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SOLUBILITY DATA SERIES

Volume 5/6

HYDROGEN AND DEUTERIUM

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Volume 5/6

HYDROGEN AND DEUTERIUM



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FOREWORD

If the knowledge is undigested or simply wrong, more is not better.

How to communicate and disseminate numerical data effectively in chemical science and technology has been a problem of serious and growing concern to IUPAC, the International Union of Pure and Applied Chemistry, for the last two decades. The steadily expanding volume of numerical information, the formulation of new interdisciplinary areas in which chemistry is a partner, and the links between these and existing traditional subdisciplines in chemistry, along with an increasing number of users, have been considered as urgent aspects of the information problem in general, and of the numerical data problem in particular.

Among the several numerical data projects initiated and operated by various IUPAC commissions, the *Solubility Data Project* is probably one of the most ambitious ones. It is concerned with preparing a comprehensive critical compilation of data on solubilities in all physical systems, of gases, liquids and solids. Both the basic and applied branches of almost all scientific disciplines require a knowledge of solubilities as a function of solvent, temperature and pressure. Solubility data are basic to the fundamental understanding of processes relevant to agronomy, biology, chemistry, geology and oceanography, medicine and pharmacology, and metallurgy and materials science. Knowledge of solubility is very frequently of great importance to such diverse practical applications as drug dosage and drug solubility in biological fluids, anesthesiology, corrosion by dissolution of metals, properties of glasses, ceramics, concretes and coatings, phase relations in the formation of minerals and alloys, the deposits of minerals and radioactive fission products from ocean waters, the composition of ground waters, and the requirements of oxygen and other gases in life support systems.

The widespread relevance of solubility data to many branches and disciplines of science, medicine, technology and engineering, and the difficulty of recovering solubility data from the literature, lead to the proliferation of published data in an ever increasing number of scientific and technical primary sources. The sheer volume of data has overcome the capacity of the classical secondary and tertiary services to respond effectively.

While the proportion of secondary services of the review article type is generally increasing due to the rapid growth of all forms of primary literature, the review articles become more limited in scope, more specialized. The disturbing phenomenon is that in some disciplines, certainly in chemistry, authors are reluctant to treat even those limited-inscope reviews exhaustively. There is a trend to preselect the literature, sometimes under the pretext of reducing it to manageable size. The crucial problem with such preselection - as far as numerical data are concerned - is that there is no indication as to whether the material was excluded by design or by a less than thorough literature search. We are equally concerned that most current secondary sources, critical in character as they may be, give scant attention to numerical data.

On the other hand, tertiary sources - handbooks, reference books, and other tabulated and graphical compilations - as they exist today, are comprehensive but, as a rule, uncritical. They usually attempt to cover whole disciplines, thus obviously are superficial in treatment. Since they command a wide market, we believe that their service to advancement of science is at least questionable. Additionally, the change which is taking place in the generation of new and diversified numerical data, and the rate at which this is done, is not reflected in an increased third-level service. The emergence of new tertiary literature sources does not parallel the shift that has occurred in the primary literature.

With the status of current secondary and tertiary services being as briefly stated above, the innovative approach of the *Solubility Data Project* is that its compilation and critical evaluation work involve consolidation and reprocessing services when both activities are based on intellectual and scholarly reworking of information from primary sources. It comprises compact compilation, rationalization and simplification, and the fitting of isolated numerical data into a critically evaluated general framework.

The Solubility Data Project has developed a mechanism which involves a number of innovations in exploiting the literature fully, and which contains new elements of a more imaginative approach for transfer of reliable information from primary to secondary/tertiary sources. The fundamental trend of the Solubility Data Project is toward integration of secondary and tertiary services with the objective of producing in-depth critical analysis and evaluation which are characteristic to secondary services, in a scope as broad as conventional tertiary services.

Fundamental to the philosophy of the project is the recognition that the basic element of strength is the active participation of career scientists in it. Consolidating primary data, producing a truly criticallyevaluated set of numerical data, and synthesizing data in a meaningful relationship are demands considered worthy of the efforts of top scientists. Career scientists, who themselves contribute to science by their involvement in active scientific research, are the backbone of the project. The scholarly work is commissioned to recognized authorities, involving a process of careful selection in the best tradition of IUPAC. This selection in turn is the key to the quality of the output. These top experts are expected to view their specific topics dispassionately, paying equal attention to their own contributions and to those of their peers. They digest literature data into a coherent story by weeding out what is wrong from what is believed to be right. To fulfill this task, the evaluator must cover all relevant open literature. No reference is excluded by design and every effort is made to detect every bit of relevant primary source. Poor quality or wrong data are mentioned and explicitly disqualified as such. In fact, it is only In fact, it is only when the reliable data are presented alongside the unreliable data that proper justice can be done. The user is bound to have incomparably more confidence in a sufficient evaluative commentary and a comprehensive review with a complete bibliography to both good and poor data.

It is the standard practice that any given solute-solvent system consists of two essential parts: I. Critical Evaluation and Recommended Values, and II. Compiled Data Sheets.

The Critical Evaluation part gives the following information: (i) a verbal text of evaluation which discusses the numerical solubility information appearing in the primary sources located in the literature. The evaluation text concerns primarily the quality of data after considerat-ion of the purity of the materials and their characterization, the experimental method employed and the uncertainties in control of physical parameters, the reproducibility of the data, the agreement of the worker's results on accepted test systems with standard values, and finally, the

fitting of data, with suitable statistical tests, to mathematical functions; (ii) a set of recommended numerical data. Whenever possible, the set of recommended data includes weighted average and standard deviations, and a set of smoothing equations derived from the experimental data endorsed by the evaluator;

(iii) a graphical plot of recommended data.

The compilation part consists of data sheets of the best experimental data in the primary literature. Generally speaking, such independent data sheets are given only to the best and endorsed data covering the known range of experimental parameters. Data sheets based on primary sources where the data are of a lower precision are given only when no better data are available. Experimental data with a precision poorer than considered acceptable are reproduced in the form of data sheets when they are the only known data for a particular system. Such data are considered to be still suitable for some applications, and their presence in the compilation should alert researchers to areas that need more work.

The typical data sheet carries the following information: (i) components - definition of the system - their names, formulas and Chemical Abstracts registry numbers;

(ii) reference to the primary source where the numerical information is reported. In cases when the primary source is a less common periodical or a report document, published though of limited availability, abstract references are also given;

(iii) experimental variables;

(iv) identification of the compiler;

(v) experimental values as they appear in the primary source. Whenever available, the data may be given both in tabular and graphical form. If auxiliary information is available, the experimental data are converted also to SI units by the compiler.

Under the general heading of Auxiliary Information, the essential experimental details are summarized:

(vi) experimental method used for the generation of data;

(vii) type of apparatus and procedure employed; (viii) source and purity of materials;

(ix) estimated error;

(x) references relevant to the generation of experimental data as cited in the primary source.

This new approach to numerical data presentation, developed during our four years of existence, has been strongly influenced by the diversity of background of those whom we are supposed to serve. We thus deemed it right to preface the evaluation/compilation sheets in each volume with a detailed discussion of the principles of the accurate determination of relevant solubility data and related thermodynamic information.

Finally, the role of education is more than corollary to the efforts we are seeking. The scientific standards advocated here are necessary to strengthen science and technology, and should be regarded as a major effort in the training and formation of the next generation of scientists and engineers. Specifically, we believe that there is going to be an impact of our project on scientific-communication practices. The quality of consolidation adopted by this program offers down-to-earth guidelines, concrete examples which are bound to make primary publication services more responsive than ever before to the needs of users. The self-regulatory message to scientists of 15 years ago to refrain from unnecessary publication has not achieved much. The literature is still, in 1980, cluttered with poor-quality articles. The Weinberg report (in "Reader in Science Information", Eds. J. Sherrod and A. Hodina, Microcard Editions Books, Indian Head, Inc., 1973, p.292) states that "admonition to authors to restrain themselves from premature, unnecessary publication can have little effect unless the climate of the entire technical and scholarly community encourages restraint...". We think that projects of this kind translate the climate into operational terms by exerting pressure on authors to avoid submitting low-grade material. The type of our output, we hope, will encourage attention to quality as authors will increasingly realize that their work will not be suited for permanent retrievability unless it meets the standards adopted in this It should help to dispel confusion in the minds of many authors of project. what represents a permanently useful bit of information of an archival value, and what does not.

If we succeed in that aim, even partially, we have then done our share in protecting the scientific community from unwanted and irrelevant, wrong numerical information.

A. S. Kertes

PREFACE

The users of this volume will find (1) the experimental solubility data of hydrogen, hydrogen deuteride and deuterium gas in liquids as reported in the scientific literature (2) evaluations and tables of tentative or recommended solubility data when two or more laboratories have reported consistent solubility data over the same range of temperature and pressure for a system. (3) general evaluations of groups of related systems when more detailed comments on individual systems are not possible. In some instances users have the option of using the experimental values, either directly, or in their own smoothing equations, or of using the smoothed values prepared by the compilers and evaluators.

A fairly liberal interpretation of the terms, "gas", "liquid" and "solubility" has been taken. In particular virtually all two phase equilibria have been considered as "solubility" when one component is hydrogen even at high pressures. The "gas" being the less dense phase and the "liquid" being the more dense phase. The two phase equilibria between isotopes of hydrogen has been excluded. The helium and hydrogen mixtures are considered in the volume on helium.

The literature has been, in general, covered up until the end of 1979 although some papers published during 1979 in journals not readily available may have been omitted. Some 1980 papers are cited.

Some words of explanation are required with respect to units, smoothing equations, auxiliary data and data sources, and other points. In general the experimental data are presented in the units found in the original paper. In addition, the original data are often converted to other units.

Only in the past 15 years have experimental methods for the determination of the solubility of gases in liquids developed to the point where 0.5 per cent or better accuracy is attained. For hydrogen the corrections for non-ideal behaviour and for expansion of the liquid phase on dissolution of the gas are small for pressures below 200 kPa and well within the normal experimental error. Thus such corrections were not made for the gas solubility of hydrogen at low pressures.

Most gas solubility measurements carried out near armospheric conditions are measured at a total pressure near one atmosphere with the gas saturated with the solvent vapor. Usually the actual partial pressure of the gas is not known. In most cases the Ostwald coefficient is the directly measured coefficient. The Bunsen coefficient and the mole fraction gas solubility at one atmosphere gas partial pressure are calculated from the Ostwald coefficient assuming the Ostwald coefficient is independent of pressure. The assumption may not be true, especially if the gas is at a partial pressure well below atmospheric, if the solvent has a high vapor pressure or if the gas is soluble enough to change the solvent properties measureably from their pure liquid properties. This problem, which becomes important for more soluble gases, is one which evaluators will need to pay more attention to as the precision of solubility measurements increases in the future. The Bunsen coefficients and mole fraction solubility values calculated from Ostwald coefficients in this volume need to be used with the above caution in mind.

The lack of high accuracy is also the reason that only a two-constant equation is used to smooth and evaluate most of the gas solubility data. A Gibbs energy of solution equation linear in temperature is used

$$\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln x_1 = A + BT$$

or in alternative form

$\ln x_1 = -\Delta G^O / RT = -A / RT - B / R$

where A is ΔH^{O} , B is $-\Delta S^{O}$, x_{1} is the mole fraction solubility at a gas partial pressure of 101.325 kPa (1 atm) and R is 8.31441 J K⁻¹ mol⁻¹. The constants A and B require five digits to reproduce the mole fraction solubility to three significant figures. Although the constants are given to five digits it is not intended to imply that the values of the changes in enthalpy and entropy of solution are significant to more than two or three digits. An inconsistency, which we believe is justified, is found with respect to the solubility data in water. A recommended equation and table of values is given for the solubility of hydrogen in water. However, for systems which contain water and other solvent compounds such as electrolytes or water miscible polar organic compounds, the experimental gas solubility in water from the paper is given, even when it is at variance with the recommended values. These data are presented because the author's ratio of gas solubility in water to the solubility in the aqueous solution may be more accurate than the solubility itself.

Solvent density data were often required in making conversions from Ostwald coefficients to mole fraction solubilities. Where the density data were not referenced, as in other volumes in this series, the main sources of density data were:

> Circular 461 of the U.S. National Bureau of Standards American Petroleum Research Project 44 Publications The International Critical Tables, Volume III (E.W. Washburn, Editor) McGraw-Hill Co., 1931
> Smow Table, Pure and Applied Chemistry, 1976, 45, 1-9.
> Thermodynamic Properties of Aliphatic Alcohols, R.C. Wilhoit and B.J. Zwolinski, J. Phys. Chem. Ref. Data, 1972, 2, Supplement No.1.
> Organic Solvents, J.A. Riddick and W.B. Bunger, Technique of Chemistry, Volume II, A. Weissberger, Editor, Wiley-Interscience, New York, 1970, 3rd Edn.

Chemical Abstracts recommended names and registry numbers were used throughout. Common names are cross referenced to Chemical Abstracts recommended names in the Index. There is a registry number index.

The Editor would appreciate users calling errors and omissions to his attention.

The Editor gratefully acknowledges the advice and comments of members of the IUPAC Commission on Solubility Data, the help and hard work of Professor Larry Clever and the efforts of the typist, Carolyn Dowie, Lesley Flanagan, Peggy Tyler and Joy Wall. The help of Kerri Hubbard in obtaining copies of papers not available in Melbourne was appreciated.

Acknowledgement is made to the University of Melbourne for a Travel Grant for Research which considerably aided the completion of this volume.

Colin L. Young

Melbourne, Victoria

THE SOLUBILITY OF GASES IN LIQUIDS

R. Battino, H. L. Clever and C. L. Young

INTRODUCTION

The Solubility Data Project aims to make a comprehensive search of the literature for data on the solubility of gases, liquids and solids in liquids. Data of suitable accuracy are compiled into data sheets set out in a uniform format. The data for each system are evaluated and where data of sufficient accuracy are available values recommended and in some cases a smoothing equation suggested to represent the variation of solubility with pressure and/or temperature. A text giving an evaluation and recommended values and the compiled data sheets are published on consecutive pages.

DEFINITION OF GAS SOLUBILITY

The distinction between vapor-liquid equilibria and the solubility of gases in liquids is arbitrary. It is generally accepted that the equilibrium set up at 300K between a typical gas such as argon and a liquid such as water is gas liquid solubility whereas the equilibrium set up between hexane and cyclohexane at 350K is an example of vapor-liquid equilibrium. However, the distinction between gas-liquid solubility and vapor-liquid equilibrium is often not so clear. The equilibria set up between methane and propane above the critical temperature of methane and below the critical temperature of propane may be classed as vapor-liquid equilibrium or as gas-liquid solubility depending on the particular range of pressure considered and the particular worker concerned.

The difficulty partly stems from our inability to rigorously distinguish between a gas, a vapor, and a liquid, which has been discussed in numerous textbooks. We have taken a fairly liberal view in these volumes and have included systems which may be regarded, by some workers, as vapor-licuid equilibria.

UNITS AND QUANTITIES

The solubility of gases in liquids is of interest to a wide range of scientific and technological disciplines and not solely to chemistry. Therefore a variety of ways for reporting gas solubility have been used in the primary literature and inevitably sometimes, because of insufficient available information, it has been necessary to use several quantities in the compiled tables. Where possible, the gas solubility has been quoted as a mole fraction of the gaseous component in the liquid phase. The units of pressure used are bar, pascal, millimeters of mercury and atmosphere. Temperatures are reported in Kelvin.

EVALUATION AND COMPILATION

The solubility of comparatively few systems is known with sufficient accuracy to enable a set of recommended values to be presented. This is true both of the measurement near atmospheric pressure and at high pressures. Although a considerable number of systems have been studied by at least two workers, the range of pressures and/or temperatures is often sufficiently different to make meaningful comparison impossible.

Occasionally, it is not clear why two groups of workers obtained very different sets of results at the same temperature and pressure, although both sets of results were obtained by reliable methods and are internally consistent. In such cases, sometimes an incorrect assessment has been given. There are several examples where two or more sets of data have been classified as tentative although the sets are mutually inconsistent.

Many high pressure solubility data have been published in a smoothed form. Such data are particularly difficult to evaluate, and unless specifically discussed by the authors, the estimated error on such values can only be regarded as an "informed guess". Many of the high pressure solubility data have been obtained in a more general study of high pressure vapor-liquid equilibrium. In such cases a note is included to indicate that additional vapor-liquid equilibrium data are given in the source. Since the evaluation is for the compiled data, it is possible that the solubility data are given a classification which is better than that which would be given for the complete vapor-liquid data (or vice versa). For example, it is difficult to determine coexisting liquid and vapor compositions near the critical point of a mixture using some widely used experimental techniques which yield accurate high pressure solubility data. For example, conventional methods of analysis may give results with an expected error which would be regarded as sufficiently small for vapor-liquid equilibrium data but an order of magnitude too large for acceptable high pressure gas-liquid solubility.

It is occasionally possible to evaluate data on mixtures of a given substance with a member of a homologous series by considering all the available data for the given substance with other members of the homologous series. In this study the use of such a technique has been very limited.

The estimated error is often omitted in the original article and sometimes the errors quoted do not cover all the variables. In order to increase the usefulness of the compiled tables estimated errors have been included even when absent from the original article. If the error on *any* variable has been inserted by the compiler this has been noted.

PURITY OF MATERIALS

The purity of materials has been guoted in the compiled tables where given in the original publication. The solubility is usually more sensitive to impurities in the gaseous component than to liquid impurities in the liquid component. However, the most important impurities are traces of a gas dissolved in the liquid. Inadequate degassing of the absorbing liquid is probably the most often overlooked serious source of error in gas solubility measurements.

APPARATUS AND PROCEDURES

In the compiled tables brief mention is made of the apparatus and procedure. There are several reviews on experimental methods of determining gas solubilities and these are given in References 1-7.

METHODS OF EXPRESSING GAS SOLUBILITIES

Because gas solubilities are important for many different scientific and engineering problems, they have been expressed in a great many ways:

The Mole Fraction, x(g)

The mole fraction solubility for a binary system is given by:

$$x(g) = \frac{n(g)}{n(g) + n(1)}$$
$$= \frac{W(g)/M(g)}{[W(g)/M(g)] + [W(1)/M(1)]}$$

here n is the number of moles of a substance (an *amount* of substance), W is the mass of a substance, and M is the molecular mass. To be unambiguous, the partial pressure of the gas (or the total pressure) and the temperature of measurement must be specified.

The Weight Per Cent Solubility, wt%

For a binary system this is given by

wt = 100 W(g) / [W(g) + W(1)]

where W is the weight of substance. As in the case of mole fraction, the pressure (partial or total) and the temperature must be specified. The weight per cent solubility is related to the mole fraction solubility by

$$x(g) = \frac{[wt%/M(g)]}{[wt%/M(g)] + [(100 - wt%)/M(1)]}$$

The Weight Solubility, C

The weight solubility is the number of moles of dissolved gas per gram of solvent when the partial pressure of gas is 1 atmosphere. The weight solubility is related to the mole fraction solubility at one atmosphere partial pressure by

$$x$$
(g) (partial pressure 1 atm) = $\frac{C_w^{W(1)}}{1 + C_w^{M(1)}}$

where M(1) is the molecular weight of the solvent.

The Moles Per Unit Volume Solubility, n

Often for multicomponent systems the density of the liquid mixture is not known and the solubility is guoted as moles of gas per unit volume of liquid mixture. This is related to the mole fraction solubility by

$$x = \frac{n v^{0}(1)}{1 + n v^{0}(1)}$$

where $v^{O}(1)$ is the molar volume of the liquid component.

The Bunsen Coefficient, a

The Bunsen coefficient is defined as the volume of gas reduced to 273.15K and 1 atmosphere pressure which is absorbed by unit volume of solvent (at the temperature of measurement) under a partial pressure of 1 atmosphere. If ideal gas behavior and Henry's law is assumed to be obeyed,

$$\alpha = \frac{V(g)}{V(1)} \frac{273.15}{T}$$

where V(g) is the volume of gas absorbed and V(1) is the original (starting) volume of absorbing solvent. The mole fraction solubility x is related to the Bunsen coefficient by

 $x(l atm) = \frac{\alpha}{\alpha + \frac{273.15}{T} \frac{v^{\circ}(g)}{v^{\circ}(l)}}$

where $v^{O}(g)$ and $v^{O}(1)$ are the molar volumes of gas and solvent at a pressure of one atmosphere. If the gas is ideal,

$$x = \frac{\alpha}{\alpha + \frac{273.15R}{v^{\circ}(1)}}$$

Real gases do not follow the ideal gas law and it is important to establish the real gas law used for calculating α in the original publication and to make the necessary adjustments when calculating the mole fraction solubility.

The Kuenen Coefficient, S

This is the volume of gas, reduced to 273.15K and 1 atmosphere pressure, dissolved at a partial pressure of gas of 1 atmosphere by 1 gram of solvent.

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The Ostwald Coefficient, L

The Ostwald coefficient, L, is defined at the ratio of the volume of gas absorbed to the volume of the absorbing liquid, all measured at the same temperature:

 $L = \frac{V(g)}{V(1)}$

If the gas is ideal and Henry's Law is applicable, the Ostwald coefficient is independent of the partial pressure of the gas. It is necessary, in practice, to state the temperature and total pressure for which the Ostwald coefficient is measured. The mole fraction solubility, x, is related to the Ostwald coefficient by

$$x = \left[\frac{\mathrm{RT}}{\mathrm{P}(\mathrm{g}) \mathrm{L} \mathrm{v}^{\mathrm{O}}(1)} + 1\right]^{-1}$$

where P is the partial pressure of gas. The mole fraction solubility will be at a partial pressure of P(g).

The Absorption Coefficient, B

There are several "absorption coefficients", the most commonly used one being defined as the volume of gas, reduced to 273.15K and 1 atmosphere, absorbed per unit volume of liquid when the total pressure is 1 atmosphere. β is related to the Bunsen coefficient by

 $\beta = \alpha (1-P(1))$

where P(1) is the partial pressure of the liquid in atmosphere.

The Henry's Law Contant

A generally used formulation of Henry's Law may be expressed as

 $P(g) = K_{H}x$

where $K_{\rm H}$ is the Henry's Law constant and x the mole fraction solubility. Other formulations are

 $P(g) = K_2C(1)$

or

 $C(g) = K_C(1)$

where K₂ and K_c are constants, C the concentration, and (1) and (g) refer to the liquid and gas phases. Unfortunately, K_H, K₂ and K_c are all sometimes referred to as Henry's Law constants. Henry's Law is a limiting law but can sometimes be used for converting solubility data from the experimental pressure to a partial gas pressure of 1 atmosphere, provided the mole fraction of the gas in the liquid is small, and that the difference in pressures is small. Great caution must be exercised in using Henry's Law.

The Mole Ratio, N

The mole ratio, N, is defined by

N = n(g)/n(1)

Table 1 contains a presentation of the most commonly used inter-conversions not already discussed.

For gas solubilities greater than about 0.01 mole fraction at a partial pressure of 1 atmosphere there are several additional factors which must be taken into account to unambiguously report gas solubilities. Solution densities or the partial molar volume of gases must be known. Corrections should be made for the possible non-ideality of the gas or the non-applicability of Henry's Law.

TABLE 1 Interconversion of parameters used for reporting solubility

$$L = \alpha (T/273.15)$$

$$C_{w} = \alpha / v_{o} \rho$$

$$K_{H} = \frac{17.033 \times 10^{6} \rho (\text{soln})}{\alpha M(1)} + 760$$

$$L = C_{w} v_{t,gas} \rho$$

where v is the molal volume of the gas in cm³mol⁻¹ at 0°C, ρ the density of the solvent at the temperature of the measurement, ρ (soln)the density of the solution at the temperature of the measurement, and v_t gas the molal volume of the gas (cm³mol⁻¹) at the temperature of the measurement.

SALT EFFECTS

The effect of a dissolved salt in the solvent on the solubility of a gas is often studied. The activity coefficient of a dissolved gas is a function of the concentration of all solute species (see ref. 8). At a given temperature and pressure the logarithm of the dissolved gas activity coefficient can be represented by a power series in C_s, the electrolyte concentration, and C_i, the nonelectrolyte solute gas concentration

$$\log f_{i} = \sum_{m,n} k_{mn} C_{s}^{n} C_{i}^{m}$$

It is usually assumed that only the linear terms are important for low C and C, values when there is negligible chemical interaction between solute species.

$$\log f_i = k_s C_s + k_i C_i$$

where k is the salt effect parameter and k, is the solute-solute gas interaction parameter. The dissolved gas activity is the same in the pure solvent and a salt solution in that solvent for a given partial pressure and temperature

$$a_i = f_i S_i = f_i^{\circ} S_i^{\circ}$$
 and $f_i = f_i^{\circ} \frac{S_i^{\circ}}{S_i}$

where S_i and S_i^O are the gas solubility in the salt solution and in the pure solvent, respectively, and the f's are the corresponding activity coefficients. If follows that log $f_i/f_o = \log S_i^O/S_i = k_s C_s + k_i (S_i - S_i^O)$. When the

quantity (S; - S, $^{\rm O}$) is small the second term is negligible even though k and k, may be of similar magnitude. This is generally the case for gas solubilities and the equation reduces to

$$\log \frac{f_i}{f_i^o} = \log \frac{s_i^o}{s_i} = k_s C_s$$

which is the form of the empirical Setschenow equation in use since the 1880's. A salt that increases the activity coefficient of the dissolved gas is said to salt-out and a salt that decreases the activity coefficient of the dissolved gas is said to salt-in.

Although salt effect studies have been carried out for many years, there appears to be no common agreement of the units for either the gas solubility or the salt concentration. Both molar (mol dm⁻) and molal (mol kg⁻) are used for the salt concentration. The gas solubility ratio S_i / S_i is given as Bunsen coefficient ratio and Ostwald coefficient ratio,

which would be the same as a molar ratio; Kueunen coefficient ratio, volume dissolved in 1 g or 1 kg of solvent which would be a molal ratio; and mole fraction ratio. Recent theoretical treatments use salt concentration in mol dm⁻³ and S_i $^{0}/S_{i}$ ratio as mole fraction ratio with each salt ion acting as a mole. Evaluations which compare the results of several workers are made in the units most compatible with present theory. TEMPERATURE DEPENDENCE OF GAS SOLUBILITY In a few cases it has been found possible to fit the mole fraction solubility at various temperatures using an equation of the form. $\ln x = A + B / (T/100K) + C \ln (T/100K) + DT/100K$ It is then possible to write the thermodynamic functions $\Delta \overline{G}_1^0, \Delta \overline{H}_1^0, \Delta \overline{S}_1^0$ and $\Delta \overline{C}_{p_1}^0$ for the transfer of the gas from the vapor phase at 101.325 Pa partial pressure to the (hypothetical) solution phase of unit mole fraction as: $\Delta \overline{G}_1^0 = -RAT - 100 RB - RCT \ln (T/100)$ $\Delta \overline{S}_{1}^{0} = RA + RC \ln (T/100) + RC$ $\Delta \overline{H}_{1}^{0} = -100 \text{ RB} + \text{RCT}$ $\Delta \overline{C}^{0}_{p_{1}} =$ RC In cases where there are solubilities at only a few temperatures it is convenient to use the simpler equations. $\Delta \overline{G}_{1}^{0} = - RT \ln x = A + BT$ in which case $A = \Delta \overline{H}_{1}^{0}$ and $-B = \Delta \overline{S}_{1}^{0}$. REFERENCES Battino, R.; Clever, H.L. Chem. Rev. 1966, 66, 395. 1. Clever, H.L.; Battino, R. in Solutions and Solubilities, Ed. M.R.J. 2. Dack, J. Wiley & Sons, New York, 1975, Chapter 7. Hildebrand, J.H.; Prausnitz, J.M.; Scott, R.L. Regular and Related Solutions, Van Nostrand Reinhold, New York, 1970, Chapter 8. 3. Markham, A.E.; Kobe, K.A. Chem. Rev. 1941, 63, 449. Wilhelm, E.; Battino, R. Chem. Rev. 1973, 73, 1. 4. 5. Wilhelm, E.; Battino, R.; Wilcock, R.J. Chem. Rev. 1977, 77, 219. Kertes, A.S.; Levy, O.; Markovits, G.Y. in Experimental Thermochemistry Vol. II, Ed. B. Vodar and B. LeNaindre, Butterworth, London, 1974, Chapter 15. 6. 7. 8. Long, F.A.; McDevit, W.F. Chem. Rev. 1952, 51, 119.

Water

COMPONENTS:	EVALUATOR:
(l) Hydrogen; H ₂ ; [1333-74-0] (2) Water; H ₂ O; [7732-18-5]	Rubin Battino and Emmerich Wilhelm Department of Chemistry Wright State University Dayton, OH 45435 USA July 1977, revised May 1980
CRITICAL THAT	

CRITICAL EVALUATION:

The solubility of hydrogen in water has been studied by many workers. We found the experimental work of ten to be of sufficient reliability to use in the smoothing equation. In the process of fitting the data to the smoothing equation any data points which differed from the smooth equation by about two standard deviations or more were rejected. The 75 points used for the final smoothing were obtained as follows (reference number - number of data points taken from that reference): 1-11; 2-2; 3-1; 4-3; 5-5; 6-2; 7-3; 8-1; 9-41; 10-6. The fitting equation used was

 $\ln x_1 = A + B/(T/100K) + C \ln (T/100K) + D(T/100K) + E(T/100K)^2$ (1) Using T/100K as the variable rather than T/K gives coefficients of approximately equal magnitude. The best fit for the 75 data points was

 $\ln x_{1} = -48.1611 + 55.2845/(T/100K) + 16.8893\ln (T/100K)$ (2)

where x_1 is the mole fraction solubility at 101.325 Pa partial pressure of gas. The fit in $\ln x_1$ gave a standard deviation of 0.52% taken at the middle of the temperature range. Table 1 gives smoothed values of the mole fraction solubility and the Ostwald coefficient at 5K intervals.

Table 1 also gives the thermodynamic functions $\Delta \overline{G}_{1}^{\circ}$, $\Delta \overline{H}_{1}^{\circ}$, $\Delta \overline{S}_{1}^{\circ}$, and $\Delta \overline{C}_{p_{1}}^{\circ}$ for the transfer of gas from the vapor phase at 101.325 Pa partial gas pressure to the (hypothetical) solution phase of unit mole fraction. These thermodynamic properties were calculated from the smoothing equation according to the following equations with R = 8.3144 J K⁻¹ mol⁻¹: $\Delta \overline{G}_{1}^{\circ}/RT = -\ln x_{1}$ (3)

 $\Delta \overline{H}_{1}^{\circ}/RT = -B(100K/T) + C + D(T/100K) + 2E (T/100K)^{2}$ (4) $\Delta \overline{S}_{1}^{\circ}/R = A + C(1n (T/100K) + 1) + 2D(T/100K) + 3E(T/100K)^{2}$ (5) $\Delta \overline{C}_{p_{1}}^{\circ}/R = C + 2D(T/100K) + 6E(T/100K)^{2}$ (6)

The experimental work of ten other workers was not compiled or used for the smoothing equation for a variety of reasons. Müller's two data points (11) were about 2% high. Symons (12) measured solubility by gas chromatography and his duplicate values at 25°C were 3% high. Braun's measurements (13) were 12% high at his lower temperatures and came down to reasonable values at 25°C. Bunsen's measurements (14) were erratically high and low indicating a poor precision. Christoff's single value (15) was 7% high; and Drucker's single value (16) was 2% high. Findlay's measurement at 25°C was 3% high (17): Just's two measurements (18) were 3-4% high. Knopp's (19) single value at 20°C was 4% high. Milligan's (20) single value at 25°C was about 3% low. Gereche and Bittrich's (21) value at 25°C is 1% high. A data sheet is included.

The curve obtained from the smoothing equation shows a distinct minimum at 327 K.

			Departmen	tino and Emmer t of Chemistry ate University DH 45435 US	
			July 1977	, revised May	1980
CDITICAL					
CRITICAL EVALUATION: Table 1. Recommended values of th functions ^{1,2} at 5K inte a hydrogen partial press Calculations based on ec			K intervals fo pressure of 1	r hydrogen in .01.325 kPa (1	water at
T/K	Mol Fraction $x_1 \times 10^5$	Ostwald Coefficient A L x 10 ²	∆G̃i ^b ∕k J mol ⁻¹	$\Delta \overline{H}_1^o/k \ J \ mol^{-1}$	∆\$°1/J K ⁻¹ mol ⁻¹
273.15	1.755	2.184	24.87	-7.61	-118.9
278.15	1.657	2.010	25.46	-6.91	-116.4
283,15	1.576	2.032	26.03	-6.20	-113.8
288.15	1.510	1.980	26.60	-5.50	-111.4
293.15	1.455	1.940	27.15	-4.80	-109.0
298.15	1.411	1.911	27.69	-4.10	-106.6
303.15	1.377	1.893	28.21	-3.40	-104.3
308.15	1.350	1.883	28.73	-2.69	-102.0
313.15	1.330	1.883	29.23	-1.99	-99.7
318.15	1.317	1.890	29.73	-1.290	-97.5
323.15	1.310	1.905	30.21	-0.588	-95.3
328.15	1.308	1.927	30.68	+0.114	-93.1
333.15	1.312	1.957	31.14	0.816	-91.0
338.15	1.320	1.993	31.59	1.518	-88.9
343.15	1.333	2.037	32.03	2.22	-86.9
348.15	1.350	2.087	32.46	2.92	-84.8
353.15	1.371	2.144	32.88	3.62	-82.8
1. The heat capacity change, $\Delta C_{p_1}^{\circ}$, is independent of temperature and has a value of 140.4 J K ⁻¹ mol ⁻¹ .					
2. cal _{th} = 4.184 Joules					

COMPONENT	5:	EVALUATOR:	
(l) Hydi	cogen; H ₂ ; [1333-74-0]	Rubin Battino and Emmerich Wilhelm Department of Chemistry	
(2) Wate	er; H ₂ O; [7732-18-5]	Wright State University Dayton, OH 45435 USA	
		July 1977, revised May 1980	
CRITICAL	EVALUATION:		
Referenc	ces		
l. Moi	crison, T. J.; Billett, F. J.	Chem. Soc. <u>1952</u> , 3819.	
2. Gei	fcken, G. Z. Physik. Chem. <u>19</u>	<u>904</u> , <i>49</i> , 257.	
3. Hüi	Ener, G. Z. Physik. Chem. <u>190</u>	<u>7</u> , <i>57</i> , 611.	
4. Tir	nofejew, W. Z. Physik. Chem.	1890, 6, 141.	
5. Wir	nkler, L. W. Ber. <u>1891</u> , 24, 89	9.	
	Net, W. J. J. S. Afr. Chem. In		
7. Rue	etschi, P.; Amlie, R. F. J. Pi	hys. Chem. <u>1966</u> , 70, 718.	
8. Sho	. Shoor, S. K.; Walker, R. D.; Gubbins, K. E. J. Phys. Chem. 1969,		
[· · · · ·	73, 312.		
1	,,,,,		
	. Gordon, L. I.; Cohen, Y.; Standley, D. R. <i>Deep-Sea Res</i> . <u>1977</u> , 24, 937.		
11. Mül	Müller, C. Z. <i>Physik. Chem.</i> <u>1912</u> , <i>81</i> , 483.		
12. Syr	Symons, E. A. Can. J. Chem. <u>1971</u> , 49, 3940.		
13. Bra	Braun, L. Z. Physik. Chem. <u>1900</u> , 33, 721.		
14. Bur	Bunsen, R. Ann. <u>1855</u> , 93, 1.		
15. Chi	istoff, A. Z. Physik. Chem.	1906, 55, 622.	
16. Dru	Drucker, K.; Moles, E. Z. Physik. Chem. 1910, 75, 405.		
17. Fir	Findlay, A.; Shen, B. J. Chem. Soc. 1912, 101, 1459.		
18. Jus			
19. Kno	pp, W. Z. Physik. Chem. 1904	, 48, 97.	
20. Mil	ligan, L. H. J. Phys. Chem.	1924, 28, 494.	
21. Ger	ecke, J.; Bittrich, H. J. Wis	ss. Zeitschrift (Leuna-Merseburg)	
<u>197</u>	<u>1, 13, 115.</u>	•	

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]		Timofejew, W.		
E.		7 Thurstly Thom 1800 6 141,152		
(2) Water; H ₂ O; [77	52-18-51	Z. Physik. Chem. <u>1890</u> , 6, 141-152.		
VARIABLES:				
	- 298.85	PREPARED BY:		
H ₂ P/kPa: 101.32	5 (1 atm)	R. Battino		
EXPERIMENTAL VALUES:				
	T/K Mol Frac	tion Bunsen		
	x _l × 1	0 ⁵ Coefficient		
		$\frac{\alpha \times 10^2}{\alpha \times 10^2}$		
	274.55 1.712 281.50 1.611			
	281.50 1.611 286.15 1.542			
	291.60 1.500			
	298.85 1.434	1.7789		
The Bunsen coefficie	ents are average v	alues of several measurements.		
{	-			
The mole fraction so	olubility values w	ere calculated by the compiler.		
¹ Mole fraction va	lues which were us	sed in the final smoothing equation uation given in the critical evaluation.		
	aca solubility eq	action given in the critical evaluation.		
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDU An absorption vessel	of 110 cm^3 or	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. No comment by author.		
300 cm^3 is used for				
The volume of gas al	sorbed is mea-	(2) Water. No comment by author.		
sured on a gas buret the solubility of hy				
alcohol (ethanol).	diogen in			
		ESTIMATED ERROR:		
ļ		REFERENCES:		
1		1		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Winkler, L. W.		
(2) Water; H ₂ O; [7732-18-5]	<i>Ber</i> . <u>1891</u> , 24, 89-101.		
_			
VARIABLES:	PREPARED BY:		
T/K: 273.65 - 323.15 H ₂ P/kPa: 101.325 (1 atm)	R. Battino		
EXPERIMENTAL VALUES:	L		
T/K Bunsen Coefficient α x 10 ²	T/K Bunsen Coefficient α x 10 ²		
273.65 2.141 273.73 2.134 273.77 2.132 283.22 1.956 283.00 1.961 283.15 1.948 293.15 1.828 293.15 1.815 303.16 1.692 303.15 1.696 303.15 1.712 303.15 1.714	303.15 1.706 313.11 1.649 313.04 1.639 313.03 1.636 313.15 1.644 313.15 1.645 313.15 1.648 323.17 1.603 323.00 1.609 323.13 1.609 323.25 1.616 323.18 1.607 323.05 1.606		
T/K Mol Frac			
<i>x</i> ₁ ×	$\frac{10^5}{\alpha \times 10^2}$		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	4 2.131		
293.16 1.46	51 1.819		
303.15 1.37 313.11 1.33			
323.13 1.30			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Gas is introduced over degassed water in an absorption vessel in a thermo-	(1) Hydrogen. Made from zinc and dilute sulfuric acid.		
stat. The volume of gas absorbed is measured on a thermostated gas buret.	(2) Water, Distilled.		
¹ Mole fraction solubility values which were used to obtain thefinal smoothing equation given in the critical evaluation.	ESTIMATED ERROR:		
	REFERENCES:		

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Geffcken, G.
(2) Water; H ₂ O; [7732-18-5]	Z. Physik. Chem. <u>1904</u> , 49, 257-302.
2	
VARIABLES:	PREPARED BY:
T/K: 288.15 - 298.15 H ₂ P/kPa: 101.325 (1 atm)	R. Battino
	Dstwald
	efficient L x 10 ²
288.15	1.973
288.15 288.15	1.979 1.992
288.15 298.15	1.984
298.15 298.15	1.911 1.932
298.15	1.936
298.15 298.15	1.922 1.921
298.15	1.924
Average values calculated by the comp	iler.
T/K Mol Frac	
<i>x</i> ₁ × 1	$\frac{1 \times 10^2}{100}$
288.15 1.51 298.15 1.42	1 1.982
1.42	21 1.926
¹ Mole fraction values which were use	d to obtain the recommended
smoothing equation which was given i	n the critical evaluation.
	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Amount of gas dissolved is determined in a thermostated gas buret system.	
Details given in original paper. Solubilities also determined in	(2) Water. No comment by author.
aqueous solutions of acetic acid, monochloracetic acid, nitric acid,	
hydrochloric acid, sulfuric acid,	
sodium hydroxide, and potassium hydroxide.	
	ESTIMATED ERROR:
	REFERENCES :
1	

Wa	iter
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COMPONENTS:			OPTOT		
	22 74 01			NAL MEASUREMENTS	:
(1) Hydrogen; H ₂ ; [1333-74-0]		Hurn	er, G.		
(2) Water; H ₂ O; [7732	-18-5]		Z. P.	hysik. Chem.	<u>1907</u> , <i>57</i> , 611-624.
VARIABLES:			PREPA	RED BY:	
т/к: 293.15 -			-	R. Bat	tino
H ₂ P/kPa: 101.325	(1 atm)				
EXPERIMENTAL VALUES:			L <u>.</u>	<u> </u>	
	/ ***				_
	T/K M	Mol Frac		Bunsen Coefficient	
		$x_1 \times 1$	05	$\alpha \times 10^2$	
	293.34			1,812	
	293.26			1.805	
	293.15			1.812	_
	293.25	1.45	7 ¹	1.810	Av.
				<u></u>	
The mole fraction val	ue was ca	alculate	d by	the compiler.	
¹ Mole fraction value					
					<u></u>
		UXILIARY		· · · · · · · · · · · · · · · · · · ·	
METHOD/APPARATUS/PROCEDURE			1	E AND PURITY OF	
Apparatus described i An absorption type us	ing gas b	ourets		Hydrogen. No	comment by author.
and an absorption fla bilities also determine	sk. Solu	1	(2)	Water. Pure.	
other solvents and so		VCIUL			
			ESTIM	ATED ERROR:	
				LILD DANOR.	
			1		
			1. H A P	RENCES: üfner, G. rchiv. F. Ana hysiologie, P 894, 5, 191.	tomie und hysiolog. Abtly.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(l) Hydrogen; H ₂ ; [1333-74-0]	Morrison, T. J.; Billett, F.
(2) Water; H ₂ O; [7732-18-5]	J. Chem. Soc. 1952, 3819-3822.
(2) water, $n_2^{(2)}$, $(7)^{(2)}$ is s	e. onem. boc. <u>1952</u> , 3019 3022.
VARIABLES:	PREPARED BY:
T/K: 285.45 - 344.85	D. Datista
H ₂ P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
······································	raction Solubility
	$\times 10^5$ cm ³ (STP) H ₂
~~1 ·	
	$\frac{1.0000 \text{ kg}^{-1} \text{ H}_2 \text{ O}}{2}$
	.5461 19.23
289.25 1 290.45 1	.505 ¹ 18.71 .492 ¹ 18.54
296.15 1	.439 ¹ 17.86
298.15 1	.427 17.70
306.35 1 318.15 1	.372 ¹ 16.98 .329 ¹ 16.37
320.45 1	.324 ¹ 16.29
	.319 ¹ 16.18 .314 ¹ 16.07
338.65 1	.323 ¹ 16.14
344.85 1	.328 ¹ 16.14
The suthers smoothing equation is	$\log S = -36.250 + 1847/(T/K)$
The authors smoothing equation is	
	+ 12.65 log ₁₀ (T/K)
The compiler calculated the mole	fraction solubility values.
	used to obtain the recommended smoothing
equation which is given in the	critical evaluation.
AUXIL	JARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Used the apparatus of Morrison and	
Billett (1) but with improvements described in the current paper in	
degassing procedure and the absor	
tion spirals. Degassed liquid is	
flowed slowly down a spiral conta ing the gas. The amount of gas	in-
absorbed is determined by using t	
liquid as its own gas buret. Vol are determined in the burets and/	
by weighing.	
	ESTIMATED ERROR:
	REFERENCES :
	1. Morrison, T. J.; Billett, F.
	J. Chem. Soc. <u>1948</u> , 2033.

COMPONENTS: (1) Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS: de Wet, W. J.
(2) Water; H ₂ O; [7732-18-5]	J. S. Afr. Chem. Inst. <u>1964</u> , 17, 9-17.
VARIABLES:	
T/K: 291.65 - 304.55 H ₂ P/kPa: 101.325 (1 atm)	PREPARED BY: R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac x ₁ x l	
291.65 1.49 298.85 1.41 304.55 1.36	1 ¹ 1.75
The mole fraction solubility values w	ere calculated by the compiler.
¹ Mole fraction values which were use equation which is given in the crit	d to obtain the recommended smoothing ical evaluation.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Degassed liquid is flowed in a thin film through a spiral containing the gas. Volumes are determined via calibrated burets. Used modification of Morrison and Billett apparatus (1). Degassing as modified by Clever, et al. (2).	 (1) Hydrogen. From commercial cylinders. Purified over activated charcoal at liquid nitrogen temperatures. Less than 0.3% impurities. (2) Water. Distilled.
	ESTIMATED ERROR:
	<pre>REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; ibid., 1952, 3819. 2. Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.</pre>

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Ruetschi, P.; Amlie, R. F.		
(2) Water; H ₂ O; [7732-18-5]			
(2) water; n_20 ; $[7732-18-5]$	J. Phys. Chem. <u>1966</u> , 70, 718-723.		
VARIABLES:	PREPARED BY:		
T/K: 303.15 H ₂ P/kPa: 101.325 (l atm)	R. Battino		
EXPERIMENTAL VALUES:			
T/K Mol Frac			
x ₁ × 1	0 ⁵ Coefficient α x 10 ²		
303.15 1.37 303.15 1.36			
303.15 1.38	1 ¹ 1.710		
303.15 1.36	7 1.693		
The mole fraction calculated by the	solubility values were compiler.		
	lues which were used to		
obtain the recomm	ended smoothing equation		
which is given in	the critical evaluation.		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
They used the apparatus of Ben-Naim and Baer (1). A calibrated dissolu-	(1) Hydrogen. Matheson Prepurified grade (99.5% min purity).		
tion vessel contains degassed water.			
Gas is introduced wet from a cali- brated gas buret system. Stirring	(2) Water. No comment by author.		
the liquid forces it up sidearms attached to the top of the flask and			
the liquid returns via a central			
tube. The amount of gas dissolved is determined via the gas burets.			
The gas burets and dissolution ves-			
sel are thermostated in a water bath. The original paper contains a diagram			
and a description of operation. The			
solubility of H ₂ was also determined	ESTIMATED ERROR:		
<u> </u>	ESTIMATED ERROR:		
in KOH and $H_2SO_4^7$ solutions at	ESTIMATED ERROR: $\delta \alpha / \alpha = 0.005$		
<u> </u>	ESTIMATED ERROR:		
in KOH and $H_2SO_4^7$ solutions at	$\delta \alpha / \alpha = 0.005$		
in KOH and $H_2SO_4^7$ solutions at	$\delta \alpha / \alpha = 0.005$ REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. <u>1963</u> , 59,		
in KOH and $H_2SO_4^7$ solutions at	$\delta \alpha / \alpha = 0.005$ REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. <u>1963</u> , 59,		
in KOH and $H_2SO_4^7$ solutions at	$\delta \alpha / \alpha = 0.005$ REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. <u>1963</u> , 59,		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Shoor, S. K.; Walker, R. D.;
-	Gubbins, K. E.
(2) Water; H ₂ O; [7732-18-5]	J. Phys. Chem. <u>1969</u> , 73, 312-317.
VARIABLES:	PREPARED BY:
T/K: 298.15 - 333.15 H ₂ P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac	
x x 10	$\frac{1}{c} \frac{2}{c \times 10^3}$
298.15 1.433 313.15 1.295	
333.15 1.305	
The mole fraction solubility values w	vere calculated by the compiler.
l Mala forstion only a which was used	to obtain the recommended smeething
¹ Mole fraction values which was used equation which is given in the crit	
	·····
• AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Solutions are saturated by bubbling.	(1) Hydrogen. Source not given.
After equilibration, samples are removed and analyzed by gas	Purity 99.9 per cent.
chromatography. Details are given by Gubbins, et al. (1).	(2) Water. Distilled from an all- glass and teflon still.
	grubb und terron berrit
	ESTIMATED ERROR:
· · ·	
	REFERENCES:
	<pre>1. Gubbins, K. E.; Carden, S. N.; Walker, R. D.</pre>
	J. Gas Chromatog. <u>1965</u> , 3, 98.
]	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Gerecke, J.; Bittrich, H. J.
(2) Water; H ₂ O; [7732-18-5]	Wiss. Zeitschrift (Leuna-Merseburg) <u>1971</u> , 13, 115–122.
	Chem. Abstr. <u>1972</u> , 76, 77239m.
VARIABLES:	PREPARED BY:
T/K: 298.15 H ₂ P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac x ₁ x 1	
298.15 1.42	7 1.77
The mole fraction solubility value wa	s calculated by the compiler.
AUXILIARY	INFORMATION '
METHOD/APPARATUS/PROCEDURE: Absorbed gas is measured in a gas buret using mercury manometers. Only written description of apparatus given. Also measured solubilities in many aqueous salt solutions.	SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. No comment by authors. (2) Water. No comment by authors.
	ESTIMATED ERROR:
	REFERENCES :

Water

•

			ORIGINAL MEASUREMENTS:		
(l) Hydrogen; H ₂ ; [1333-74-0]		Crozier, T. E.; Yamamoto, S.			
(2) Water;	H ₂ O; [7732-1	8-5]	J. Chem.	Eng. Data <u>1974</u>	, 19, 242-244
ARIABLES:			PREPARED BY:		
T/K: 274.60 - 302.47 P/kPa: 101.325 (1 atm)		R. Battino			
XPERIMENTAL V	ALUES:				
т/к м	lol Fraction ¹		т/к	Mol Fraction:	
	$x_1 \times 10^5$	Coefficient		$x_1 \times 10^5$	Coefficient
274.60	$\frac{1}{1.728}$	$\frac{\alpha \times 10^2}{2.150}$	287.85	$\frac{1}{1.505}$	$\frac{\alpha \times 10^2}{1.871}$
274.60	1.727	2.148	287.85	1.505	1.871
274.64	1.730	2.152	287.92	1.503	1.869
277.54	1.672	2.080	287.94	1.505	1.871
277.70	1.667	2.074	287.94	1.520	1.890
277.70	1.661	2.067	287.94	1.516	1.885
277.73	1.665	2.072	287.95	1.512 1.454	1.880 1.806
277.74 282.98	1.671 1.571	2.079 1.954	293.01 293.01	1.459	1.800
282.99	1.579	1.964	293.01	1.458	1.811
282.99	1.567	1.949	293.03	1.453	1.804
283.00	1.565	1.947	293.03	1.453	1.805
283.00	1.567	1.949	297.85	1.403	1.740
283.00	1.572	1.955	297.85	1.414	1.754
283.01	1.576	1.960 1.957	297.88	1.408 1.403	1.747 1.741
283.01 283.02	1.573 1.573	1.957	297.88 297.92	1.403	1.742
283.02	1.576	1.960	301.99	1.369	1.696
287.77	1.514	1.882	302.17	1.379	1.709
287.80 287.82	1.509 1.507	1.876	302.31 302.47	1.377 1.382	1.706 1.712
¹ All of the were used equation	in the comp which is give	uter fit to ob en in the crit	ical evalua	ation.	Jening
were used	in the comp which is give	en in the crit	ical evalua	ation.	
were used	which is give	en in the crit	ical evalua	PURITY OF MATERIA	
were used equation ETHOD/APPARATI	which is give	en in the crit	ical evalua INFORMATION SOURCE AND H (1) Hydrod	PURITY OF MATERIAN gen. Linde Spe	
were used equation ÆTHOD/APPARAT Solubility the Scholan	Which is give US/PROCEDURE: measurements der micro-ga	en in the crit AUXILIARY were made by sometric tech-	ical evalua INFORMATION SOURCE AND H (1) Hydrod 99.99	PURITY OF MATERIA	
were used equation ÆTHOD/APPARATI Solubility the Scholan nique (1) a Equilibrati free water. a micromete	US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume r which adju	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount	ical evalua INFORMATION SOURCE AND H (1) Hydroo 99.999 (2) Water	PURITY OF MATERIAN gen. Linde Spe	LS: ecialty Gas.
were used equation of ÆTHOD/APPARATI Solubility the Scholan nique (1) a Equilibrati free water. a micromete of mercury The authors	Which is give US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume r which adju in the system also report ydrogen in so	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount m. the solu-	ical evalua INFORMATION SOURCE AND H (1) Hydroo 99.999 (2) Water	PURITY OF MATERIAL gen. Linde Spe 95% purity.	LS: ecialty Gas.
were used equation ÆTHOD/APPARAT Solubility the Scholan nique (1) a Equilibrati free water. a micromete of mercury The authors bility of h NaCl soluti	Which is give US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume r which adju in the system also report ydrogen in so ons.	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount m. the solu- eawater and	ical evalua INFORMATION SOURCE AND H (1) Hydroo 99.999 (2) Water	PURITY OF MATERIAN gen. Linde Spe 95% purity. . Glass distil	LS: ecialty Gas. Lled water.
were used equation of #THOD/APPARATI Solubility the Scholan nique (1) a Equilibrati free water. a micromete of mercury The authors bility of h NaCl soluti The authors their data	Which is give US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume r which adju in the system also report ydrogen in so ons.	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount m. the solu- eawater and quation for	ical evalua INFORMATION SOURCE AND H (1) Hydrod 99.99 (2) Water	PURITY OF MATERIAN gen. Linde Spo 95% purity. . Glass distil	LS: ecialty Gas. Lled water.
were used equation of ÆTHOD/APPARATI Solubility the Scholan nique (1) a Equilibrati free water. a micromete of mercury The authors bility of h NaCl soluti The authors their data ln α = -39.9	Which is give US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume: r which adju in the system also report ydrogen in so ons. smoothing en is	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount m. the solu- eawater and quation for 1/(T/K)	ical evalua INFORMATION SOURCE AND H (1) Hydroo 99.99 (2) Water ESTIMATED E	PURITY OF MATERIAN gen. Linde Spe 95% purity. . Glass distin RROR: $\delta T/K = 0.6$ $\delta \alpha / \alpha = 0.6$	LS: ecialty Gas. Lled water.
were used equation of ÆTHOD/APPARATI Solubility the Scholan nique (1) a Equilibrati free water. a micromete of mercury The authors bility of h NaCl soluti The authors their data ln α = -39.9	Which is give US/PROCEDURE: measurements der micro-ga s modified by on is with 6 All volume: r which adju in the syste also report ydrogen in so ons. smoothing ea is 611 + 5393.8	AUXILIARY Were made by sometric tech- y Douglas (2). cm ³ of gas- s are read on sts the amount m. the solu- eawater and quation for 1/(T/K)	ical evalua INFORMATION SOURCE AND H (1) Hydroo 99.99 (2) Water ESTIMATED E REFERENCES: 1. Scholan	PURITY OF MATERIAN gen. Linde Spe 95% purity. . Glass distin RROR: $\delta T/K = 0.6$ $\delta \alpha / \alpha = 0.6$	LS: ecialty Gas. Lled water.

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Water; H₂0; [7732-18-5]</pre>	Gordon, L. I.; Cohen, Y.; Standley, D. R. Deep-Sea Res. <u>1977</u> , 24, 937 - 941.		
VARIABLES: T/K: 273.29 - 302.40 P/kPa: 101.325 (1 atm)	PREPARED BY:		
EXPERIMENTAL VALUES:			
Temperature Mol Fraction	Bunsen Ostwald		
$t/^{\circ}C$ T/K $x_1 \times 10^5$	Coefficient Coefficient $\alpha \times 10^3$ L x 10^3		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	22.17 22.18 20.63 21.01 19.66 20.38 18.66 19.80 17.62 19.14 17.18 19.02		
given in the critical evalua			
	INFORMATION		
METHOD/APPARATUS/PROCEDURE: The method of Ben-Naim and Baer (1) as modified by Murray, Riley, and Wilson (2) was used with slightly further modifications. The Bunsen coefficients were	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Ultra-pure electro- lytically generated gas (Elhygen R generator). (2) Water. Doubly distilled. 		
corrected for the change in volume of the solution upon dissolution of the hydrogen using a partial molal vol- ume of 26 cm ³ mol ⁻¹ . The correction increased the Bunsen coefficient about 0.12 per cent.			
The results above average approxi- mately 0.5 per cent higher than the results of Crozier and Yamamoto (3).	ESTIMATED ERROR: Root mean square deviation from authors fitted equation is 0.7 per cent. Equation fitted to water and sea water data above and ref 3. REFERENCES: 1. Ben-Naim, A.; Baer, S.		
3. Crozier, T. E.; Yamamoto, S. J. Chem. Eng. Data <u>1974</u> , 19, 242.	 Ben-Naim, A.; Baer, S. Trans. Faraday Soc. <u>1963</u>, 59,2735. Murray, C. N.; Riley, J. P.; Wilson, T. R. S. Deep-Sea Res. <u>1969</u>, 16, 297. 		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Longo, L. D.; Delivoria-
2. Water; H ₂ O; [7732-18-5]	Papadopoulos, M.; Power, G. G.;
	Hill, E. P.; Forster, R. E.,
	Am. J. Physiology, <u>1970</u> , 219,
	561-569.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	·
T/K Bunsen coeffi	cient, α S.D.
310.15 0.01629	0.0001
* standard deviation	
	i
+ added by editor. Bunsen coe	
than that derived from recomm	ended smoothing equation
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
	SOURCE AND FORTH OF PARENTALD,
Liquid samples were equilibrated	
with gas and then the dissolved gas	
was stripped out under vacuum and	No details given.
measured in a manometric Van Slyke	
apparatus. Some details in ref. 1.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.03.$
	01/X = 10.03.
	DEEEDENCKS.
	REFERENCES :
	1. Power, G. G.,
	J. Appl. Physiology, <u>1968</u> , 24,
	468.
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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Power, G.G.; Stegall, H.
2. Water; H ₂ O; [7732-18-5]	J. Appl. Physiology, <u>1970</u> , 29,145-9
VARIABLES:	PREPARED BY:
	C.L. Young ⁺
EXPERIMENTAL VALUES:	
T/K Bunsen coefficient, α	S.D. No. of measurements
310.15 0.01629 0.	00011 3
* Standard deviation.	
+ added by editor. Bunsen coef lower than that derived from a	
Tower than that derived from 1	commended smoothing equation
	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
5 to 12 cm ⁻³ samples placed in a stirrer cell and gas, saturated with water vapor passed through water for 30-60 mins. Samples of saturated liquid withdrawn and transferred to Van Slyke apparatus. Dissolved gas removed under reduced pressure.	 Matheson sample, purity better than 99.7 mole per cent.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1$
	REFERENCES:

COMPONENTS:	EVALUATOR:
l. Hydrogen; H ₂ ; 1333-74-0 2. Sea Water	Denis A. Wiesenburg Department of Oceanography Texas A&M University College Station, Texas 77843 USA June 1980

CRITICAL EVALUATION:

There are two reports of the solubility of hydrogen in sea water (1, 2). It is fortunate that these two reports cover both a wide range of temperatures and salinities, use different experimental techniques, and obtain results in good agreement. Crozier and Yamamoto (1) report 222 solubility measurements for distilled water and three salinities (27.665, 33.680, 39.927%) for many different temperatures between 274.60 and 303.48°K. Their solubility measurements are estimated to have an accuracy of 0.5%. Gordon et al. (2) report 39 solubility values over the temperature range 272.80 to 302.41°K for distilled water and sea water to 39.096%. The data of Gordon et al. (2) average about 0.5% higher than those of Crozier and Yamamoto (1), but differences are never greater than 1%. Both of these studies measured Bunsen solubility coefficients by equilibrating sea water with pure hydrogen at 1 atm total pressure. The volumes of sea water equilibrated in each study were quite different, however, 6 ml (1) vs. 1000 ml (2).

The solubility data of Crozier and Yamamoto (1) and Gordon et al. (2) are similar in precision and thus are combined to form the data base for this evaluation. Gordon et al. (2) also combined the two data sets and determined a smoothing equation, but they weighted each data set equally. Since the data of Crozier and Yamamoto (1) are not statistically different from those of Gordon et al. (2), the data used here are combined without weighting. The combined data sets have been fitted (3) by the method of least squares to an equation developed by Weiss (4) which expresses solubility as the natural logarithm of the Bunsen coefficient, α , and is consistent with both the integrated form of the van't Hoff equation and the Setchenow salt effect relation. The equation for hydrogen is valid from 273.15 to 303.15°K and a salinity range, S, of 0 to 40%. The smooth equation reproduced the combined hydrogen data with a root-mean-square deviation of 7.8 x 10⁻⁵ units (~ 0.46 %). The equation is

 $\ln \alpha = -47.9848 + 65.0368 (100/T) + 20.1709 \ln (T/100)$ + S[-0.082225 + 0.049564 (T/100) - 0.0078689 (T/100)²]

where S is the salinity in parts per thousand. Wiesenburg and Guinasso (3) give an extensive table of hydrogen Bunsen coefficients calculated from the above equation.

Although the Bunsen solubility coefficients are well defined by the above equation, for practical purposes, oceanographers require the atmospheric equilibrium solubility values in their work. Weiss (4) has proposed an equation similar to the above which expresses the atmospheric equilibrium solubility from moist air at 1 atm total pressure, in units of Volume (STP) dm⁻³, as a function of salinity and temperature. In working with samples from the depths of the ocean, it is also advantageous to express atmospheric solubilities in terms of mol kg⁻¹, which are pressure and temperature independent (4, 5). Weiss' atmospheric solubility equation is based on the assumption of a constant atmospheric concentration of hydrogen. Since hydrogen is variable in the atmosphere, Weiss' (4) equation has been modified (3) to include the atmospheric concentration as a variable. The combined data sets for hydrogen (1, 2) have been fitted (3) to the equations

 $\ln c/nl dm^{-3} = f_{g} - 314.3572 + 455.8526 (100/T)$ + 297.5313 ln (T/100) - 49.2778 (T/100)+ s [-0.070143 + 0.041069 (T/100) - 0.0063763 (T/100)²]

COMPONENTS:	EVALUATOR:
1. Hydrogen; H ₂ ; 1333-74-0 2. Sea Water	Denis A. Wiesenburg Department of Oceanography Texas A&M University College Station, Texas 77843 USA June 1980

CRITICAL EVALUATION:

 $\ln m/nmol kg^{-1} = f_{cr} - 320.3079 + 459.7398 (100/T)$ + 299.2600 ln (T/100) - 49.3946 (T/100) + S [$-0.074474 + 0.043363 (T/100) - 0.0067420 (T/100)^2$]

where f_g is the mole fraction of hydrogen in dry air. In these calculations hydrogen was assumed to be an ideal gas. Vapor pressure for pure water was calculated using the equation of Bridgeman and Aldrich (6) and corrected for salinity effects using the expression of Robinson (7). Knudsen's (8) formula was used to calculate densities. These two equations can be used to calculate the atmospheric equilibrium solubility of hydrogen under any given conditions of temperature, salinity, and atmospheric concentration. Using an atmospheric hydrogen mole fraction of 0.58×10^{-6} (9), the equations reproduce the individual calculated atmospheric solubilities with a root-mean-square deviation of 0.45%.

In making calculations of atmospheric equilibrium solubilities from Bunsen solubilities measured at 1 atm of pure hydrogen, there is a question of whether Henry's law can be extrapolated accurately through six orders of magnitude (10, 11). Schmidt (12) considered this problem by making atmospheric solubility measurements of hydrogen at partial pressures of hydrogen of about 10^{-5} atm. He measured solubilities for pure water and sea water (24 values) at 31.6%. salinity over the temperature range 273.15 to 303.15°K by equilibrating sea water with air containing 21.5 ppmv hydrogen. The standard error of Schmidt's data (7%) is higher than that of the other data evaluated here (1, 2), but within the standard error of his data, Schmidt's data are consistent with the Bunsen coefficients measured at 1 atm.

References

- 1.
- Crozier, T. E.; Yamamoto, S. J. Chem. Eng. Data <u>1974</u>, 19, 242. Gordon, L. I.; Cohen, Y.; Standley, D. R. Deep-Sea Res. <u>1977</u>, 24, 2. 937.
- Wiesenburg, D. A.; Guinasso, N. L., Jr. J. Chem. Eng. Data 1979, 24, з. 356.
- 4.
- Weiss, R. F. Deep-Sea Res. <u>1970</u>, 17, 721. Kester, D. in "Chemical Oceanography" v. 1 2nd Edition, J. P. Riley and G. Skirrow, eds. Academic Press, New York, <u>1975</u>, pp. 497-556. Bridgeman, O. C.; Aldrich, E. W. J. Heat Transfer <u>1964</u>,86, 279. Robinson, R. A. J. Mar. Biol. Assoc. U.K. <u>1954</u>, 33, 449. 5.
- 6.
- 7.
- Knudsen, M. Hydrographical Tables, G. E. Gad, Copenhagen, <u>1901</u>. Schmidt, U. J. Geophys. Res. <u>1978</u>, 83, 941. Bieri, R. H. in "The Sea', v. 5, E. D. Goldberg, ed., Wiley Interscience, New York, <u>1974</u>, pp. 199-218. Meadows, R. W.; Spedding, D. J. *Tellus* <u>1974</u>, 26, 143. 8.
- 9. 10.
- 11.
- 12. Schmidt, U. Tellus 1979, 31, 68.

OMPONENTS:	<u> </u>		ORIGINAL MEASUR	EMENTS:	
1. Hydrogen; H ₂ ;1333-74-0			Crozier, T. E.; Yamamoto, S.		
2. Sea Wate	er		J. Chem. Eng Data <u>1974</u> , 19, 242 - 244.		
/ARIABLES: T/K: 274.60 - 303.49 H ₂ P/kPa: 101.325 (1 atm) Salinity/%o: 0 - 39.927		PREPARED BY: Denis A. Wiesenburg			
					XPERIMENTAL VA
Salinity %。	Temp/K	Bunsen Coefficient α	Salinity %。	Temp/K	Bunsen Coefficient α
0.0 Continued	274.60 274.63 274.64 277.54 277.70 277.70 277.73 277.74 282.99 282.99 283.00 283.00 283.00 283.01 283.01 283.01 283.02 283.03 287.77 287.80 287.82	0.02150 0.02148 0.02152 0.02081 0.02074 0.02077 0.02079 0.01954 0.01964 0.01949 0.01949 0.01947 0.01949 0.01955 0.01960 0.01957 0.01957 0.01957 0.01957 0.01957 0.01960 0.01882 0.01876 0.01873	0.0	287.85 287.91 287.92 287.94 287.94 287.94 287.94 287.95 290.01 290.01 290.02 290.03 290.03 297.85 297.85 297.85 297.88 297.88 297.88 297.88 297.88 297.88 297.88 297.88 297.88	0.01871 0.01882 0.01869 0.01871 0.01890 0.01885 0.01885 0.01806 0.01812 0.01804 0.01805 0.01740 0.01754 0.01747 0.01741 0.01742 0.01696 0.01712
		AUXILIARY	INFORMATION		
ETHOD /APPARATU	S/PROCEDURE:		SOURCE AND PURI	TY OF MATERI	ALS:
Solubility determinations were made using the Scholander microgasometric technique (1) as modified by Douglas (2). Pure hydrogen and degassed sea Water were introduced into a reaction Vessel in a constant temperature room. The vessel was shaken vigor- Ously to allow equilibration between the hydrogen and sea water. The amount of gas absorbed and the Volume of sea water were measured Volumetrically with a microburet. Bunsen solubility coefficients were calculated from the observed volumes.		specifi 2. Sea Wate 0.45- μ m poisone Sea wat with gl. (used for desired ESTIMATED ERROR $\delta T/K = 0.$ $\delta S/ \%_{oo} = 0.$ REFERENCES:	ed 99.9995 er. Passe millipore d with 1 m er was boi ass distil or 0 %.)t salinitie	d through filter and g/l of MgCl ₂ . led or diluted led water o obtain	
			2. Douglas, J. Phys.	Chem. 190	

20		nyurogen Solub	inties up to zookra		
COMPONENTS:		<u></u>	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ;1333-74-0 2. Sea Water		Crozier, T. E.; Yamamoto, S. J. Chem. Eng. Data <u>1974</u> , 19, 242 - 244.			
VARIABLES: T/K: 274.60 - 303.49 H ₂ P/kPa: 101.325 (1 atm) Salinity/°/••: 0 - 39.927		PREPARED BY: Denis A. Wiesenburg			
EXPERIMENTAL V				· · · · · · · · · · · · · · · · · · ·	
Salinity %。	Temp/K	Bunsen Coefficient	Salinity %。	Temp/K	Bunsen Coefficient
27.665	274.78 274.81 274.83 274.83 274.83 274.84 274.84 274.84 274.84 274.84 274.85 280.17 280.18 280.18 280.18 280.19 280.19 280.19 280.19 280.19 280.19 280.19 285.21 285.21 285.22	α 0.01856 0.01859 0.01847 0.01850 0.01853 0.01851 0.01851 0.01851 0.01861 0.01754 0.01754 0.01751 0.01755 0.01755 0.01752 0.01752 0.01752 0.01754 0.01752 0.01754 0.01754 0.01752 0.01754 0.01752 0.01754 0.01679 0.01680 0.01682	27.665	285.23 285.23 285.23 285.24 285.25 292.23 292.23 292.23 292.24 292.25 298.35 298.35 298.36 298.36 298.36 298.36	$\begin{array}{c} \alpha\\ 0.01680\\ 0.01681\\ 0.01681\\ 0.01678\\ 0.01684\\ 0.01684\\ 0.01599\\ 0.01598\\ 0.01598\\ 0.01598\\ 0.01596\\ 0.01597\\ 0.01596\\ 0.01597\\ 0.01598\\ 0.01598\\ 0.01599\\ 0.01601\\ 0.01602\\ 0.01541\\ 0.01541\\ 0.01541\\ 0.01547\end{array}$
Continued	on next pa	ge			
			INFORMATION		
METHOD 'APPARAT	US/PROCEDURE:	:	SOURCE AND PURI	TY OF MATERI	ALS:
See prev	ious page.		See previ	ous page.	
			ESTIMATED ERROR		
			REFERENCES: See previ	ous page.	
L			<u> </u>		

COMPONENTS:			ORIGINAL MEASUR	EMENTS .	
Com Change,			OKIGINAL MEASUR	EMEN15:	
1. Hydroge	en; H ₂ ;1333	-74-0	Crozier, T. E.; Yamamoto, S.		
2. Sea Wat	-				
		J. Chem. Eng. Data <u>1974</u> , 19,			
			242 - 244.		
l					
WARTARIEC				<u> </u>	
VARIABLES:	/K: 274.60	- 303.49	PREPARED BY:		
H ₂ P/ki	Pa: 101.32	5 (1 atm)	Den	is A. Wies	enburg
Salinity/%	•••••••••••••••••••••••••••••••••••••••	.927			
EXPERIMENTAL V	ALUES:				
Salinity	Temp/K	Bunsen	Salinity	Temp/K	Bunsen
%.		Coefficient	%。	10p/ 11	Coefficient
		α			α
27.665	298.37	0.01548	33.680	275.15	0.01783
	298.37	0.01550	33.000	275.16	0.01783
	298.38	0.01540		281.42	0.01679
	298.40	0.01549		281.44	0.01682
	303.41	0.01511		281.44	0.01684
l	303.41	0.01508		281.44	0.01678
	303.42	0.01503		281.45	0.01686
ļ	303.43	0.01507		281.46	0.01684
	303.43	0.01511		281.46	0.01690
	303.44	0.01501		281.47	0.01682
	303.47	0.01510		281.47	0.01682
	303.47	0.01512		281.48	0.01679
	303.47	0.01513		286.63	0.01618
	303.48	0.01516		286.63	0.01616
22 600	0.85 1.0	A A3 770		286.63	0.01609
33.680	275.10	0.01778		286.63	0.01606
	275.12	0.01789		286.63	0.01608
	275.12	0.01782		286.63	0.01619
[275.13	0.01783		286.63	0.01621
	275.13	0.01784		286.63	0.01618
	275.14 275.14	0.01787 0.01795		286.63 286.64	0.01617 0.01619
	275.14	0.01795		292.33	0.01559
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COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ;1333-74-0		Crozier, T. E.; Yamamoto, S.			
2. Sea Wat	-				
2. Dea Mat			J. Chem. En	g. Data <u>19</u>	<u>77</u> , 19,
			242 - 244.		
/ARIABLES: T/	/K: 274.60	- 303.49	PREPARED BY:		
H ₂ P/kI Salinity/%	Pa: 101.32	5 (l atm)	De	nis A. Wie	senburg
EXPERIMENTAL V					
Salinity	Temp/K	Bunsen	Salinity	Temp/K	Bunsen
% 0	. //	Coefficient	%。		Coefficient
	<u> </u>	<u> </u>			<u>α</u>
33.680	292.36	0.01555	33.680	303.11	0.01472
	292.37	0.01554		303.11	0.01477
	292.38	0.01557		303.11	0.01482
	292.38	0.01545		303.12	0.01486
	292.40	0.01550		303.13	0.01473
	292.41	0.01555		303.14	0.01491
	292.43	0.01547			
	292.44	0.01554	39.927	274.65	0.01730
	292.46	0.01555		274.65	0.01730
	298.10	0.01519		274.65	0.01734
	298.13	0.01502		274.65	0.01729
	298.13	0.01502		274.65	0.01744
	298.14	0.01515		274.66	0.01728
	298.14	0.01507		274.66	0.01739
	298.15	0.01506		274.66	0.01723
	298.16	0.01513		274.66	0.01734
	298.16	0.01515		274.67	0.01723
	298.16	0.01504		279.63	0.01658
	298.17	0.01517		279.63	0.01655
	303.08	0.01480		279.65	0.01655
	303.11	0.01486		279.66	0.01658
	303.11 303.11	0.01477		279.67 279.68	0.01656 0.01652
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			REFERENCES:	<u></u>	<u> </u>
			See previ	ous page.	

			ORIGINAL MEASUREMENTS:			
l. Hydroge 2. Sea Wat	n; H ₂ ;1333- er	-74-0	Crozier, T. E.; Yamamoto, S. J. Chem. Eng. Data <u>1974</u> , 19, 242 - 244.			
ARIABLES:					<u></u>	
Т	Pa: 101.32		PREPARED BY:	nis A. Wie	senburg	
XPERIMENTAL V	ALUES:					
Salinity %。	Temp/K	Bunsen Coefficient	Salinity %。	Temp/K	Bunsen Coefficient	
39.927	279.68 279.68 279.68 279.69 285.63 285.63 285.63 285.63 285.63 285.63 285.65 285.65 285.65	0.01649 0.01654 0.01658 0.01653 0.01573 0.01573 0.01573 0.01575 0.01574 0.01574 0.01573	39.927	291.79 291.83 297.52 297.52 297.53 297.53 297.53 297.54 297.54 297.55 297.55 297.55 303.40	0.01519 0.01517 0.01469 0.01466 0.01465 0.01467 0.01467 0.01466 0.01461 0.01466 0.01465 0.01470 0.01446	

METHOD/APPARAIUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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	ESTIMATED ERROR:
	See previous page.
	REFERENCES :
	See previous page.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; 1333-74-0 2. Sea Water	Gordon, L. I.; Cohen, Y.; Standley, D. R. Deep-Sea Res. <u>1977</u> , 24, 937 - 941.
VARIABLES: T/K: 272.80 - 302.41 H ₂ P/kPa: 101.325 (1 atm) Salinity/%: 0 - 39.096	PREPARED BY: Denis A. Wiesenburg

EXPERIMENTAL VALUES:

Temp/K	Salinity %。	Bunsen Coefficient	Temp/K	Salinity %。	Bunsen Coefficient
		<u> a x 10³</u>			<u>α x 10³</u>
272.80	29.931	18.75	296.78	0.000	17.62
273.29	0.000	22.17	296.78	4.919	17.50
273.18	10.626	21.00	296.77	10.385	17.02
273.21	20.396	19.90	296.77	17.115	16.53
273.17	35.109	18.44	296.78	19.675	16.20
2/3.1/	33.109	10.44	296.77	34.728	15.13
278.19	0.000	20.63	296.77	39.096	14.88
278.20	9.470	19.55	207 01	22 001	15 20
278.20	19.757	18.94	297.91	32.901	15.39
278.19	30.060	17.68	302.40	0.000	17.18
278.21	37.810	17.03	302.40	7.946	16.68
	0 000		302.41	12.260	16.28
283.15	0.000	19.66	302.40	17.154	16.02
283.17	0.000	19.67	302.40	21.898	15.68
283.11	10.063	18.80	302.41	25.171	15.31
283.17	19.694	17.68	302.40	25.325	15.23
283.19	19.736	17.75	302.41	32.022	14.97
283.12	38.079	16.26	302.40	32.570	14.82
289.82	0.000	18.66	302.41	38.981	14.39
289.92	10.524	17.72			
289.83	20.156	16.94			
289.83	32.284	15.93			
289.79	37.317	15.50			

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:

Solubility determinations were made using the method of Ben-Naim and Baer (1) as modified by Murray et al. (2), with slight further modifications. Pure hydrogen which had been saturated with sea water was placed in contact with a known volume of sea water in a thermostated dissolution flask. The sea water was mechanically stirred and the total gas pressure was maintained at 1 atm, using a gas manometer and a mercury leveling bulb. Solubility was calculated from the difference in buret readings, before and after solubility equilibrium had been maintained (about 7 hours duration), and the known volume of sea water.

SOURCE AND PURITY OF MATERIALS:

- Hydrogen. Ultra-pure electrolytically generated hydrogen was used.
- Sea Water. Aged surface sea water filtered and adjusted to pH < 3.2 with 4N HCl. Sea waters of various salinities were made by addition of distilled water or by evaporation.

ESTIMATED ERROR:

REFERENCES:

Trans. Faraday	, Soc.	1963, 59, 2735.
Wilson, T.R.S.	• -	
Deep-Sea Res.	1969,3	16, 297.
	Trans. Faradau Murray, C.N.; Wilson, T.R.S	Ben-Naim, A.; Baer, Trans. Faraday Soc. Murray, C.N.; Riley, Wilson, T.R.S. Deep-Sea Res. <u>1969</u> , 2

COMPONENTS:	EVALUATOR:
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Water; H₂O; [7732-18-5] (3) Electrolyte</pre>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1980, October
CRITICAL EVALUATION: An Evaluation of the Solubi Electrolyte Solutions Pressure of	at a Hydrogen Partial

Not enough workers have measured the solubility of hydrogen in any one aqueous electrolyte system over common ranges of concentration and temperature to recommend solubility values. Most of the available data are classed as tentative.

In order to have a common basis for comparison, the solubility data have been converted to Sechenow salt effect parameters in the form

$$k_{cs\alpha}/dm^3 mol^{-1} = (1/(c/mol dm^{-3}))\log(\alpha^{\circ}/\alpha)$$

where c is the electrolyte concentration in mol dm⁻³ and α° and α are the Bunsen coefficients in pure water and electrolyte solution, respectively. The Ostwald coefficient ratio, L°/L, will give the same value, but the salt effect parameter is symbolized, k_{scL}. Both ratios are equivalent to a molar gas solubility ratio.

Other forms of the salt effect parameter will be found on the data sheets that follow this discussion. They include

 $k_{sms}/kg \text{ mol}^{-1} = (1/(m/mol kg^{-1}))\log(s^{\circ}/s)$ $k_{scx}/dm^3 \text{ mol}^{-1} = (1/(c/mol dm^{-3}))\log(x^{\circ}/x)$ $k_{smx}/kg \text{ mol}^{-1} = (1/(m/mol kg^{-1}))\log(x^{\circ}/x)$

where m is the electrolyte molality, s°/s is the Kuenen coefficient ratio, and x°/x is the mole fraction gas solubility ratio usually calculated with respect to all ions in the solution. The Kuenen coefficient, s, is referenced to 1 gof water whether it is for pure water or the electrolyte solution. Thus the s°/s ratio is proportional to a gas molality ratio m°/m. The density data required to convert the salt effect parameter from one form to another were taken from the *International Critical Tables*, McGraw-Hill, 1928, v. III.

The salt effect parameter is often assumed to be independent of electrolyte concentration. This is definitely not true of aqueous sulfuric acid solutions. It is probably true only as an approximation for many other solutions. There are indications through out the literature that the salt effect parameter values are larger in dilute solutions than at higher concentrations but there are no definitive studies on the point.

The effect of the electrolyte concentration on the salt effect parameter was checked by one of two ways. A graph was prepared either of $\log(\alpha^{\circ}/\alpha)$ vs. c or of k vs. c. A linear $\log(\alpha^{\circ}/\alpha)$ vs. c plot shows no concentra-

tion dependence to the salt effect parameter and the slope is $k_{sc\alpha}$.

A linear $k_{sc\alpha}$ vs. c plot of zero slope shows no concentration dependence to the salt effect parameter. The second type of graph is more sensitive to small changes in $k_{sc\alpha}$ with concentration than the first type. The solubility of hydrogen in water has usually been taken from the paper under evaluation for the calculation of the salt effect parameter. The reason for using the water solubility of the author, instead of the recommended solubility of hydrogen in water, is that systematic errors in a given authors work may cancel in the α °/ α ratio.

The use of a salt effect parameter of the Sechenow type should not be taken to mean that it is necessarily the best way to represent salt effect results. It is used here as a convenient parameter for the comparison of data from several sources.

Studies of the solubility of hydrogen in aqueous electrolyte solutions appear in about fifteen papers. Some specific comments on several of the papers follow.

Geffcken (1) measured the solubility of hydrogen in five aqueous systems over an extended electrolyte range of concentration. His average value of the Ostwald coefficient of hydrogen in water of 0.01926 at 298.15 K is 0.78 per cent higher than the recommended value. His salt effect parameters usually show a small decrease in value as the electrolyte concentration increases.

Morrison and Billett (4) measured the solubility of hydrogen at four temperatures in four aqueous systems. Their values of the solubility of hydrogen in water agree well with the recommended values. A weakness of their work is that they report only the salt effect parameter, which is based on a solubility measurement at just one electrolyte concentration. They have reported what is equivalent to a molal gas solubility ratio.

Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in eight aqueous systems at temperatures up to 523 K in a high pressure apparatus. Their solubilities are given as Bunsen coefficients which are treated here as if they apply at a hydrogen partial pressure of 101.325 kPa. They did not measure the solubility of hydrogen in water, but they did their own evaluation of the solubility of hydrogen in water from literature data. Their data table includes both the solubility, α , and the corresponding ratio α/α° . From the α/α° values one can deduce the solubility values of hydrogen in water used by them are

Т/К	298.15	323.15	348.15	373.15
$\alpha^{\circ}/cm^{3} cm^{-3} atm^{-1}$	0.01744	0.01629	0.01637	0.01835
T/K	398.15	423.15	473.15	523.15
α°/cm^3} cm ⁻³ atm ⁻¹	0.02031	0.02328	0.03149	0.04456

The salt effect parameters, $k_{sc\alpha}$, at the electrolyte concentrations of 0.5, 1.0, and 1.5 mol dm⁻³ were calculated directly from the inverse of the α/α° ratio tabulated in the paper. The values, which scatter widely, do not appear to show a correlation with either electrolyte concentration or temperature. The tabulated values of $k_{sc\alpha}$ are average values of the

three values measured at the three electrolyte concentrations. Although the data are classed as tentative they do not appear to be quite as reliable as the data from most of the other papers. In general the salt effect parameters calculated from the data in their paper are greater than the values obtained by other workers. This is probably due in part to the difficulties in making measurements at high pressure.

Deckwer (14) measured the solubility of hydrogen in aqueous manganese (II) sulfate solution at several temperatures between 293.15 and 353.15 K. He did not measure the solubility of hydrogen in water, but he took literature values from the Seidell Linke Handbook. A more consistent set of salt effect parameters was obtained when the recommended water solubility values from this volume were used. They are the salt effect parameters presented.

Shoor, Walker, and Gubbins (9) measured the solubility of hydrogen in aqueous KOH solutions. They calculated their salt effect parameters from the hydrogen mole fraction solubility ratio, x^0/x . Their salt effect parameters were not converted from the k_{SCX} to the $k_{SC\alpha}$ form because (1) reliable density data for aqueous KOH was not readily available, and (2) the authors did not define whether their mole fraction values were based on the KOH ion pairs or on the K⁺ and OH⁻ ions.

Hydrogen solubility measurements have been reported in over 20 aqueous electrolyte systems. Each system is discussed briefly on the following pages. Unless otherwise stated, the salt effect parameters are for a one mole dm⁻³ solution at a hydrogen partial pressure of 101.325 kPa. Tentative values of the salt effect parameters are given as calculated from the various papers. The systems are given in the order of the standard arrangement for electrolytes used in U.S. National Bureau of Standards publications.

1. Hydrogen + water + Hydrochloric acid [7647-01-0]

Geffcken (1) measured the solubility of hydrogen in aqueous hydrochloric acid at nine concentrations up to 2.836 mol dm^{-3} at 298.15 K. The salt effect parameter decreases with increasing HCl concentration

$$k_{con}/cm^3 mol^{-1} = 0.0297 - 2.20 \times 10^{-4} (c_3/mol dm^{-3})$$

At 298.15 K and one mole dm^{-3} HCl the tentative value of $\text{k}_{_{\rm SCM}}$ is 0.0295.

2. Hydrogen + water + Sulfuric acid [7664-93-9]

Although the solubility of hydrogen in aqueous sulfuric acid has been measured in four laboratories, no two laboratories report data at a common temperature. Christoff (2) measured the solubility at 293.15 K and three concentrations between 35.8 and 95.6 weight per cent sulfuric acid. There is not enough data to identify the acid concentration of minimum hydrogen solubility, but it is probably near 80 weight percent. Salt effect parameters of 0.0729 and 0.0490 were calculated from the Christoff data at 4.63 and 9.53 mol dm⁻³ H₂SO₄. Assuming a linear change of $k_{\rm SC\alpha}$ with concentration gives

$$k_{sca}/dm^3 mol^{-1} = 0.0955 - 4.88 \times 10^{-3} c_3/mol dm^{-3}$$

Geffcken (1) measured the solubility at 298.15 K at eleven sulfuric acid concentrations up to 2 mol dm⁻³. The salt effect parameter decreases with increasing acid concentration

$$k_{sca}/dm^3 mol^{-1} = 0.0718 - 7.16 \times 10^{-4} c_3/mol dm^{-3}$$

Ruetschi and Amlie (8) measured the solubility of hydrogen at ten concentrations up to 7.6 mol dm⁻³ sulfuric acid. The salt effect parameter decreases with increasing acid concentration

$$k_{sca}/dm^3 mol^{-1} = 0.0932 - 6.68 \times 10^{-3} c_3/mol dm^{-3}$$

The data of Christoff and of Ruetschi and Amlie roughly parallel each other as a function of concentration, but the data of Christoff is too limited for the agreement to be meaningful.

Bruhn, Gerlach and Pawlek (7) measured the solubility of hydrogen at sulfuric acid concentrations of 0.5, 1.0, and 1.5 mol dm⁻³ at five temperatures between 323.15 and 523.15 K. As discussed earlier in the section their salt effect parameter values show considerable scatter and poor correlation with both acid concentration and temperature. The average of their $k_{sc\alpha}$ values at each temperature show little change with temperature.

Tentative values of	the salt effect	parameters at a sulfu	uric acid concen-
tration of one mole	dm-3 from the f	our papers are:	

T/K	293.15	298.15	303.15	323.15
$k_{sca}/dm^3 mol^{-1}$	0.0906	0.0711	0.0865	0.075
σ^1			** =-	0.014
т/к	373.15	423.15	473.15	523.15
$k_{sca}/dm^3 mol^{-1}$	0.074	0.080	0.074	0.074
σ1	0.023	0.001	0.003	0.026

3. Hydrogen + water + Nitric acid [7697-37-2]

Geffcken (2) made ten measurements of the hydrogen solubility at 298.15 K up to a concentration of 4.23 mol dm⁻³ nitric acid. The salt effect parameters show some scatter but there is a tendency to a decrease in the parameters as the acid concentration increases.

 $k_{sca}/dm^3 mol^{-1} = 0.0220 - 5.3 \times 10^{-4} c_3/mol dm^{-3}$

The tentative value of the salt effect parameter at 298.15 K and one mol dm-3 nitric acid is 0.0215 dm³ mol⁻¹.

4. Hydrogen + water + Ammonium hydroxide [1336-21-6]

Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous solutions of ammonium hydroxide at concentrations of 2.87, 3.63, and 8.28 mol dm⁻³ at temperatures up to 423 K. Ammonium hydroxide shows only a small salt effect. There is no discernable trend with either concentration or temperature. The tentative values are the average of the three salt effect parameters at each temperature.

T/K			348.15		423.15
$k_{sca}/dm^3 mol^{-1}$	0.0043	0.0064	0.0025	0.0040	0.0042
σ ¹	0.0016	0.0012	0.0015	0.0012	0.0014

5. Hydrogen + water + Ammonium chloride [12125-02-9]

Gerecke and Bittrich (12) measured the solubility of hydrogen in several ammonium chloride solutions at temperatures of 288.15 and 323.15 K. They cite a salt effect parameter value at 298.15 K from the thesis of Gerecke (10). The hydrogen solubility is reported as a Kuenen coefficient and the salt concentration is reported as molality (mol kg⁻¹). Their salt effect parameter, $k_{\rm Sms}$, was converted to a $k_{\rm Sca}$ value. The tentative values for a one mol dm⁻³ solution are

T/K	288.15	298.15	323.15
k _{sms} /kg mol ⁻¹	0.055	0.057	0.044
$k_{sca}/dm^3 mol^{-1}$	0.057	0.059	0.046

6. Hydrogen + water + Ammonium sulfate [7783-20-2]

Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous ammonium sulfate at 0.25, 0.75, 1.5 and 3.0 mol dm⁻³ at temperatures up to 523 K. The individual $k_{sc\alpha}$ values show considerable scatter, The four values at each temperature were averaged for the tentative salt effect parameter values. They are

¹ Standard deviation

T/K 373.15 423.15 473.15 523.15 298.15 323.15 $k_{sca}/dm^3 mol^{-1}$ 0.156 0.151 0.148 0.145 0.152 0.140 0.022 0.046 0.025 0.024 ___ σ 7. Hydrogen + water + Ammonium nitrate [6684-52-2] Knopp (15) made measurements on this system for six different concentrations at 293.15K. The results show some scatter. The tentative value of k_{sca} is 0.033 dm³ mol 8. Hydrogen + water + Zinc sulfate [7732-02-0] Steiner (16) made measurements on this system for four different concentrations at temperatures near 288K and "adjusted" values to 288.2K. The tentative value of k is 0.237 dm³ mol⁻¹ at a salt concentration of 1 mol dm³. There appears to be a slight decrease of k with increasing concentration. 9. Hydrogen + water + Copper (II) sulfate [7758-98-7] Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous copper sulfate of 0.5, 1.0, and 1.5 mol dm⁻³ and temperatures up to 398.15 K. There is no definite trend in the salt effect parameter with either copper sulfate concentration or temperature. The three values of $k_{sc\alpha}$ at each temperature were averaged to give the tentative salt effect parameters below. T/K 298.15 323.15 348.15 373.15 398.15 $k_{sca}/dm^3 mol^{-1}$ 0.169 0.170 0.156 0.158 0.176 0.021 0.037 0.023 σ 0.015 0.018 10. Hydrogen + water + Nickel sulfate [7786-81-4] Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous nickel sulfate at 0.5, 1.0, and 1.5 mol dm^{-3} and temperatures up to 398.15 K. There is no definite trend in the salt effect parameter with either nickel sulfate concentration or temperature. The three values of k_{sca} at each temperature were averaged to obtain the tentative salt effect parameters below. T/K 298.15 323.15 348.15 373.15 398.15 $k_{sca}/dm^3 mol^{-1}$ 0.174 0.184 0.164 0.177 0.173 0.021 0.033 σ 0.036 0.018 0.015 11. Hydrogen + water + Cobalt (II) sulfate [10124-43-3] Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous cobalt sulfate at 0.5, 1.0, and 1.5 mol dm^{-3} and temperatures up to 398.15 K. There is no definite trend in the salt effect parameter with either cobalt sulfate concentration or temperature. The three values of $k_{\mbox{sca}}$ at each temperature were averaged to obtain the tentative salt effect parameters below. T/K 298.15 323.15 348.15 373.15 398.15 $k_{sca}/dm^3 mol^{-1}$ 0.157 0.156 0.157 0.159 0.155 0.006 0.019 0.036 σ 0.012 0.027 Hydrogen + water + Hydrate iron (III) oxide [12259-21-1] 12.

The data of Shkol'nikova (6) are classed as tentative. She made no solubility measurements in pure water. No salt effect parameters were calculated for the colloidal solutions.

13. Hydrogen + water + Manganese (II) sulfate [7785-87-7]

Deckwer (14) measured the solubility of hydrogen in aqueous manganese (II) sulfate up to a concentration of 3.5 mol dm^{-3} at six temperatures between 293.15 and 353.15 K. He did not measure the solubility of hydrogen in water. The salt effect parameters were calculated using the recommended hydrogen in water values of this volume, rather than the literature values picked by Deckwer.

The salt effect parameters appear to be a function of the electrolyte concentration at each temperature. An equation for the salt effect parameter as a linear function of the Manganese (II) sulfate concentration and the $k_{\rm SC\alpha}$ values at concentrations of one and three mol dm⁻³ are given below.

т/к	$k_{sca} = a + b C_3$	l mol dm ⁻³ k _{sca}	3 mol dm ⁻³
293.15	0.111 + 0.037 C ₃	0.148	0.222
303.15	0.133 + 0.025 C ₃	0.158	0.208
313.15	0.155 + 0.013 C ₃	0.168	0.194
323.15	0.154 + 0.010 C ₃	0.164	0.184
333.15	0.175 + 0.003 C ₃	0.178	0.184
353.15	0.160 + 0.007 C ₃	0.167	0.181

14. Hydrogen + water + Hydrated aluminum oxide [1333-84-6]

The data of Shkol'nikova (6) are classed as tentative. She made no pure water hydrogen solubility measurements. No salt effect parameters were calculated for the colloidal solutions.

15. Hydrogen + water + Aluminium Chloride [7446-70-0]

This system has been studied by Steiner (16) at four different salt concentrations at temperatures near 288K. Values "adjusted" to 288.2K were reported and give a tentative value of $k_{SC\alpha}$ of 0.197 dm³ mol-1 at a salt concentration of 1 mol dm⁻³. There appears to be a slight decrease of $k_{SC\alpha}$ with increasing concentration.

16. Hydrogen + water + Lanthanum chloride [10099-58-8]

Morrison and Billett (4) measured the solubility of hydrogen in 0.333 mol kg⁻¹ LaCl₃ at four temperatures. Their salt effect parameter, k was recalculated as a k value at 1 mol dm⁻³. The values are classed as tentative.

T/K	285.75	303.15	322.55	344.85
k _{sms} /kg mol ⁻¹	0.237	0.234	0.228	0.225
$k_{sc\alpha}/dm^3 mol^{-1}$	0.240	0.247	0.252	0.265

17. Hydrogen + water + Uranyl sulfate [1314-64-3]

Stephan, Hatfield, Peoples and Pray (5) measured the solubility of hydrogen in aqueous uranyl sulfate of 40, 100, and 243 g dm⁻³ uranium at temperatures of 373.15, 408.15, and 435.93 K. Salt effect parameters were not calculated. The data are classed as tentative.

18. Hydrogen + water + Magnesium sulfate [7487-88-9]

This system has also been studied by Steiner (16) at four different salt concentrations at temperatures near 288K. Values "adjusted" to 288.2K were reported and give a tentative value of $k_{SC\alpha}$ of 0.233 dm³ mol⁻¹ at a salt concentration of 1 mol dm⁻³. There appears to be a slight increase of $k_{SC\alpha}$ with increasing concentration.

19. Hydrogen + water + Calcium chloride [10043-52-4]

This system has been studied by Steiner (16) at six different salt concentrations at temperatures near 288K. Values "adjusted" to 288.2K were reported and give a tentative value of $k_{SC\alpha}$ of 0.194 dm³ mol⁻¹ at a salt concentration of 1 mol dm⁻³. The salt effect parameters show some scatter but there is a tendency to a decrease in $k_{SC\alpha}$ as the salt concentration increases.

 $k_{sca}/dm^3 mol^{-1} = 0.1976 - 3.2 \times 10^{-3} c_3/mol dm^{-3}$

where c_3 is the salt concentration.

20. Hydrogen + water + Barium chloride [10361-37-2]

This system has been investigated by Braun (17). The salt effect parameters are as below at a concentration of 70g/kg (solution). The values calculated from Braun's data decrease with an increase in concentration. The Bunsen coefficients at the lowest temperature are thought to be considerably in error but the salting out parameters are probably more reliable, however the data are classified as doubtful.

T/K	278.2	283.2	288.2	293.2	298.2
k _{sca} ∕dm³ mol ⁻¹	0.245	0.229	0.224	0.223	0.225

21. Hydrogen + water + Lithium chloride [7447-41-8]

Morrison and Billett (4) measured the solubility of hydrogen in one mol kg^{-1} lithium chloride at four temperatures. Gerecke and Bittrich (12) and Gerecke (10) reported salt effect parameters at 288.15 and 298.15 K respectively. All of the salt effect parameters were converted to k_{sca} values which are classed as tentative. The values for one mol dm^{-3} solutions are:

			298.15			
k _{sca} /dm ³ mol ⁻¹	0.074	0.070	0.073	0.076	0.076	0.075
Steiners data (16) for this	system g	ive a value	of k _{sca}	of 0.078 mo	1 dm ⁻³ .

22. Hydrogen + water + Sodium hydroxide [1310-73-2]

Geffcken (1) and Bruhn, Gerlach, and Pawlek (7) measured the solubility of hydrogen in aqueous sodium hydroxide. Geffcken made measurements at ten NaOH concentrations up to 4.687 mol dm⁻³ at 298.15 K. Bruhn *et al.* made measurements at 0.5, 1.0, and 1.5 mol dm⁻³ NaOH up to a temperature of 523 K. The salt effect parameter calculated from Geffcken's data is about 30 per cent lower than the values of Bruhn *et al.* at the higher temperatures.

The tentative salt effect parameters for a NaOH concentration of one mol $\rm dm^{-3}$ are

T/K	298.15	323.15	373.15	423.15	473.15	523.15
k _{sca} /dm ³ mol ⁻¹	0.137	0.181	0.190	0.179	0.173	0.189
				0.045		

23. Hydrogen + water + Sodium chloride [7647-14-5]

The solubility of hydrogen in aqueous sodium chloride was measured by Morrison and Billett (4) at four temperatures, by Gerecke and Bittrich (12) at two temperatures, by Gerecke (10) at one temperature, and by Crozier and Yamamoto (13) at five temperatures.

All measurements were converted to salt effect parameters, $k_{sc\alpha}$. Morrison

and Billett's measured the hydrogen solubility at one mol kg⁻¹ NaCl, while Crozier and Yamamoto made measurements at 0.1895 and 0.4815 mol kg⁻¹ NaCl. Gerecke and Bittrich made measurements over a range of 0.50 to 4.30 mol kg⁻¹ NaCl. Both Morrison and Billett and Gerecke and Bittrich reported log (S°/S) values and not the original solubility data. In the Morrison and Billett paper the ratio, S°/S, was identified as the hydrogen solubility ratio per kg of water. Gerecke and Bittrich identified the S°/S ratio as a ratio of Kuenen coefficients, which was taken to mean the solubility of hydrogen per g of water in both pure water and solution. Conversions to $k_{\rm SCA}$ values were made consistent with the authors definitions.

The salt effect parameters scatter, but there is a general trend of a decrease of salt effect parameter magnitude as the temperature increases. A linear regression, over the 273-345 K temperature interval gave

$$k_{SCG}/dm^3 mol^{-1} = 0.2256 - 4.09 \times 10^{-4} T/K$$

The salt effect parameters calculated from the papers and the smoothed values are given below. The smoothed values have an uncertainty of about 10 per cent.

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	т/к	Braun	Morrison, Billett	Gerecke	Gerecke, Bittrich	Crozier, Yamamoto	Steiner	Value from Equation
$ \begin{bmatrix} 278.2 & 0.103 & & 0.111 \\ 283.2 & 0.095 & & 0.109 \\ 283.97 & & 0.107 & & 0.101^2 & & 0.109 \\ 285.75 & & 0.107 & & 0.106 & & 0.109 \\ 288.15 & 0.093 & & 0.107 & & 0.106 & 0.108 \\ 289.55 & & & 0.115^1 & & 0.107 \\ 293.2 & 0.090 & & & 0.105^2 & & 0.105 \\ 298.15 & 0.096 & & 0.106 & & & 0.106^2 & & 0.103 \\ 301.50 & & & 0.088^1, 0.091^2 & & 0.102 \\ 303.15 & & 0.103 & & & 0.102 \\ \end{bmatrix} $	274.04					0.1271		0.113
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		0.103						0.111
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	283.2	0.095						0.109
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	283.97					0.101 ²		0.109
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	285.75		0.107					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	288.15	0.093			0.107		0.106	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	289.55					0.1151		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	293.2	0.090						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	295.34					0.106²		
303.15 0.103 0.102	298.15	0.096		0.106			•	
00000	301.50				(0.088 <mark>,</mark> 0.091	. 2	
1 322,55 0.099 0.094	303.15							
	322.55		0.099					
323.15 0.100 0.093	323.15				0.100			
344.85 0.088 0.085	344.85		0.088					0.085

measurements at ca. 0.2 mol dm⁻³

² measurements at ca. 0.5 mol dm⁻³

The Bunsen coefficient data of Braun at the lowest temperatures are thought to be considerably in error but the salting and parameters are probably more reliable. The values quoted in the table are for a concentration of 1 mol dm⁻³. Braun's data gives larger values for more dilute solution and are classified as doubtful.

24. Hydrogen + water + Sodium sulfate [7757-82-6]

This system has been studied by Steiner (16) at three different concentrations. The average value of k_{sca} is 0.279 dm³ mol⁻¹ at 288.2 K.

25. Hydrogen + water + Sulfuric acid [7664-93-9] + Sodium sulfate [7757-82-6]

Kobe and Kenton (3) made two measurements of the solubility of hydrogen in a mixture that was 1.76 mol kg⁻¹ Na₂SO₄ and 0.90 mol kg⁻¹ H₂SO₄. Using the sum of the component molalities gives the salt effect parameter, $k_{\rm Sm\alpha} = 0.157$. The value indicates the Na₂SO₄ contributes more to the salting out effect than does the H₂SO₄. The value appears reasonable and is classed as tentative.

26. Hydrogen + water + Sodium nitrite [7632-00-0]

Longo, Delivoria-Papadopoulas, Power, Hill, and Forster (11) measured the solubility of hydrogen in water and in 0.14 mol dm⁻³ NaNO₂. The salt effect parameter calculated from their data is $k_{\rm SCO}$ 0.154 at 298.15 K. The value is greater than for other 1-1 electrolytes. It is classed as tentative.

27. Hydrogen + water + Sodium nitrate [7631-99-4]

Gerecke (10) measured the solubility of hydrogen in aqueous NaNO₃. He reported one value of the salt effect parameter, $k_{\rm SMS}$, of 0.081 at 298.15 K. This was converted to a salt effect parameter value, $k_{\rm SC\alpha}$, of 0.098. The value is classed as tentative.

This system has also been studied by Steiner (16) at five concentrations at temperatures near 288 K. Values "adjusted" to 288.2 K were reported and give a tentative value of $k_{sc\alpha}$ of 0.0986 dm³ mol⁻¹ at a salt concentration of 1 mol dm⁻³. The salt effect parameters show some scatter but there is a tendency to a decrease in $k_{sc\alpha}$ as the salt concentration increases

 $k_{ccc}/dm^3 mol^{-1} = 0.1007 - 2.1 \times 10^{-4} c_3/mol dm^{-3}$

where c_3 is the salt concentration.

The data of Knopp (15) give salt effect parameters, $k_{SC\alpha}$ which scatter considerably with an average value of 0.094 dm³ mol⁻¹ at 293.15 K.

28. Hydrogen + water + Sodium carbonate [497-19-8]

Steiner (16) studied this system at four concentrations at temperatures near 288 K. Values "adjusted" to 288.2 K were reported and give a tentative value of $k_{SC\alpha}$ of 0.294 dm³ mol⁻¹.

29. Hydrogen + water + Potassium hydroxide [1310-58-3]

The solubility of hydrogen in aqueous potassium hydroxide was measured by Geffcken (1), Knaster and Apel'baum (15), Bruhn, Gerlach, and Pawlek (7), Ruetschi and Amlie (8), and Shoor, Walker, and Gubbins (9). The authors' results were converted to a Sechenow salt effect parameter of the form $k_{SC\alpha} = (1/c_3) \log(\alpha^{\circ}/\alpha)$, except for the results of Shoor, Walker, and Gubbins which were left in the original form of $k_{SC\alpha} = (1/c) \log(\alpha^{\circ}/\alpha)$. The value of $k_{SC\alpha}$ was taken as the slope of a linear regression of $\log(\alpha^{\circ}/\alpha) vs$. c_3 , except for the data of Bruhn *et al*. for which $k_{SC\alpha}$ values were averaged.

T/K Geffcken Kaster, Bruhn, Reutschi, Shoor. Apel'baum Gerlach, Amlie Walker, Pawlek Gubbins 294.15 0.123 0.1371 298.15 0.127^{3} 303.15 0.133 313.15 0.130^{3} 318.15 0.132 323.15 0.169^{2} 333.15 0.129^{3} 348.15 0.137 353.15 0.128³ 0.156² 0.1273 373.15 0.164² 423.15 0.151² 473.15 1 Average of four values at KOH concentrations between 0.715 and 1.480 mol dm^{-3} . Standard deviation 0.002. 2 Average of three values at KOH concentrations 0.5, 1.0, and 1.5 mol dm $^{-3}$ The standard deviations are 0.025, 0.024, 0.024 and 0.015 from top to bottom. ³ The salt effect parameters are given as k_{scx} values. Conversion to k sca values will make them smaller by about 0.01. 30. Hydrogen + water + Potassium chloride [7747-40-7] Gerecke and Bittrich (12) measured the solubility of hydrogen at two concentrations of potassium chloride at 288.15 K. They quote a salt effect parameter of Gerecke (10) at 298.15. They worked with electrolyte molality and gas Kuenen coefficients. Their values are classed as tentative. Values of both $k_{\rm sms}$ and $k_{\rm sca}$ are given. T/K 288.15 298.15 k_{sms}/kg mol⁻¹ 0.085 0.078 $k_{sca}/dm^3 mol^{-1}$ 0.100 0.094 Steiner (16) also studied this system and the salt effect parameter $k_{sc\alpha}$ at 288.2K is given by $k_{SCG}/dm^3 mol^{-1} = 0.1016 - 0.00295 \times c_3/mol dm^3$ where c3 is the concentration of the salt. Knopp's data (15) yield salt effect parameters which show no concentration dependence. The average value of $k_{sc\alpha}$ is 0.096 mol⁻¹ dm³. Hydrogen + water + Potassium iodide [7681-11-0] 31. The solubility of hydrogen in aqueous potassium iodide was measured at four temperatures by Morrison and Billett (4) and at one temperature by Gerecke (10). Their values of k_{sms} were converted to $k_{sc\alpha}$ values. The salt effect parameters in both forms are given below. T/K 285.75 298.15 303.15 322.55 344.85 k_{sms}/kg mol⁻¹ 0.088 0.083 0.081 0.066 0.043 $k_{sca}/dm^3 mol^{-1}$ 0.113 0.110 0.108 0.097 0.078

The results are given in the table below.

32. Hydrogen + water + Potassium nitrate [7757-79-1] This system has been studied by Steiner (16), Gerecke (10) and Knopp (15). Values of the salt effect parameter derived from Knopp's data at 293.15K show considerable variation but no clear correlation with concentration the average value is 0.07 mol⁻¹ dm³. Steiner's data give values of k_{sca} which decrease with increasing concentration but show considerable The value of $k_{sca}/mol-1 dm^3$ are given below scatter. $k_{sca}/mol^{-1} dm^3$ 0.1012 0.1121 0.0853 0.0864 0.0835 Conc. of salt /mol dm⁻³ 0.482 0.879 1.541 1.820 2.430 Gerecke (10) reports a salt effect parameter for aqueous potassium nitrate at 298.15 K. The value is classed as tentative. It is 0.061 as k_{sms} and 0.083 as $k_{sc\alpha}$. 33. Hydrogen + water + Potassium carbonate [584-08-7] This system has been studied by Steiner (16) at seven different salt concentrations at temperatures near 288K. Values "adjusted" to 288.2K were reported and give a tentative value of $k_{SC\alpha}$ of 0.290 mol⁻¹ dm³ at a salt concentration of 1 mol dm³. Their values decrease slightly with increasing concentration. References: 1. Geffcken, G. Z. Phys. Chem. 1904, 49; 257. 2. Christoff, A. Z. Physik. Chem. 1906, 55, 622. 3. Kobe, K. A.; Kenton, F. H. Ind. Eng. Chem., Anal. Ed. <u>1938</u>, 10, 76. 4. Morrison, T. J.; Billett, F. J. Chem. Soc. 1952, 3819. 5. Stephan, E. L.; Hatfield, N. S.; Peoples, R. S.; Pray, H. A. H. Battelle Memorial Institute Report BMI-1067, 1956. 6. Uch. Zap. Leningr. Gos. Univ., Shkol'nikova, R. I. Ser. Khim. Nauk. 1959, Nr. 18, 64. 7. Bruhn, G.; Gerlach, J.; Pawlek, F. Zeit. Anorg. Allg. Chem. 1965, 337, 68. 8. Ruetschi, P.; Amlie, R. F. J. Phys. Chem. 1966, 70, 718. 9. Shoor, S. K.; Walker, R. D. Jr.; Gubbins, K. E. J. Phys. Chem. 1969, 73, 312. 10. Gerecke, J. Dissertation (Dr. rer. nat.) 1969 THS "Carl Schorlemmer" Leuna-Merseburg, DDR 11. Longo, L. D.; Delivoria-Papadopoulas, M.; Power, G. G.; Hill, E. P.; Forster, R. E., Am. J. Physiology, 1970, 219, 561. Gerecke, J.; Bittrich, H. J. Wiss. Z. Tech. Hocsch. Chem. "Carl Schorlemmer" Leuna-Merseburg <u>1971</u>, 115 and 313. 13. Crozier, T. E.; Yamamoto, S. J. Chem. Eng. Data 1974, 19, 242. 14. Deckwer, W.-D. J. Chem. Eng. Data 1980, 25, 75. 15. Knopp, W. Z. Phys. Chem. 1904, 48, 97. 16. Steiner, P. Ann. der Phys. Chem. 1894, 52, 275 17. Braun, L. A. Phys. Chem. <u>1900</u>, 33, 721 18. Knaster, M.B.; Apel'baum, L.A. Zh. Fiz. Khim. 1964, 38, 223.

COMPONENTS :		ORIGINAL MEASUREMENTS:
	; [1333-74-0]	Geffcken, G.Z. Phys.Chem.
2. Water; H_2O ;		1904, <i>49</i> ,257-302
		1904, 39, 297-302
3. Hydrochloric [7647-01-0]		
VARIABLES:		
		PREPARED BY:
Concentratio	n	C.L. Young
EXPERIMENTAL VALUES:		
т/к	Conc of acid/mol dr	n ³ (soln) Ostwald coefficient, L
298.15	0.426	0.01875
	0.432 1.063	0.01868 0.01789
	1.062	0.01732
	1.802 1.928	0.01699 0.01688
	2.338	0.01652
	2.438 2.836	0.01627 0.01606
	AUXILIARY	INFORMATION
METHOD /APPARATUS,	/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric metho adsorption pipe Diagram and deta given in origina	t and buret. ailed description	 Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. Degassed.
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.1; \delta L = \pm 1\%.$
		(estimated by compiler). REFERENCES:
		ALFLALAULS:
		1

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Geffcken, G. Z. Phys. Chem.
	1904,49,257-302
2. Water; H ₂ O; [7732-18-5]	<u>1904</u> ,49,257-302
3. Sulfuric acid; H ₂ SO ₄ ; [7664-93-9]	
VARIABLES:	PREPARED BY:
Concentration	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of acid/mol o	dm ³ (soln) Ostwald coefficient,L
298.15 0.2635 0.2344 0.4925 0.5610 0.9330 0.9525 1.3025 1.5225 1.5870 1.9810 1.9945	0.01869 0.01780 0.01768 0.01642 0.01632 0.01575 0.01496 0.01456 0.01422 0.01402
METHOD /APPARATUS/PROCEDURE:	INFORMATION
Volumetric method using simple adsorption pipet and buret. Diagram and detailed description given in original paper.	 SOURCE AND PURITY OF MATERIALS: Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. Degassed.
1	

COMPONENTS :		ORIGINAL MEASUREMEN	NTS:	
(1) Hydrogen;	H ₂ ; [1333-74-0]	Christoff, A.		
(2) Water; H ₂ O	; [7732-18-5]	Z. Physik. Che	m. <u>1906</u> , 55,	622-634.
(3) Sulfuric a [7664-93-9	cid; H ₂ SO ₄ ;]			
VARIABLES:	202.15	PREPARED BY:		
P:	293.15 Atmospheric		E. Derrick L. Clever	
H ₂ SO ₄ /wt %: EXPERIMENTAL VALUE			<i>D</i> . CIEVEI	
		m (mol kg=1	Ostwald	
	T/K H ₂ SO ₄ /wt %	^m H ₂ SO ₄ /mol kg ⁻¹	$\frac{\text{Coefficient}}{\text{L} \times 10^2}$	-
	293.15 0.0 35.82 61.62 95.6	0.0 5.690 16.37 222.	2.077 0.9544 0.7081 1.097	
		INFORMATION		
METHOD/APPARATUS/P			OF MATERIALS.	
The apparatus with a lead cap which the gas	was an Ostwald type (l) pillary tube through flows to the absorption buret, and the gaso-	reaction o	Prepared from f zinc and di cid.	
The solvent was under reflux. ' a one per cent concentration procedure. The filled with so	s degassed by boiling The author estimates change in the acid due to the degassing absorption flask was lvent, the gas was	and 1.839 95.6 wt pe	cid. Merck (E ravity 1.271, for 35.82, 61 r cent, respe	1.523, .62, and
	d the system shaken ium was reached.	Barometric flu negligible.	δT/K = 0.02 f = 0.5 f ctuation stat	or gas
		REFERENCES: 1. Ostwald, W. Lehrbuch de (2 Aufl.),	r allgem. Che	mie
)		(2 najvi);	1, 015.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O; [7732-18-5]	Zeit. Anorg. Allg. Chem.
3. Sulfuric acid; H ₂ SO ₄ ;[7664-93-9]	<u>1965</u> , <i>337</i> , 68-79
VARIABLES:	PREPARED BY:
Temperature, concentration	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of acid/mol 1-	¹ Bunsen coefficient,α
323.15 0.5 1.0 1.5	0.01521 0.01348 0.01220
373.15 0.5 1.0 1.5	0.01733 0.01475 0.01398
423.15 0.5 1.0 1.5	0.02125 0.01935 0.01770
473.15 0.5	0.02900 0.02645
523.15 1.0	0.04180 0.03600
	-
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE: Static equilibrium cell. Similar to that described by Pray and Stephan (1). Composition of liquid determined by stripping solution of gas and estimating volumetrically.	SOURCE AND PURITY OF MATERIALS: No details given.
	ESTIMATED ERROR: $\delta T/K = \pm 2; \ \delta \alpha = \pm 2$ %. (estimated by compiler) REFERENCES: 1. Pray, H.A.; Stephan, E.L.

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COMPONENTS:	······································		ORIGINAL MEASUR	EMENTS:	
(1) Hydrogen	н ₂ ; [1333-	74-0]	Ruetschi, P	.; Amlie,	R. F.
(2) Water; H	0; [7732-18	-5]	J. Phys. Ch	em. <u>1966</u> ,	70, 718 - 723.
(3) Sulfuric [7664-93-	acid; H ₂ SO ₄ 9]	7			
VARIABLES:	m /w. 202		PREPARED BY:		
$H_2 H_2 H_2 H_2 SO_4/eq d$	T/K: 303. P/kPa: 101. Im ⁻³ : 0 -	325 (1 atm) 15.2		H. L. Clev	ver
EXPERIMENTAL VAL	UES:				
Temperature		_	olubility		
t/ ⁰ C T/K	^C ¹ ₂ H ₂ SO ₄ / mol dm ⁻³	$\frac{c_{H_2SO_4}}{mo1 \ dm^{-3}}$	m ³ (STP) dm ⁻³	log 50/5	(1/c)log S ^O /S ¹
30 303.15	0.0	0.0	17.03 16.90 17.10 16.93		
		 16	.99 ± 0.08 Av	·	-
,	0.0011 0.100 0.502 1.02 3.04 5.05 6.95 9.67 12.4 15.2	0.00055 0.050 0.251 0.51 1.52 2.525 3.475 4.835 6.2 7.6	17.09 16.66 16.15 15.17 12.76 10.83 10.01 8.87 8.11 7.68	0 0.0083 0.0221 0.0495 0.1243 0.195 0.230 0.283 0.322 0.345	0 0.166 0.088 0.097 0.082 0.077 0.066 0.059 0.052 0.045
		, c _{H2} SO4 ^{/mol d}			
METHOD /ADDADATUS	/PROCEDURE .	AUXILIARI	INFORMATION	TTY OF MATER	
the liquid re tube. The ar is determined The gas bure sel are ther	apparatus A calibra contains deg luced wet fr aret system. orces it up the top of t eturns via a hount of gas i via the ga as and disso nostated in	ted dissolu- assed water. om a cali- stirring sidearms the flask and central dissolved is burets.	grade (9 (2) Water. (3) Sulfuric Reagent	Matheso 9.5% min g No comment acid. So grade.	on Prepurified
and a descrip	tion of ope	eration.	ESTIMATED ERRO	R:	
			1. Ben-Naim,		, S. <u>1963</u> , 50,

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Geffcken, G.Z. Phys.Chem.
2. Water; H ₂ O; [7732-18-5]	1904,49,257-302
	1904,10,237 502
3. Nitric acid; HNO ₃ ; [7697-37-2]	
VARIABLES:	PREPARED BY:
Concentration	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of acid/mol dm	³ (soln) Ostwald Coefficient, <i>L</i>
298.15 0.741	0.01851
0.753	0.01868 0.01812
1.45	0.01782
2.09 2.96	0.01739 0.01690
3.18	0.01667 0.01633
3.22 4.13	0.01611
4.23	0.01589
AUXILIARY	INFORMATION
AUXILIARY METHOD /APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS;
	·
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	 SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed.
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried.
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	 SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed.
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	 SOURCE AND PURITY OF MATERIALS; 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed.
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	<pre>SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed. ESTIMATED ERROR:</pre>
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	<pre>SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed. ESTIMATED ERROR:</pre>
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	<pre>SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed. ESTIMATED ERROR:</pre>
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	<pre>SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed. ESTIMATED ERROR:</pre>
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description	<pre>SOURCE AND PURITY OF MATERIALS; 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. 2. Degassed. ESTIMATED ERROR:</pre>

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen, H ₂ ; [1333-74-0]	
	Bruhn, G.; Gerlach, J.; Pawlek, F. Zeit. Anorg. Allg. Chem.
2. Water, H ₂ O; [7732-18-5]	
3. Ammonium hydroxide; NH ₄ OH; [1336-21-6]	<u>1965</u> , <i>337</i> ,68-79.
VARIABLES:	PREPARED BY:
Temperature, concentration	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of salt/mol l ⁻¹	Bunsen coefficient, α
298.15 2.87 5.63 8.28	0.01745 0.01659 0.01603
323.15 2.87 5.63 8.28	0.01571 0.01473 0.01460
348.15 2.87 5.63 8.28	0.01629 0.01569 0.01530
373.15 2.87 5.63 8.28	0.01791 0.01762 0.01656
423.15 2.87 5.63 8.28	0.02285 0.02175 0.02140
	INFORMATION
METHOD /APPARATUS/PROCEDURE: Static equilibrium cell. Similar to that described by Pray and Stephan (1) Composition of liquid determined by stripping solution of gas and estimating	SOURCE AND PURITY OF MATERIALS: No details given.
volumetrically.	<pre>ESTIMATED ERROR:</pre>

(1) Hydrogen; H ₃ ; [133-74-0] (2) Water; H ₂ O; [7732-18-5] (3) Ammonium chloride; NH ₄ Cl; [12125-02-9] WARABLES: T/K: 288, 323 P/KPa: 101.325 (1 atm) m _{NH₄Cl^{/mol} kg⁻¹: 0.50 - 5.00 EXPERIMENTAL VALUES: T/K m_{NH₄Cl^{/mol} kg⁻¹ 100 (5°/S) EXPERIMENTAL VALUES: T/K m_{NH₄Cl^{/mol} kg⁻¹ 100 (5°/S) 2.00 0.112 323 0.50 0.0213 Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. MURLIARY INFORMATION METHOD/APTMAATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). METHOM/APTMAATUS/PROCEDURE: The hydrogen solubilities appear to floog (S°/S) = ±0.003 from graph. REFRENCES; 1. Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1940, 2033.}}}	COMPONENTS:	[]333-74-0]		ORIGINAL MEASUREMENTS: Gerecke, J.; Bittrich, H. J.
(3) Ammonium chloride; NH ₄ Cl; [12125-02-9] VARIABLES: P/KPa: 101.325 (1 atm) m _{H4} Cl ^{/mol} kg ⁻¹ : 0.50 - 5.00 EXPERIMENTAL VALUES: T/K $\frac{m_{H4}cl^{/mol} kg^{-1}}{288}$ T/K $\frac{m_{H4}cl^{/mol} kg^{-1}}{2.00}$ $\frac{1.00}{0.262}$ $\frac{1.00}{0.262}$ $\frac{323}{0.50}$ $\frac{0.55}{0.00}$ $\frac{1.00}{0.262}$ $\frac{323}{0.50}$ $\frac{0.021}{0.053}$ $\frac{1.00}{0.213}$ Values were taken from a graph in the paper by the compiler. The solubility ratio, 5°/5, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 2298.15 K and one atm partial pressure is a Bunsen coefficient of 0.017. METHOD/AFPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). METHOD (AFPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of .0177. SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. REFERENCES: 1. Morrison, T. J.; Billett, F.	4			Wiss. Z. Tech. Hocsch. Chem. "Carl
$[12125-02-9] Chem. Abstr. 1972, 76, 77239, 77, 66741. PKPR: 101.325 (1 atm) mH4_d1/mol kg-1: 0.50 - 5.00 EXPERIMENTAL VALUES: \frac{7/K}{268} \frac{m_{H4_dC1}/mol kg^{-1}}{2.00} \frac{\log (s^*/s)}{0.029} \frac{0.023}{1.00} \frac{0.021}{0.021} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.023}{5.00} \frac{0.021}{0.213} \frac{0.00}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.00} \frac{0.023}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.00}{0.023} \frac{0.021}{5.00} \frac{0.021}{0.023} \frac{0.021}$				
T/K: 288, 323 (1 atm) H. L. Clever H. L. C	[12125-02-9]	•		Chem. Abstr. <u>1972</u> , 76, 77239, 77,
$\frac{p/kP_{3}: 101.325 (1 \text{ atm})}{P_{MH_{4}C1}/mol \text{ kg}^{-1}: 0.50 - 5.00}$ H. L. Clever $\frac{p/kP_{3}: 101.325 (1 \text{ atm})}{2.00 - 5.00}$ H. L. Clever $\frac{p/kP_{3}: 101.325 (1 \text{ atm})}{2.00 - 0.50}$ H. L. Clever $\frac{p/kP_{3}: 101.325 (1 \text{ atm})}{2.00 - 0.50}$ Representation of the solution of the so	VARIABLES:			PREPARED BY:
EXPERIMENTAL VALUES: $ \frac{T/K}{288} \frac{m_{NH_4Cl}/mol kg^{-1}}{0.50} \frac{\log (S^{\circ}/S)}{0.029} \frac{1.00}{0.058} \frac{1.00}{0.029} \frac{1.00}{0.056} \frac{1.00}{0.021} \frac{1.00}{0.045} \frac{1.00}{2.00} \frac{1.00}{0.245} \frac{1.00}{2.00} \frac{1.00}{0.213} \frac{1.00}{0.045} \frac{1.00}{2.00} \frac{1.00}{0.213} \frac{1.00}{0.023} \frac{1.00}{$	P/kPa:	101.325 (1 a	atm)	H. L. Clever
288 0.50 0.029 1.00 0.058 2.00 0.112 5.00 0.262 323 0.50 0.021 1.00 0.045 2.00 0.213 Values were taken from a graph in the paper by the compiler.The solubility ratio, S°/S , is a ratio of Kuenen coefficients.The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177 .AUXILIARY INFORMATIONMETHOD/APPARATUS/PROCEDURE:The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1).SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. (2) Water.(3) Ammonium chloride. No information on the materials.ESTIMATED ERROR: $\delta \log (S^{\circ}/S) = \pm 0.003$ from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.		······		
1.00 0.053 2.00 0.112 5.00 0.262 323 0.50 0.021 1.00 0.045 2.00 0.233 Values were taken from a graph in the paper by the compiler. Values were taken from a graph in the paper by the compiler. Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: (1) Morrison, T. J.; Billett, F.		T/K m _{NI}	H ₄ Cl ^{/mol}	kg ⁻¹ log (S°/S)
2.00 0.112 5.00 0.262 323 0.50 0.021 1.00 0.045 2.00 0.033 S.00 0.213 Values were taken from a graph in the paper by the compiler. Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. (2) Water. (3) Anmonium chloride. No information on the materials. REFERENCES: 1. Morrison, T. J.; Billett, F.		288		
323 0.50 0.021 1.00 0.045 2.00 0.023 S.00 0.213 Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIANY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: Slog (S°/S) = ±0.003 from graph. REFERENCES: I. Morrison, T. J.; Billett, F.				
1.00 0.045 2.00 0.093 5.00 0.213 Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial presure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: & \$log (\$°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				0.262
2.00 0.093 5.00 0.213 Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: Ólog (S°/S) = ±0.003 from graph. REFERENCES: I. Morrison, T. J.; Billett, F.		323	0.50	0.021
5.00 0.213 Values were taken from a graph in the paper by the compiler. The solubility ratio, S°/S, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILLARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: Slog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				
paper by the compiler. The solubility ratio, S°/5, is a ratio of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). METHOD / APPARATUS / PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). ESTIMATED ERROR: $\delta \log (S^{\circ}/S) = \pm 0.003$ from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				
of Kuenen coefficients. The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: $\delta \log (5^{\circ}/S) = \pm 0.003$ from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				
hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: ôlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				
<pre>METHOD/APPARATUS/PROCEDURE: The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1). (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: δlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.</pre>		hydrogen : atm partia	in water al pressu	at 298.15 K and one re is a Bunsen
<pre>The hydrogen solubilities appear to have been determined by the method of Morrison and Billett (1).</pre> (1) Hydrogen. (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: <pre></pre>			AUXILIARY	INFORMATION
<pre>have been determined by the method of Morrison and Billett (1). (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR: δlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.</pre>	METHOD/APPARATUS/PRO	CEDURE :		SOURCE AND PURITY OF MATERIALS:
<pre>of Morrison and Billett (1). (2) Water. (3) Ammonium chloride. No information on the materials. ESTIMATED ERROR:</pre>	The hydrogen sol	ubilities app	pear to	(1) Hydrogen.
<pre>(3) Ammonium chloride. No information on the materials. ESTIMATED ERROR:</pre>	have been determ of Morrison and	ined by the m Billett (1).	nethod	(2) Water.
No information on the materials. ESTIMATED ERROR: $\delta \log (S^{\circ}/S) = \pm 0.003$ from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.		· · · · · · · · · · · · · · · · · · ·		
ESTIMATED ERROR: δlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.				(3) Annonium chioride.
<pre>δlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.</pre>				No information on the materials.
<pre> δlog (S°/S) = ±0.003 from graph. REFERENCES: 1. Morrison, T. J.; Billett, F.</pre>				
REFERENCES: 1. Morrison, T. J.; Billett, F.				
1. Morrison, T. J.; Billett, F.				$\delta \log (S^{\circ}/S) = \pm 0.003$ from graph.
				1. Morrison, T. J.; Billett, F.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Gerecke, J.
(2) Water; H ₂ O; [7732-18-5]	Dissertation (Dr. rer. nat.) 1969 THC "Carl Schorlemmer"
(3) Electrolyte	Leuna-Merseburg, DDR
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (l atm)	H. L. Clever
EXPERIMENTAL VALUES: $T/K k_s = (1/s)$	m) log (S ⁰ /S)
Ammonium chloride;	NH ₄ Cl; [12125-02-9]
298.15	0.055
Lithium chloride; L	iCl; [7447-41-8]
298.15	0.062
Sodium chloride; Na	Cl; [7647-14-5]
298.15	0.095
Potassium chloride;	KCl; [7447-40-7]
298.15	0.078
Potassium iodide; K	I; [7681-11-0]
298.15	0.083
Sodium nitrate; NaN	0 ₃ ; [7631-99-4]
298.15	0.081
Potassium nitrate;	KNO ₃ ; [7757-79-1]
298.15	0.061
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The values above were quoted in a paper by Gerecke and Bittrich (1).	No information on the source and purity of materials.
The solubility ratio, S ⁰ /S, is ratio of Kuenen coefficients. The salt concentration is m/mol kg ⁻¹ .	
	VETTWATED EDDOD.
	ESTIMATED ERROR:
	REFERENCES :
	1. Gerecke, J.; Bittrich, HJ. Wiss. Z. Tech. Hochsch. Chem. "Carl Schorlemmer" Leuna- Merseburg 1971, 13, 313 - 321.

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ;	[1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O; [7		Zeit. Anorg. Allg. Chem.
3. Ammonium sulfa [7783-20-2]	-	<u>1965</u> , <i>337</i> , 68-79.
VARIABLES:		PREPARED BY:
Temperature, co	oncentration	C.L. Young
EXPERIMENTAL VALUES:		
т/к	Conc of salt/mol 1	-1 Bunsen coefficient, α
298.15	0.25 0.75 1.5 3.0	0.01638 0.01358 0.00953 0.00766
323.15	0.25 0.75 1.5 3.0	0.01540 0.01191 0.00854 0.00747
373.15	0.25 0.75 1.5 3.0	0.01657 0.01449 0.01029 0.00759
423.15	0.25 0.75 1.5 3.0	0.02175 0.01798 0.01300 0.01030
473.15	1.5 3.0	0.01703 0.01250
523.15	1.5 3.0	0.02305 0.02055
······································	AUXILIARY	INFORMATION
METHOD /APPARATUS/P	ROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibriu to that described Stephan (1). Com liquid determined solution of gas a volumetrically.	by Pray and position of by stripping	No details given.
		<pre>ESTIMATED ERROR:</pre>

COMPONENTS :			ORIGINAL MEASU	DEMENTS .	
1		74 01		remento:	
-	ogen; H ₂ ; [133]		Knopp, W.		
1	; H ₂ O; [7732-]			~ 1	
	nium nitrate; NH	14NO3;	Z. Phys. (
[6484	-52-2]		<u>1904</u> , 48,	A1-TO8.	
		· · · · · · · · · · · · · · · · · · ·			
VARIABLES:			PREPARED BY:		
Con	centration of sa	alt		C. L. Young	
EXPERIMENT	AL VALUES:				
				Bunsen	
	We of colt	Conc. of salt	Density of	absorption	fraction
T/K	Wt. of salt in 100 g soln.	(soln.)	$/g \text{ cm}^{-3}$	a	10 ⁴ x _H ,
	-				112
	<u></u>	k			
293.15	0	0	0.99823	0.01883	0.1511
	1.037 2.167	0.1308 0.2765	1.00267 1.00722	0.01872 0.01845	0.1508 0.1492
	3.378	0.4363	1.01216	0.01823	0.1492
	4.823	0.6333 0.9069	1.01815	0.01773 0.01744	0.1450 0.1436
	6.773 11.550	1.6308		0.01647	0.1384
		AUXILIARY	INFORMATION		
METHOD APP	ARATUS/PROCEDURE:		SOURCE AND PUR	ITY OF MATERIALS	3.
ILLINOD ALL	AMIDS/I KOCEDUKE.		SOURCE AND FUR	ATT OF PATERIALS	5.
pipet an	ic method with and gas buret bein s were determine	ng used.	dil. su apparat silver	ed from pure 2 alfuric acid 5 tus, passed th nitrate, pota ide and perman ons.	in a Kipp's nrough assium
Sprengel	pyknometer.		2 and 3.	No details o	given.
			POTTMATED PRO		
1			ESTIMATED ERRC	JK:	
			$\delta \alpha / \alpha = \pm 3$	& (estimated b	by compiler).
			REFERENCES :		
L			í		

COMPONENTS	:	ORIGINA	L MEASUREMENTS:	
1. Hydro	ogen; H ₂ ; [1333-74-0]	Stei	ner, P.	
	r; H_2O ; [7732-18-5]	Ann.	der Phys. Chem.	
3. Zinc	<pre>sulfate; ZnSO₄;</pre>	1894	, 52, 275-299.	
[773:	3-02-0]			
VARIABLES:		PREPARI	ED BY:	
	Concentration of salt		C. L. Young	r
EXPERIMENT	AL VALUES:			
	Density		Bunsen	Bunsen
T/K	Conc. of salt at 28 / mol dm ⁻³ /g	8.2 K cm ⁻³	$\operatorname{coefficient}_{\alpha}$	at 288.2 K
288.2			0.01883	0.01883
290.94 291.10		620 394	0.01495 0.01151	0.01525 0.01175
291.37	1.277 1.1	961	0.00940	0.00961
291.71	2.180 1.3	265	0.00590	0.00605
	<pre># given in original, :</pre>	method o	f calculation from	m
	Bunsen coefficient	at exper:	imental temperatu	re
	not clear.			
-				
			1	
	AUXILIA	RY INFORMA	TION	
METHOD/APP	PARATUS/PROCEDURE:	SOURCE	AND PURITY OF MATER	IALS:
1	ric method using an Ostwald		Recrystallized.	
	s buret and pipet. Solvent			
	assed before being admitted			
to the p	pipet. Details in source.			
		ESTIMA	TED ERROR:	i
		δα/	$\alpha = \pm 0.02.$	
	•	REFERE	NCES:	

COMPONENTS:		ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂;</pre>	[1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O;	-	Zeit. Anorg. Allg. Chem.
	ulfate; CuSO ₄ ;	<u>1965</u> , <i>337</i> , 68-79
VARIABLES:		PREPARED BY:
Temperature,	concentration	C.L. Young
EXPERIMENTAL VALUES:		
т/к	Conc of salt/mol 1	-1 Bunsen coefficient,α
298.15	0.5 1.0 1.5	0.01422 0.01222 0.01050
323.15	0.5 1.0 1.5	0.01280 0.01189 0.00935
348.15	0.5 1.0 1.5	0.01372 0.01102 0.01001
373.15	0.5 1.0 1.5	0.01490 0.01275 0.01149
398.15	0.5 1.0 1.5	0.01619 0.01384 0.01153
METHOD/APPARATUS/P		
	um cell. Similar d by Pray and mposition of d by stripping	SOURCE AND PURITY OF MATERIALS; No details given.
		<pre>ESTIMATED ERROR:</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O; [7732-18-5]	Zeit. Anorg. Allg. Chem.
<pre>3. Nickel (2+) sulfate; NiSO₄; [7786-81-4]</pre>	<u>1965</u> , <i>337</i> , 68-79.
VARIABLES:	PREPARED BY:
Temperature, concentration	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of salt/mol 1 ⁻¹	Bunsen coefficient,α
298.15 0.5 1.0 1.5	0.01412 0.01205 0.01031
323.15 0.5 1.0 1.5	0.01260 0.01143 0.00897
348.15 0.5 1.0 1.5	0.01356 0.01076 0.00985
373.15 0.5 1.0 1.5	0.01425 0.01233 0.01135
398.15 0.5 1.0 1.5	0.01630 0.01390 0.01155
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Similar to that described by Pray and Stephan (1). Composition of liquid determined by stripping solution of gas and estimating volumetrically.	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 2; \ \delta \alpha = \pm 2$.
	(estimated by compiler).
	REFERENCES: 1. Pray, H.A.; Stephan, E.L. Battelle Memorial Institute Report BMI-840, <u>1953</u> .

COMPONE	NTS:		ORIGINAL MEASUREMENTS:
		[1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
-		[7732-18-5]	Zeit. Anorg. Allg. Chem.
	.0124-43-3]	ulfate; CoSO ₄ ;	<u>1965</u> ,337, 68-79
VARIABL	.ES:		PREPARED BY:
Те	mperature,	concentration	C.L. Young
EXPERIM	ÆNTAL VALUES:		
	т/к	Conc of salt/mol 1-1	Bunsen coefficient, a
29	8.15	0.5 1.0	0.01446 0.01250
30	3.15	1.5 0.5	0.01085 0.01297
52		1.0 1.5	0.01237 0.01183 0.01038
34	8.15	0.5	0.01364
		1.0	0.01125 0.00971
37	3.15	0.5	0.01506
		1.0 1.5	0.01270 0.01105
39	8.15	0.5	0.01641
		1.0 1.5	0.01455 0.01275
		AUXILIARY	INFORMATION
METHOD	/APPARATUS/I	PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Simil and S liqui solut	Stephan (1). id determine	ium cell. described by Pray Composition of ed by stripping and estimating	No details given.
			ESTIMATED ERROR:
			$\delta T/K = \pm 2; \ \delta \alpha = \pm 2 $
			(estimated by compiler).
			REFERENCES:
			 Pray, H.A.; Stephan, E.L. Battelle Memorial Institute Report, BMI-840, <u>1953</u>.

		ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74	4-0]	Shkol'nikova, R. I.
(2) Water; H ₂ O; [7732-18-5	5]	Uch. Zap. Leningr. Gos. Univ., Ser.
<pre>(3) Hydrated iron oxide; Fe₂O₃·xH₂O; [12259-21-</pre>	-1]	Khim. Nauk. <u>1959</u> , Nr. 18, 64 - 86. Chem. Abstr. <u>1961</u> , 55, 25443b.
VARIABLES: T/K: 293.15 - 313 P/kPa: 101.325 (1 Fe ₂ O ₃ /Wt %: 0 - 0.8		PREPARED BY: A. L. Cramer H. L. Clever
EXPERIMENTAL VALUES:		L
	/K Hydra Fe ₂ 0 ₃	a ted Bunsen a / Wt % Coefficient $a \times 10^3$
293.	.15 0. 0. 0.	.5 16.1
303.	.15 0. 0. 0.	.5 15.1
313.		.5 12.6
The hydrated iror	n oxide is d	described as a sol (colloidal).
······································	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS;
METHOD/APPARATUS/PROCEDURE: The apparatus and procedu Lannung were modified (1)	ire of	·-
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given.
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent.
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent. (2) Water. No information.
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent. (2) Water. No information. (3) Iron oxide. No information.
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent. (2) Water. No information. (3) Iron oxide. No information.
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent. (2) Water. No information. (3) Iron oxide. No information. ESTIMATED ERROR:
The apparatus and procedu	ire of	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. Stated to be 99.99 per cent. (2) Water. No information. (3) Iron oxide. No information. ESTIMATED ERROR: REFERENCES: 1. Lannung, A.

COMPONENTS:			ORIGINAL MEASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]						
(2) Water; H ₂ O; [7732-18-5]			Deckwe	er, WD.		
(2) Water; n ₂ 0; [7732-18-5] (3) Manganese (II) sulfate; MnSO ₄ ; [7785-87-7]			J. Chem. Eng. Data <u>1980</u> , 25, 75 - 76.			
	3.15 - 35		PREPARED BY:			
(2 P/kPa: 10	0 - 80 °C 1.325 (1) atm)	H. L. Clever			
P/kPa: 101.325 (1 atm) CMnSO4/mol dm ⁻³ : 0.5 - 3.5			<u> </u>			
EXPERIMENTAL VALUES:						
C _{MnSO4} /mol dm ⁻³ Bunsen c		Bunsen co	Defficient, $\alpha \times 10^2$			
	293.15K	303.15K 3	313 . 15K	323.15K	333 . 15K	353.15K
01	1 9 2 0		1 640	1 610	1 600	1 600
0.5	1.820 1.672	1.700 1.508	1.640 1.429		1.600 1.302	1.600 1.236
1.0	1.339	1.212	1.141	1.141	1.072	1.108
1.5		0.945	0.867	0.856	0.835	0.920
2.0	0.725 0.515	0.696 0.524	0.690 0.573	0.686 0.585	0.690 0.592	0.782 0.631
3.0	0.375	0.399	0.427	0.464	0.462	0.477
3.5	0.304	0.312	0.330	0.352	0.339	0.352
		AUXILIARY	INFORMAT	ION		
METHOD/APPARATUS/PROCH	EDURE :		SOURCE A	AND PURITY (OF MATERIAL	5;
A gas chromatograph technique was used. The gas was presaturated by passing through a MnSO ₄ solution, then passed through the solution, equilibrium was established in one hour. A known volume (about 10 cm ³) was transferred to an evacuated, heated column. Most of the H ₂ desorbed from the saturated solution under these conditions, but any remaining was		 Hydrogen. Source not given. Commercial sample of 99.9 per cent purity. 				
		(2) Wa	ter. No i	nformatio	n.	
		(3) Manganese (II) sulfate. No information				
stripped by passa			ESTIMATED ERROR: Mean relative error			
The gas flow was dried on silica gel, and introduced to the gas chromato- graph (Perkin-Elmer Fll6E). Peaks without tailing were obtained on a 2-cm column at 50 C filled with 5A molecular sieve and a heat conductiv- ity detector. The instrument was calibrated with H_2 and H_2/Ar mixtures.		is about 2 per cent at MnSO4 concen- tration of 1 mol dm ⁻³ , increases to about 4 per cent at 3.5 mol dm ⁻³ (author).				
		REFERENCES: 1. Seidell, A.; Linke, W. F. Solubilities of Inorganic and				
		<i>Metalorganic Compounds</i> , Van Nostrand, Princeton, NJ, <u>1958</u> , Vol. I.				
The paper also reports solution den- sities, viscosities, & vapor pressure		loweri	ng.			

	·				
COMPONENTS:	ORIGINAL MEASUREMENTS:				
(1) Hydrogen; H ₂ ; [1333-74-0]	Shkol'nikova, R. I.				
(2) Water; H ₂ O; [7732-18-5]	Uch. Zap. Leningr. Gos. Univ., Ser. Khim. Nauk. 1959, Nr. 18, 64 - 86.				
(3) Hydrated aluminium oxide; Al ₂ O ₃ ·xH ₂ O; [1333-84-2]	Chem. Abstr. 1961, 55, 25443b.				
VARIABLES:	PREPARED BY:				
T/K: 293.15 - 313.15 P/kPa: 101.325 (1 atm) $A1_2O_3/Wt$ %: 0 - 0.35	A. L. Cramer H. L. Clever				
EXPERIMENTAL VALUES:					
T/K Hydrated Al ₂ O ₃ /Wt					
293.15 0.1 0.35	17.7 15.0				
303.15 0.1 0.35	16.7 11.1				
313.15 0.1 0.35	15.6 9.2				
The enthalpy of solution of hydrogen was calculated from the temperature coefficient of the Bunsen coefficient. It is 1590, 1150, and 3920 cal mol ⁻¹ in water, 0.1 and 0.35 wt % Al ₂ O ₃ , respectively. The values for the solubility of hydrogen in water were not given in the paper. The hydrated aluminium oxide is described as a sol (colloidal).					
AUXILIARY	INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
The apparatus and procedure of Lannung (1) were modified.	 Hydrogen. Source not given. Stated to be 99.99 per cent. Water. No information. Aluminium oxide. No information. 				
· ·	ESTIMATED ERROR:				
	REFERENCES:				
	<pre>1. Lannung, A. J. Am. Chem. Soc. <u>1930</u>, 52, 68.</pre>				

COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]			
2. Water; H ₂ O; [7732-18-5]	Steiner, P.		
	Ann. der Phys. Chem.		
 Aluminium chloride; AlCl₃ [7446-70-0] 	<u>1894</u> , <i>52</i> , 275-299.		
[/446-/0-0]			
VARIABLES:	PREPARED BY:		
Concentration of salt			
	C. L. Young		
EXPERIMENTAL VALUES:			
Density of	soln. Bunsen	Bunsen "	
T/K Conc. of salt at 288.	2 K coefficient,	$\texttt{coefficient}^{\#}$	
/mol dm ⁻³ /g cm	α α	at 288.2 K	
288.2 0 0.999	0.01883	0.01883	
290.61 0.541 1.048		0.01486	
290.45 1.019 1.091 290.43 1.802 1.158		0.01210 0.00874	
290.29 3.080 1.264		0.00533	
[#] given in original, me Bunsen coefficient at not clear.			
Bunsen coefficient at			
Bunsen coefficient at not clear.	INFORMATION		
Bunsen coefficient at not clear.			
Bunsen coefficient at not clear. AUXILIARY	INFORMATION		
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATE	RIALS ;	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent	INFORMATION SOURCE AND PURITY OF MATE	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR:	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating.	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR:	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	RIALS; en chloride and	
Bunsen coefficient at not clear. AUXILIARY METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	INFORMATION SOURCE AND PURITY OF MATER 3. Chlorine, hydroge iron removed from heating. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	RIALS; en chloride and	

COMPONENTS:						
COMPONENTS:	ORIGINAL MEASUREMENTS:					
(1) Hydrogen; H ₂ ; [1333-74-0]	Morrison, T. J.; Billett, F.					
(2) Water; H ₂ O; [7732-18-5]	J. Chem. Soc. <u>1952</u> , 3819 - 3822.					
(3) Lanthanum chloride; LaCl ₃ ; [10099-58-8]						
VARIABLES: T/K: 285.75 - 344.85 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever					
EXPERIMENTAL VALUES:						
Temperature	Salt Effect Parameters					
1/(T/K) (1/c)log(S°/S^{1} (1/m)log(S°/S) (1/m)log(x°/x)					
12.6 285.75 0.0035 0.079 30.0 303.15 0.0033 0.078 49.4 322.55 0.0031 0.076 71.7 344.85 0.0029 0.075	0.237 0.267 0.234 0.264 0.228 0.258 0.225 0.255					
¹ In the authors notation c represen	ted g eq LaCl ₃ per 1.000 kg water.					
The salt effect parameters were calculated from two solubility measurements. The solubility in 1.000 kg water, S ⁰ , and the solubility in a l equivalent of salt per 1.000 kg of water, S. Values of the solubility of hydrogen in water are given in the paper, but not the solubility in the salt solution. The compiler calculated the salt effect parameter on a salt molal basis, and on a salt molal and gas mole fraction basis.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
The degassed solvent flows in a thin film down an absorption helix containing the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	 Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. Water. No information given. Lanthanum chloride. "AnalaR" material. 					
	ESTIMATED ERROR:					
	δk = 0.010					
	REFERENCES:					
	l. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u> , 2033.					

			,	•			
COMPONENTS:				ORIGINAL 1	IEASUREMENTS	:	
 Hydrogen; H₂; [1333-74-0] Water; H₂O; [7732-18-5] Uranyl sulfate; UO₆S; [1314-64-3] 				Peoples Battell	, E. L.; , R. S.; e Memoria 7, <u>1956</u> .	Pray, H.	А. Н.
VARIABLES:				PREPARED 1	3Y:		
Temperature, pressure, composition				С. L. Y	oung		
EXPERIMENTA	L VALUES:	·····		I			
	g Uranium per liter		Solubility [*]	т/к	g Uraniu per lite	m P [†] /bar r	Solubility
*	40	26.4 27.6 29.1 30.2 46.4 47.6 48.7 50.1 68.2 69.3 70.7 71.6 72.1 98.7 101.1 102.4 106.2 26.3 27.4 27.6 29.3	0.375 0.395 0.392 0.41 0.62 0.64 0.675 0.69 0.97 0.98 0.91 1.08 1.01 1.44 1.48 1.50 1.49 0.305 0.31 0.325 0.34	373.15	243 artial pro		0.35 0.396 0.63 0.645 0.662 0.648 0.83 0.867 0.84 0.84 1.20 1.24 1.25 1.27 1.27 1.27 1.27 0.20 0.207 0.23 0.372 0.40 (cont.)
		at 5.1.P.,		INFORMATIO			
METHOD /APE	ARATUS/P	ROCEDURE:		····	D PURITY OF	MATERIALS:	
Gas and 1 hours. Bourdon of red with of liquid method. pressure	iquid eq Pressure gauge and thermoco l estimat Details estimate	uilibrated measured temperatu uple. Co ed by volu	with are measu- omposition ametric e. Partial racting		No deta	ails give	n.
					±0.6; δP, ility) = ±	±3% (esti	

3. Uranyl sulfate; $UO_{6}S; [1314-64-3]$ EXPERIMENTAL VALUES: T/K g Uranium P^{\dagger}/bar Solubility T/K g Uranium P^{\dagger}/bar Solubil 373.15 243 46.2 0.392 408.15 243 93.5 0.895 73.6 0.62 95.0 0.95 73.6 0.668 435.93 40 14.2 0.324 78.5 0.668 435.93 40 14.2 0.324 101.8 0.92 16.5 0.294 103.1 0.93 70.70 105.8 0.91 40.0 0.753 106.8 0.95 41.4 0.782 106.6 0.96 43.1 0.805 408.15 40 27.4 0.40 56.9 1.20 0.29.0 0.40 56.9 1.20 408.15 40 27.4 0.40 56.9 1.20 105.6 0.95 14.1 0.782 106.6 0.96 43.1 0.805 408.15 40 27.4 0.40 56.9 1.20 105.6 0.77 18.6 0.31 47.4 0.71 94.1 1.715 47.6 0.702 96.5 1.77 48.4 0.718 100 18.1 0.321 47.6 0.702 96.5 1.77 48.4 0.718 100 18.1 0.321 47.4 0.71 94.1 0.71 96.9 1.47 35.9 0.58 70.1 1.07 35.9 0.58 70.1 0.887 71.7 18.6 0.77 44.3 0.55 58.6 0.77 44.3 0.55 58.6 0.77 45.9 0.613 60.7 1.03 70.1 0.887 71.7 1.4 71.4 0.272 46.5 0.77 44.3 0.55 58.6 0.77 45.9 0.613 60.7 1.03 71.4 1.05 58.6 0.77 71.4 1.05 77.7 1.14 71.4 0.95 77.7 1.14 71.4 0.95 77.7 1.14 71.4 0.95 77.7 1.14 71.4 0.95 77.7 1.14 71.4 0.75	COMPONENTS:			ORIGINAL MEASUREMENTS:				
3. Uranyl sulfate; $U065; [1314-64-3]$ EXPERIMENTAL VALUES: T/K g Uranium p^+/bar Solubility T/K g Uranium p^+/bar Solubil 77.6 0.62 95.0 0.95 73.6 0.62 95.0 0.95 73.6 0.62 95.0 0.95 73.6 0.62 95.0 0.95 101.8 0.92 16.5 0.294 103.1 0.93 37.9 0.705 105.8 0.91 40.0 0.755 106.8 0.95 41.4 0.755 106.8 0.95 41.4 0.725 106.6 0.96 43.1 0.805 408.15 40 27.4 0.40 56.9 1.20 408.15 40 27.4 0.40 56.9 1.20 408.15 40 27.4 0.40 56.9 1.20 408.15 40 27.4 0.40 56.9 1.20 10.44 66.0 1.22 46.0 0.676 93.4 1.71 47.6 0.702 96.5 1.77 47.4 0.71 94.1 1.715 47.6 0.702 96.5 1.77 48.4 0.718 100 18.1 0.321 49.5 0.77 18.6 0.35 90.585 102.1 1.59 40.0 0.663 104.8 1.56 41.0 0.663 105.8 0.270 43.4 0.717 44.3 0.55 58.6 0.977 45.9 0.613 60.7 1.03 47.3 0.635 60.7 7.7 1.14 71.4 0.95 88.0 1.24 10.3 1.225 1.05 66.2 0.855 60.0 1.09 243 22.4 0.219 34.1 0.334 102.9 1.30 31.225 1.03 32.4 0.236 71.7 1.14 71.4 0.95 88.0 1.41 102.9 1.30 34.1 0.394 243 22.4 0.219 34.1 0.394 243 22.4 0.219 34.1 0.344 102.9 1.30 34.1 0.395 56.7 0.588 1.02.4 1.24 102.4 1.24 1	2. Water; H ₂ O; [7732-18-5]			Peoples, R. S.; Pray, H. A. H. Battelle Memorial Institute Report				
T/Kg Uranium per liter p^+/bar solubility* T/KT/Kg Uranium per liter p^+/bar Solubil373.1524346.20.392408.1524393.50.89577.30.666435.934014.20.32478.50.65215.40.330101.80.9215.40.330102.80.95140.00.755105.80.95140.00.755106.80.9643.10.805408.154027.40.4056.929.00.4061.41.11240.60.667693.41.7147.40.7194.11.7748.40.71810018.149.50.07716.60.3271.41.0535.90.58571.41.0535.90.58571.41.0535.90.585102.11.5940.00.66310018.80.27043.471.40.27246.50.7744.30.5556.60.10972.40.61360.71.0373.40.62364.21.0573.40.63364.21.0573.40.63364.21.0574.40.95584.01.4199.91.4739.30.555102.11.5964.01.4199.21.2786.01.43 <trr>100.31.</trr>				BMI-1067, <u>1956</u> .				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	EXPERI	MENTAL VALUE	ES :					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	T/K		P [†] /bar	Solubility*	т/к	g Uranium per liter		Solubility
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	373.15	243			408.15	243		0.895
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	408.15	40	77.3 78.5 101.8 103.1 105.8 106.8 108.6 27.4	0.668 0.65 0.92 0.93 0.91 0.95 0.96 0.40	435.93	40	14.2 15.4 16.5 37.9 40.0 41.4 43.1 56.9	0.324 0.330 0.294 0.705 0.753 0.782 0.805 1.20
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			30.1 46.0 47.4 47.6 48.4 49.5 67.6 68.5	0.44 0.676 0.71 0.702 0.718 0.77 0.99 1.04		100	66.0 93.4 94.1 96.5 18.1 18.6 18.8 19.2	1.22 1.71 1.715 1.77 0.321 0.316 0.333 0.358
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		100	71.4 98.9 102.1 104.8 18.8 19.8 21.4 44.3 45.9	1.05 1.47 1.59 1.56 0.270 0.251 0.272 0.55			35.9 39.3 40.0 41.0 43.4 43.5 46.5 58.6	0.617 0.595 0.663 0.683 0.745 0.73 0.77 0.97
		243	69.2 70.1 71.4 99.2 100.3 101.3 102.9 22.4 23.9 56.4 57.6 58.7 60.7	0.855 0.887 0.95 1.27 1.265 1.325 1.30 0.219 0.236 0.561 0.558 0.588 0.625		243	66.0 71.7 84.0 88.0 32.3 33.4 34.1 34.5 71.0 74.2 78.3 102.4	1.09 1.14 1.41 1.43 0.391 0.384 0.395 0.42 0.82 0.82 0.83 0.91 1.24
* ml of hydrogen at S.T.P./g of solution ⁺ partial pressure of hydrogen	* mlo:	f hydrogen a	t S.T.P./q	g of soluti	on [†] p	artial pres	ssure of	hydrogen

COMPONENTS:		<i>.</i> -	ORIGINAL MEASUREMENTS:		
	ogen; H ₂ ; [1333		Steiner, P.		
	; H ₂ O; [7732-]		Ann. der Phys. Chem.		
	esium sulfate; N	lgSO ₄ ;	<u>1894</u> , 5	52, 275-299.	
[7487	7-88-9]				
			ļ		
VARIABLES:			PREPARED B		
	Concentration of	salt		C. L. Young	9
			<u> </u>		
EXPERIMENTA	AL VALUES:				
	Conc. of salt	Density of	soln.	Bunsen	Bunsen #
т/К	/mol dm ⁻³	at 288.2 /g cm	2 K - 3	coefficient, α	coefficient [#] at 288.2 K
		/g ciii			
288.2	0	0.999		0.01883	0.01883
290.25	0.433	1,050	3	0.01479	0.01501
290.45 290.70	0.936 1.631	1.106		0.01140 0.00783	0.01159 0.00797
291.41	2.501	1.267		0.00487	0.00499
	not clea		experime		
		r.	INFORMATIO		
ME THOD / AP P		r.	INFORMATIO		TALS ;
ME THOD / AP P	not clea	r.	INFORMATIO	N	IALS ;
METHOD / AP P	not clea	r.	INFORMATIO	N	TALS ;
	not clea	r. AUXILIARY	INFORMATIO	N	
Volumet	not clea	r. AUXILIARY an Ostwald	INFORMATIO	N D PURITY OF MATER	
Volumet: type gas	not clea ARATUS/PROCEDURE: ric method using s buret and pipe	AUXILIARY an Ostwald c. Solvent	INFORMATIO	N D PURITY OF MATER	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO	N D PURITY OF MATER	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipe	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO	N D PURITY OF MATER	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE ANI	N D PURITY OF MATER No details	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED	N D PURITY OF MATER No details ERROR:	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE ANI	N D PURITY OF MATER No details ERROR:	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED	N D PURITY OF MATER No details ERROR:	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED	N PURITY OF MATER No details ERROR: ±0.02.	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED $\delta \alpha / \alpha =$	N PURITY OF MATER No details ERROR: ±0.02.	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED $\delta \alpha / \alpha =$	N PURITY OF MATER No details ERROR: ±0.02.	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED $\delta \alpha / \alpha =$	N PURITY OF MATER No details ERROR: ±0.02.	
Volumet: type gas was dega	not clea ARATUS/PROCEDURE: ric method using s buret and pipes assed before bein	AUXILIARY an Ostwald c. Solvent ng admitted	INFORMATIO SOURCE AND ESTIMATED $\delta \alpha / \alpha =$	N PURITY OF MATER No details ERROR: ±0.02.	

1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS:	
	Steiner, P.	
2. Water; H ₂ O; [7732-18-5]	Ann. der Phys. Chem.	
3. Calcium chloride; CaCl ₂ ;	1894, 52, 275-299.	
	1094, 02, 215 299.	
[10043-52-4]		
VARIABLES:	PREPARED BY:	
Concentration of salt	C. L. Young	
EXPERIMENTAL VALUES:		
Density of		n n##
T/K Conc. of salt at 288. /mol dm ⁻³ /g cm	-3 α at 288.2	
288.2 0 0.999		
291.67 0.321 1.028		
291.19 0.578 1.051 291.55 1.122 1.098		
291.24 1.827 1.156	8 0.00821 0.00839	
290.99 2.556 1.215 290.83 2.962 1.247		
250.03 2.502 1.247	0.00310 0.00313	
	INFORMATION	
	INFORMATION	
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE:		
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt	SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent		
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent Was degassed before being admitted	SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent	SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwalt type gas buret and pipet. Solvent Was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02$.	

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001/2011/2017						
COMPONENTS:			ORIGINAL MEASUREMENTS:			
1. Hydro	gen; H ₂ ; [1333	-74-0]	Braun, L.			
2. Water	; H ₂ O; [7732-1	8-5]	Z. phys. Chem.			
3. Bariu	m chloride; BaC	12;	<u>1900</u> ,	33, 721-741.		
[1036	1-37-2]				ł	
VARIABLES:			PREPARED	BY:		
Temperature, concentration of salt				C. L. Young	1	
_						
EXPERIMENTA	AL VALUES:					
		_				
т/к	Wt. of salt per 100 g soln.	Bunsen coefficient.	т/к	Wt. of salt per 100 g soln.		
-/	/g	α	-,	/g	α	
			<u></u>			
278.2	0	0.02366	288.2	6.453 7.002	0.01734 0.01715	
	3.291 3.600	0.02110 0.02089	293.2	0	0.01905	
	6.453	0.01957		3.291 3.600	0.01719 0.01700	
283.2	7.002 0	0.01937 0.02213		6.453	0.01605	
	3.291	0.01983	298.2	7.002	0.01591 0.01750	
	3.600 6.453	0.01971 0.01857	298.2	3.291	0.01570	
	7.002	0.01833		3.600 6.453	0.01562 0.01474	
288.2	0 3.291	0.02059 0.01847		7.002	0.01455	
	3.600	0.01839				
	out parameter more reliable	s at the lowe	st temper	r but the salting ratures are proba n).	bly	
		AUXILIARY	INFORMATIC	DN		
METHOD APPA	ARATUS/PROCEDURE:	<u></u>	SOURCE AN	D PURITY OF MATERIAL	S :	
Ostwald :	method, using ga	s buret and		No details g	iven.	
pipet.	Measurement of	volume of				
gas befo	re and after abs	orption.				
Vapor pr	essure of water	was allowed				
for by a	ssuming Raoult's	law.				
Solution	was degassed.	Concentra-				
	salt solution es					
-	tion with silver	nitrate	ESTIMATED ERROR:			
solution	•		δα,	$/\alpha = \pm 0.03$		
			REFERENCE	:S :		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Steiner, P.			
2. Water; H ₂ O; [7732-18-5]	Ann. der Phys. Chem.			
3. Lithium chloride; LiCl;	<u>1894</u> , <i>52</i> , 275-299.			
[7447-41-8]				
VARIABLES:	PREPARED BY:			
Concentration of salt	C. L. Young			
EXPERIMENTAL VALUES:				
	Bunsen Bunsen "			
T/K Conc. of salt Density of	soln. coefficient, coefficient [#]			
/mol dm ⁻³ at 288.2 _/g cm	2 K α at 288.2 K			
288.2 0 0.999				
283.62 0.835 1.0192	0.01676 0.01619			
285.55 1.800 1.0416 285.92 3.734 1.0843				
	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Volumetric method using an Ostwald	No details given.			
type gas buret and pipet. Solvent				
was degassed before being admitted				
to the pipet. Details in source.				
	ESTIMATED ERROR:			
	$\delta \alpha / \alpha = \pm 0.02.$			
	REFERENCES:			

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Morrison, T. J.; Billett, F.		
(2) Water; H ₂ O; [7732-18-5]	J. Chem. Soc. 1952, 3819 - 3822.		
<pre>(2) Hithium Chloride; LiCl;</pre>	<u></u> ,		
[7447-41-8]			
VARIABLES:	PREPARED BY:		
T/K: 285.75 - 344.85 P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VATUES:			
Temperature	Salt Effect Parameters		
	$\frac{m}{\log(S^{O}/S)^{1}} \frac{(1/m)\log(x^{O}/x)}{(1/m)\log(x^{O}/x)}$		
12.6 285.75 0.0035 30.0 303.15 0.0033	0.064 0.079 0.065 0.080		
49.4 322.55 0.0031	0.061 0.076		
71.7 344.85 0.0029	0.054 0.069		
¹ The authors used $(1/c)\log(S^{O}/S)$ with water. For the 1-1 electrolyte the $m_{NaCl}/mol kg^{-1}$. The hydrogen solubi	compiler changed the c to an m for		
salt effect parameter are given in the the salt solution are not given. The compiler calculated the values of mole fraction gas solubility ratio.			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:			
The degassed solvent flows in a thin film down an absorption helix containing the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. (2) Water. No information given. (3) Lithium Chloride. "AnalaR" material. 		
film down an absorption helix containing the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached	 Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. Water. No information given. Lithium Chloride. "AnalaR" material. 		
film down an absorption helix containing the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached	 Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. Water. No information given. Lithium Chloride. "AnalaR" 		
film down an absorption helix containing the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached	 Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. Water. No information given. Lithium Chloride. "AnalaR" material. ESTIMATED ERROR: 		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Gerecke, J.; Bittrich, H. J.		
(2) Water; H ₂ O; [7732-18-5]	Wiss. Z. Tech. Hocsch. Chem. "Carl		
(3) Lithium chloride; LiCl; [7447-41-8]	Schorlemmer" Leuna-Merseburg <u>1971</u> , 115 - 122, 313 - 321.		
	Chem. Abstr. <u>1972</u> , 76, 77239, 77, 66741.		
VARIABLES: T/K: 288	PREPARED BY:		
P/kPa: 101.325 (1 atm)	H. L. Clever		
$m_{\rm LiC1}/mol ~ kg^{-1}$: 0.43 - 3.75			
EXPERIMENTAL VALUES:	1		
T/K m _{LiCl} /mol	kg ⁻¹ log (S°/S)		
288 0.43	0.026		
0.75	0.046		
1.43	0.089		
3.75	0.225		
Values were taken the paper by the	n from a graph in compiler.		
The solubility ra ratio of Kuenen o			
of hydrogen in wa	ial pressure is a		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
The hydrogen solubilities appear to	(l) Hydrogen.		
have been determined by the method of Morrison and Billett (1).	(2) Water.		
	(3) Lithium chloride.No information on the materials.		
	NOTIVITED DDDD.		
	ESTIMATED ERROR:		
	$\delta \log (S^{\circ}/S) = \pm 0.003$ from graph.		
	REFERENCES :		
	1. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u> , 2033.		

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Geffcken, G.Z. Phys.Chem.	
2. Water; H_2O ; [7732-18-5]	<u>1904</u> ,49,257-302	
<pre>3. Sodium hydroxide; NaOH; [1310-73-2]</pre>		
VARIABLES:	PREPARED BY:	
Concentration	C.L. Young	
EXPERIMENTAL VALUES:	I	
T/K Conc. of Hydroxide,	/mol dm ⁻³ (soln) Ostwald coefficient, L	
298.15 0.543 0.571 0.962 0.974 1.059 1.137 1.850 3.400 3.430 4.687	0.01632 0.01608 0.01442 0.01409 0.01372 0.01348 0.01018 0.00648 0.00639 0.00483	
	INFORMATION	
METHOD /APPARATUS/PROCEDURE: Volumetric method using simple adsorption pipet and buret. Diagram and detailed description given in original paper.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permangan- ate. 2. Degassed. ESTIMATED ERROR:</pre>	

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H	2; [1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O;	[7732-18-5]	Zeit. Anorg. Allg. Chem.
3. Sodium hydro	oxide; NaOH;	<u>1965</u> 337, 68-79
[1310-73-2]	l	
VARIABLES:		PREPARED BY:
Temperature	, concentration	C.L. Young
EXPERIMENTAL VALUE	S:	
т/к	Conc of salt/mol l ⁻¹	Bunsen coefficient, α
323.15	0.5 1.0 1.5	0.01306 0.01108 0.00868
373.15	0.5 1.0 1.5	0.01433 0.01270 0.00933
423.15	0.5 1.0 1.5	0.01790 0.01682 0.01308
473.15	0.5 1.0 1.5	0.02597 0.02115 0.01710
523.15	0.5 1.0 1.5	0.03535 0.02930 0.02350
	۵UXILIARY	INFORMATION
METHOD/APPARATUS		SOURCE AND PURITY OF MATERIALS:
Static equilib to that descri Stephan (1). liquid determi	rium cell. Similar bed by Pray and Composition of ned by stripping s and estimating	No details given.
	·	ESTIMATED ERROR: δT/K = ±2; δα = ±2%. (estimated by compiler). REFERENCES: 1. Pray, H.A.; Stephan, E.L. Battelle Memorial Institute Report BMI-840, <u>1953</u> .

COMPONENTS	•	······	ORIGINAL	MEASUREMENTS:	
	ogen; H ₂ ; [1333-	74-01	Steiner, P.		
_	$H_2O;$ [7732-18]		Ann. der Phys. Chem.		
	ım chloride; NaCl		1894, 52, 275-299.		
	7-14-5]	- ,	<u> </u>		
VARIABLES:	<u> </u>		PREPARED	BY:	
	Concentration of	salt		C. L. YOung	
EXPERIMENT	CAL VALUES:				
		Density of	soln.	Bunsen	Bunsen "
т/к	Conc. of salt	at 288. /g cm	2 К	coefficient,	coefficient" at 288.2 K
	/mol dm ⁻³	/g cm	-	α	at 200.2 K
288.2	0	0.999		0.01883	0.01883
286.71	0.825	1.031		0.01565 0.01140	0.01548 0.01130
286.95 286.32	2.801	1.108	8	0.00938	0.00925
286.63	4.815	1.181	7	0.00602	0.00595
		AUXILIARY	INFORMAT	 ION	
METHOD / APF	PARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERI	ALS:
					- i won
	ric method using a			No details	given.
	s buret and pipet. assed before being				
	pipet. Details :		{		
			ESTIMAT	ED ERROR:	
			δα/α :	= ±0.02.	
			REFEREN		
			1	CES:	
				CES:	
				CES :	
				CES :	
				CES :	

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COMPONENT	ːs:		ORTGINAL	MEASUREMENTS:		
	rogen; H ₂ ; [133	3-74-01	Braun, L.			
1	er; H_2O ; [7732-		Z. phys. Chem.			
1	ium chloride; Na		<u>1900</u> , 33, 721-741			
	47-14-5]		<u>1900</u> ,	00, 721-741		
[[/0	4/-14-5]					
VARIABLES	5:		PREPARED	BY:		
Temperature, concentration of salt				C. L. Youn	Ia	
-	·······				- -	
EXPERIMEN	VTAL VALUES:					
т/к	Wt. of salt per 100 g soln. /g	Bunsen coefficient, a	т/к	Wt. of salt per 100 g soln. /g	Bunsen coefficient, α	
278.2	0	0.02366	288.2	4.496	0.01714	
	1.250	0.02180		5.506	0.01665	
	1.523 3.798	0.02155 0.01977	293.2	5.999 0	0.01640 0.01905	
	4.496	0.01920		1.250	0.01771	
]	5.506 5.999	0.01861 0.01839		1.523 3.798	0.01754 0.01623	
283.2	0	0.02213		4.496	0.01587	
	1.250 1.523	0.02052 0.02030		5.506 5.999	0.01532	
	3.798	0.01876	298.2	0	0.01750	
	4.496 5.506	0.01817 0.01769		1.250 1.523	0.01621 0.01603	
	5.999	0.01749		3.798	0.01476	
288.2	0 1.250	0.02059		4.496 5.506	0.01429	
	1.523	0.01914 0.01896		5.999	0.01395 0.01383	
	3.798	0.01760				
N.B.	to be conside	rably in error	but the	st temperatures a salting out para er evaluation).		
		AUXILIARY	INFORMATI	ON		
METHOD /AF	PARATUS/PROCEDURE:		SOURCE AN	ND PURITY OF MATERIAL	S:	
	l method, using g			No details	given.	
pipet.	Measurement of					
	Fore and after ab					
	pressure of water					
	assuming Raoult'	s law.				
	on was degassed.	Concentra-				
	salt solution e		ESTIMATEI	FPPAR.		
by titi	ation with silve	r nitrate	2011121121	J LINKON.		
solutio	on.			$\delta \alpha / \alpha = \pm 0.$	03.	
			REFERENCI	ES:		
l						

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Morrison, T. J.; Billett, F.
(2) Water; H ₂ O; [7732-18-5]	J. Chem. Soc. <u>1952</u> , 3819 - 3822.
<pre>(3) Sodium Chloride; NaCl; [7647-14-5]</pre>	
VARIABLES:	PREPARED BY:
T/K: 285.75 - 344.85 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
	alt Effect Parameters
	$\log(S^{\circ}/S)^{1} (1/m)\log(x^{\circ}/x)$
	.097 0.112
	.092 0.107
	.082 0.097 .066 0.081
¹ The authors used (1/c)log(S ^O /S) with water. For the 1-1 electrolyte the m _{NaCl} /mol kg ⁻¹ . The hydrogen solubi	compiler changed the c to an m for
The salt effect parameters were calculated solubility of hydrogen in water, S^{O} , and S^{O} only the solubility of the hydrogen in effect parameter are given in the paper salt solution are not given.	and in the one molal salt solution, S. n water, and the value of the salt
The compiler calculated the values of mole fraction gas solubility ratio.	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	COURCE AND DUDTTY OF WATERLALC.
The degassed solvent flows in a thin film down an absorption helix con- taining the hydrogen gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Prepared from pure zinc and dilute hydrochloric acid. (2) Water. No information given. (3) Sodium Chloride. "AnalaR" material.
	ESTIMATED ERROR: $\delta k = 0.010$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u> , 2033.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Gerecke, J.; Bittrich, H. J.		
(2) Water; H ₂ O; [7732-18-5]	Wiss. Z. Tech. Hocsch. Chem. "Carl		
(3) Sodium chloride; NaCl;	Schorlemmer" Leuna-Merseburg <u>1971</u> , 115 - 122, 313 - 321. Chem. Abstr. <u>1972</u> , 76, 77239, 77, 66741.		
[7647-14-5]			
VARIABLES:	PREPARED BY:		
T/K: 288, 323			
P/kPa: 101.325 (1 atm)	H. L. Clever		
m _{NaCl} /mol kg ⁻¹ : 0.50 - 4.30			
EXPERIMENTAL VALUES:			
T/K m _{NoCl} /mol k	g ⁻¹ log (S°/S)		
288 0.50	0.051		
1.00	0.097		
2.00	0.164		
4.30	0.388		
323 0.50	0.042		
1.00	0.083		
2.00	0.190 0.325		
Values were taken the paper by the co			
The solubility rat ratio of Kuenen co			
The authors value of hydrogen in wate of hydrogen in wate and one atm partia Bunsen coefficient	er at 298.15 K l pressure is a		
AUXILIARY	INFORMATION		
	4 -		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The hydrogen solubilities appear to have been determined by the method	(l) Hydrogen.		
of Morrison and Billett (1).	(2) Water.		
	(3) Sodium chloride.		
	No information on the materials.		
	ESTIMATED EDDOD.		
	ESTIMATED ERROR:		
	$\delta \log (S^{\circ}/S) = \pm 0.003$ from graph.		
	REFERENCES.		
	REFERENCES:		
	<pre>1. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u>, 2033.</pre>		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Crozier, T. E.; Yamamoto, S.
(2) Water; H ₂ O; [7732-18-5]	J. Chem. Eng. Data <u>1974</u> , 19, 242-244.
<pre>(3) Sodium chloride; NaCl; [7647-14-5]</pre>	
VARIABLES:	PREPARED BY:
T/K: 274.03 - 301.51 P/kPa: 101.325 (1 atm) $W_{NaCl}/{}^{0}/{}_{00}$: 10.950, 27.376	P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	
T/K Bunsen Coefficient α	Ostwald Coefficient L
10.950 parts NaCl per	- 1000
283.97 0.01852 289.55 0.01770	0.01925 0.01876
0.01770	0.01876
301.48 0.01650 301.51 0.01651	0.01821 0.01822
27.376 parts NaCl per	
274.03 0.01877	0.01883
274.04 0.01881 295.34 0.01586	0.01887 0.01715
295.37 0.01585 301.47 0.01552	0.01714 0.01713
The compiler calculated the Ostwald of coeffcients.	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The solubility measurements were made by the Scholander (1) micro- gasometric technique as modified by	(1) Hydrogen. Linde Specialty Gas. Research grade, 99.9995 per
Douglas (2). Equilibration is with	(2) Water. Distilled from glass
Douglas (2). Equilibration is with 6 cm ³ of gas-free water. All volumes are read on a micrometer which adjust the amount of mercury in the system.	cent pure. (2) Water. Distilled from glass apparatus.

COMPONENTS:			ORIGINAL	MEASUREMENTS:	
			Steiner, P.		
-	1. Hydrogen; H_2 ; [1333-74-0] 2. Water: H_2 0; [7732-18-5]			-	
	2. Water; H_2O ; [7732-18-5]			ler Phys. Chem.	
3. Sodium sulfate; Na ₂ SO ₄ ;			<u>1894</u> ,	52, 275-299.	
[7757-82-6]					
VARIABLES:			PREPARED	BY:	
	Concentration of s		1 ILLI IIILD	C. L. Young	
	concentration of a	bait		0. 1. 10ung	
EXPERIMENT					
т/к	Conc. of salt	Density of at 288.		Bunsen coefficient,	Bunsen
17K	/mol dm ⁻³	/g cm	- 3	a a	at 288.2 K
288.2		0.999		0.01883	0.01883
291.66 291.72		1.041		0.01482 0.01223	0.01519 0.01254
291.56		1.160		0.00757	0.00775
				<u> </u>	
	not clear. * at 291.15				
		AUXILIARY		ON.	
METHOD /APP	ARATUS/PROCEDURE:			ND PURITY OF MATERI	A1 S .
The HOD/MIT	RAIDS/INCEDURE.		SOURCE AN	D FURITI OF PATERI	ALS;
1					
Volumetr	ric method using ar	n Ostwald		No details	given.
	s buret and pipet.	Solvent			
	assed before being	admitted			
to the p					
-					
			ESTIMATE	D ERROR:	
			δα/α =	±0.02.	
			REFERENC	ES:	
			1		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Kobe, K. A.; Kenton, F. H.
(2) Water; H ₂ O; [7732-18-5]	Ind. Eng. Chem., Anal. Ed. <u>1938</u> , 10, 76 - 77.
(3) Sodium sulfate; Na ₂ SO ₄ ; [7757-82-6]	
(4) Sulfuric acid; H_2SO_4 ; [7664-93-9]	
VARIABLES: T/K: 298.15	PREPARED BY: P. L. Long
H ₂ P/kPa: 101.325 (760 mmHg)	H. L. Clever
EXPERIMENTAL VALUES:	
t/°C T/K Volume Vol cm ³ Abs	rogen Bunsen Ostwald ume Coefficient Coefficient orbed α L m ³
	37 72 0.0067 0.0073
The solvent was a mixture of	800 g H_2O , 200 g Na_2SO_4 (anhydrous), 40 ml H_2SO_4 (conc., 36 N).
Thus the molality of the solu ^M Na ₂ S	
	$4/mol kg^{-1} = 0.90$
н250	4
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was described in detail	(1) Hydrogen. Source not given.
in an earlier paper (1). The appara-	Purity stated to be 99° percent.
tus consists of a gas buret, a pres- sure compensator, and a 200 cm ³	(2) Water. Distilled.
absorption bulb and mercury leveling	(3, 4) Sodium sulfate and sulfuric acid. Sources not given.
bulb. The absorption bulb is attached to a shaking mechanism.	Analytical grades.
-	
The solvent and the gas are placed in the adsorption bulb. The bulb was	
shaken until equilibrium was reached. The remaining gas was returned to the	
buret. The difference in final and	ESTIMATED ERROR:
initial volumes was taken as the gas absorbed.	$\delta \alpha / cm^3 = 0.001 (authors)$
absorbed.	
	REFERENCES :
	l. Kobe, K. A.; Williams, J. S. Ind. Eng. Chem., Anal. Ed. <u>1935</u> , 7, 37.

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. G.;
.,
9,

COMPONENTS	:		ORIGINAL	MEASUREMENTS :	
 Hydrogen; H₂; [1333-74-0] Water; H₂O; [7732-18-5] Sodium nitrate; NaNO₃; [7631-99-4] 				c, P. er Phys. Chem. 52, 275-299.	
VARIABLES:			PREPARED	BY:	
	Concentration of s	alt		C. L. Young	
EXPERIMENT	AL VALUES:				
T/K	Conc. of salt /mol dm ⁻³	Density of at 288.2 /g cm	2 K	Bunsen coefficient, α	Bunsen coefficient [#] at 288.2 K
288.2 290.95 290.80 290.55 290.51 290.42	1.413 2.656	0.999 1.036 1.076 1.141 1.2099 1.2963	7 5 7 9	0.01883 0.01572 0.01345 0.01034 0.00797 0.00568	0.01883 0.01603 0.01370 0.01052 0.00810 0.00578
		AUXILIARY	INFORMATI	N	
ME THOD / AP P	ARATUS/PROCEDURE:		SOURCE AN	D PURITY OF MATERI	ALS :
Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted to the pipet. Details in source.				No details g	jiven.
) ERROR: ±0.02.	
			REFERENCI	:S :	

COMPONENTS	5:		ORIGINAL MEASUREMENTS:			
-	ogen; H ₂ ; [133		Knopp, W.			
	$r; H_2O; [7732-$		Z. Phys. Chem.			
	um nitrate; NaN 1-99-4]	037	<u>1904</u> , <i>48</i> , 97-108.			
[703.	1 22 4]					
VARIABLES:	:		PREPARED BY:			
Co	ncentration of s	alt	C. L. Young			
EXPERIMENT	TAL VALUES:					
				Bunsen	10 ⁴ mole	
	Wt. of salt	Conc. of salt	soln.	absorption	fraction	
T/K	in 100 g soln.		$/g \text{ cm}^{-3}$	α	$10^4 x_{\rm H_2}$	
293.15	0	0	0.99823		0.1511	
	1.041 2.192	0.1236 0.2634	1.00524 1.01303		0.1476 0.1428	
	4.405	0.5416	1.02820	0.01694	0.1367	
	6.702 12.637	0.8442 1.7394	1.04411 1.08667		0.1229 0.1064	
		AUXILIARY	INFORMATION			
ME THOD / AP F	PARATUS / PROCEDURE :	AUXILIARY	SOURCE AND PU	JRITY OF MATERIA		
METHOD /APF	PARATUS/PROCEDURE:	AUXILIARY	SOURCE AND PU 1. Prepar dil. s	red from pure sulfuric acid	zinc and in a Kipp's	
			SOURCE AND PU 1. Prepar dil. s appara	red from pure sulfuric acid atus, passed	zinc and in a Kipp's through	
Manometi	ric method with a	absorption	SOURCE AND PU l. Prepar dil. s appara silver hydrox	red from pure sulfuric acid atus, passed r nitrate, po kide and perm	zinc and in a Kipp's through tassium	
Manometı pipet ar	ric method with a nd gas buret were	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver	red from pure sulfuric acid atus, passed r nitrate, po kide and perm	zinc and in a Kipp's through tassium	
Manometi pipet ar Densitie	ric method with a	absorption e used.	SOURCE AND PU 1. Prepan dil. s appara silver hydros soluti	red from pure sulfuric acid atus, passed r nitrate, po kide and perm	zinc and in a Kipp's through tassium anganate	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydros soluti	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions.	zinc and in a Kipp's through tassium anganate	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydros soluti 2 and 3.	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydros soluti 2 and 3. ESTIMATED ERF	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydros soluti 2 and 3. ESTIMATED ERF	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydrox soluti 2 and 3. ESTIMATED ERF $\delta \alpha / \alpha = \pm 3$	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydros soluti 2 and 3. ESTIMATED ERF	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydrox soluti 2 and 3. ESTIMATED ERF $\delta \alpha / \alpha = \pm 3$	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate	
Manomet: pipet ar Densitie	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydrox soluti 2 and 3. ESTIMATED ERF $\delta \alpha / \alpha = \pm 3$	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	
Manometı pipet ar Densiti¢	ric method with a nd gas buret were es were determine	absorption e used.	SOURCE AND PU 1. Prepar dil. s appara silver hydrox soluti 2 and 3. ESTIMATED ERF $\delta \alpha / \alpha = \pm 3$	red from pure sulfuric acid atus, passed r nitrate, po xide and perm ions. No details	zinc and in a Kipp's through tassium anganate given.	

COMPONENTS:			ORIGINAL	MEASUREMENTS:	
	····· 11 - (1000 ·	74_01	Steine		
	H_2 ; [1333-]		Ann. der Phys. Chem.		
	$H_2O;$ [7732-18-			52, 275-299.	
	3. Sodium carbonate; Na ₂ CO ₃ ; [497-19-8]			52, 215-299.	
[49/-1	.9-8]				
VARIABLES:	· · · · · · · · · · · · · · · · · · ·		PREPARED	BY:	
c	oncentration of a	salt		C. L. Young	
EXPERIMENTA	L VALUES:				
		Density of	soln.	Bunsen	Bunsen "
т/к	Conc. of salt	at 288.	2 K	Bunsen coefficient,	coefficient [#]
	/mol dm ⁻³	/g cm	- 3	α	at 288.2 K
288.2	0	0.999		0.01883	0.01883
285.09		1.021		0.01677	0.01639
284.76 285.23	0.438 0.819	1.045 1.083		0.01420 0.01106	0.01385 0.01082
286.22	1.218	1.121		0.00851	0.00839
		AUXILIARY	INFORMATI	ON	
METHOD /APPA	RATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERI	ALS:
Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted to the pipet. Details in source.					
		admitted		No details o	given.
		admitted	ESTIMATE		given.
		admitted		D ERROR:	given.
		admitted	δα/α =	D ERROR: ±0.02.	given.
		admitted		D ERROR: ±0.02.	given.
		admitted	δα/α =	D ERROR: ±0.02.	given.
		admitted	δα/α =	D ERROR: ±0.02.	given.
		admitted	δα/α =	D ERROR: ±0.02.	given.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Geffcken, G.Z.Phys.Chem.
2. Water; H_2O ; [7732-18-5]	1904,49,257-302
3. Potassium hydroxide; KOH;	<u></u> ,,
[1310-58-3]	
VARIABLES:	PREPARED BY:
Concentration	C.L. Young
	· · · · · · · · · · · · · · · · · · ·
EXPERIMENTAL VALUES:	
T/K Conc of hydroxide	e/mol dm ⁻³ (soln) Ostwald coefficient, L
298.15 0.536	
0.715 1.059	0.01539 0.01378
1.056 1.480	0.01389 0.01195
AUXILIA	RY INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method using simple adsorption pipet and buret. Diagram and detailed description given in original paper.	 Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. Degassed.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta L = \pm 1\%.$
	(estimated by compiler).
	REFERENCES:
-	

COMPONENTS:		· · · · · · · · · · · · · · · · · · ·		ORIGINAL MEASUR	EMENTS:
(1) Hydrog	(1) Hydrogen; H ₂ ; [1333-74-0]			Knaster, M.	B.; Apel'baum, L. A.
(2) Water; H ₂ O; [7732-18-5]			-5]	Zh. Fiz. Kh	im. <u>1964</u> , 38, 223 - 225.
<pre>(3) Potassium hydroxide; KOH [1310-58-3]</pre>			КОН	Russ. J. Ph 120 - 122.	ys. Chem. <u>1964</u> , 38,
VARIABLES: T/K: 294.15, 318.15, 348.15 P/kPa: 101.325 (760 mmHg) c ₃ /mol dm ⁻³ : 0 - 10				PREPARED BY:	H. L. Clever
EXPERIMENTAL					
		perature	Potassium Hydroxide	Bunsen Coefficient	Salt Effect Parameter
	t∕°C	Т/К	$c_3/mol dm^{-3}$	10 ³ α	$\frac{k_{sc}}{dm^3 mol^{-1}}$
	21	294.15	0 1 4 7 10	18.10 14.15 6.11 2.51 1.11	- 0.107 0.118 0.123 0.121
	45	318.15	0 1 4 7 10	16.30 12.75 5.35 2.13 0.809	0.107 0.121 0.126 0.130
	75	348.15	0 1 4 7 10	16.10 12.14 5.21 1.98 0.736	0.123 0.122 0.130 0.134
	(1/	'(c ₃ /mol d	m ³)) log (α ⁰ ,	/α).	
			AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE: The KOH solution was introduced into the saturating vessel. The solution was saturated with gas, which was bubbled through the solution at a rate of 15 dm ³ h ⁻¹ for 5 h. The gas stream was turned off and the solu- tion was allowed to stand for one h to allow suspended gas bubbles to escape. A known amount of the gas- saturated solution was transferred to an evacuated flask. The gas evolved from the solution was with- drawn, together with water vapor, into an evacuated and calibrated			The solution which was tion at a h. The gas d the solu- d for one h ubbles to of the gas- ransferred The gas n was with- er vapor, librated . The water a liquid re (<i>ca</i> . gas at a lume was	 Hydrogen by elect to a sta process. Water. Potassiu informat ESTIMATED ERROR &T/ 	rolysis and subjected andard purification No information. m hydroxide. No tion.

COMPONENTS :		ORIGINAL MEASUREMENTS:
	2;[1333-74-0]	Bruhn, G.; Gerlach, J.; Pawlek, F.
2. Water; H ₂ O;	•	Zeit. Anorg. Allg. Chem.
	ydroxide, KOH;	<u>1965</u> , <i>337</i> , 68-79
VARIABLES:	<u> </u>	PREPARED BY:
Temperature,	, concentration	C.L. Young
EXPERIMENTAL VALUE	S:	
т/К	Conc of salt/mol 1^{-1}	Bunsen coefficient, α
323.15	0.5 1.0 1.5	0.01299 0.01146 0.00947
373.15	0.5 1.0 1.5	0.01528 0.01360 0.00992
423.15	0.5 1.0 1.5	0.01880 0.01620 0.01404
473.15	0.5 1.0 1.5	0.02650 0.02298 0.01313
	AUXILIARY	INFORMATION
METHOD/APPARATUS	/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
to that describ (1). Composit:	rium cell. Similar bed by Pray and Stephan ion of liquid determin- g solution of gas and umetrically.	No details given.
		ESTIMATED ERROR: $\delta T/K = \pm 2; \delta \alpha = \pm 2$ %.
		(estimated by compiler).
		REFERENCES: 1. Pray, H.A.; Stephan, E.L. Battelle Memorial Institute Report, BMI-840, <u>1953</u> .

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Ruetschi, P.; Amlie, R. F.
(2) Water; H ₂ O; [7732-18-5]	J. Phys. Chem. <u>1966</u> , 70, 718 - 723.
<pre>(3) Potassium hydroxide; KOH; [1310-58-3]</pre>	
VARIABLES:	PREPARED BY:
$\begin{array}{c} T/K: & 303.15\\ H_2 \ P/kPa: \ 101.325 \ (1 \ \text{atm})\\ C_{KOH}/mol \ dm^{-3}: \ 0 \ - \ 10.23 \end{array}$	H. L. Clever
EXPERIMENTAL VALUES:	
	bility log(S ^O /S) (l/c)log(S ^O /S) IP)dm ⁻³
16 17	. 03 . 90 . 10 . 93
	<u>+ 0.08 Av.</u> – –
0.102 16 0.510 14	.68 0.003 0.33 .29 0.018 0.18 .13 0.080 0.16
	.13 0.146 0.141 .27 0.264 0.133
	.71 0.404 0.133 .65 0.666 0.133
7.61 1	.59 1.029 0.135 .77 1.344 0.131
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
They used the apparatus of Ben-Naim and Baer (1). A calibrated dissolu- tion vessel contains degassed water.	(1) Hydrogen. Matheson Prepurified grade (99.5% min purity).
Gas is introduced wet from a cali- brated gas buret system. Stirring	(2) Water. No comment by author.
the liquid forces it up sidearms attached to the top of the flask and the liquid returns via a central tube. The amount of gas dissolved is determined via the gas burets. The gas burets and dissolution ves- sel are thermostated in a water bath.	(3) Potassium hydroxide. Source not given. Reagent grade.
The original paper contains a diagram and a description of operation.	ESTIMATED ERROR:
	REFERENCES:
	<pre>1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59, 2735.</pre>

Salt	Solutions	(Aqueous)
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COMPONEN	TS:		ORI	GINAL MEASUREMENTS	5:
(1) Hy	ydrogen;	H ₂ ; [1333-74-0]	st st	oor, S. K.; Walke: Gubbins, K. E.	r, R. D. Jr.;
(2) Wa	ater; H ₂ O	; [7732-18-5]			<i>aa</i> 210 217
(3) Pa [:	otassium 1310-58-3	hydroxide; KOH;]		Phys. Chem. <u>1969</u>	, 73, 312 - 317
EXPERIM	MENTAL VA	LUES:	<u>.</u>	<u></u>	<u> </u>
T/K				Solubility Ratio	
	KOH/wt %	c _{KOH} /mol dm ⁻³	$H_2/x_1 \times 10^5$	$\gamma = x^0/x$	Parameter $k_s = \log(x^0/x)/c$
298.15	0.0 5.00 9.00 19.50 41.40 52.40	0.0 0.92 1.70 4.12 10.37 14.35	1.43	1.00 1.36 1.71 3.50 20.1 72.0	0.145 0.137 0.132 0.127 0.129 0.129 (authors
313.15	0.0 5.00 9.00 19.50 32.40 41.40 52.40	0.0 0.92 1.70 4.12 7.60 10.37 14.35	1.29	1.00 1.28 1.64 3.29 8.70 20.4 73.7	0.117 0.126 0.125 0.124 0.126 0.130 0.129 (authors
333.15	0.0 5.00 9.00 19.50 32.40 41.40 52.40	0.0 0.92 1.70 4.12 7.60 10.37 14.35	1.30	1.00 1.32 1.74 3.58 9.16 21.4 76.7	0.131 0.141 0.134 0.127 0.128 0.131 0.129 (authors
353.15	0.0 5.00 9.00 19.50 32.40 41.40 52.40	0.0 0.92 1.70 4.12 7.60 10.37 14.35	1.322	1.00 1.33 1.81 3.65 9.04 21.8 75.4	0.135 0.152 0.136 0.126 0.129 0.131 0.129 (authors
373.15	0.0 38.00 41.40 52.40 56.50	0.0 9.27 10.37 14.35 16.20	1.342	1.00 15.3 21.9 82.6 108.	0.128 0.129 0.134 0.126

The compiler calculated the salt effect parameters, $k_s = (1/c)\log(x^0/x)$, at the individual KOH concentrations. The authors values are noted.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Shoor, S. K.; Walker, R. D., Jr.; Gubbins, K. E.
(2) Water; H ₂ O; [7732-18-5]	·
(3) Potassium hydroxide; KOH; [1310-58-3]	J. Phys. Chem. <u>1969</u> , 73, 312 - 317.
VARIABLES:	PREPARED BY:
T/K: 298.15 - 373.15 P/kPa: 101.325 (l atm) KOH/wt %: 0 - 56.50	P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	
See preced	ling page.
	INFORMATION
METHOD/APPARATUS/PROCEDURE: A gas chromat-	SOURCE AND PURITY OF MATERIALS:
ographic method was used (1). The	(1) Hydrogen. Source not given.
hydrogen saturated solutions were prepared by bubbling the gas through	Minimum purity stated to be 99.9 per cent.
presaturators and then through the KOH solution. Samples were drawn from	(2) Water. Specially distilled and
the solution over a 48 hour period to determine whether or not equilibrium	degassed from an all glass- Teflon still.
was established. Samples were trans- ferred from the saturator to the gas	(3) Potassium hydroxide. Baker Anal-
chromatograph in gas tight Hamilton syringes. All analyses were made with	yzed Reagent Grade. Contained a maximum of 1 per cent K ₂ CO ₃ . The
a thermal conductivity detector, and	KOH solutions were protected from atmospheric CO2 with Ascarite.
with nitrogen as the carrier gas.	ESTIMATED ERROR: $\delta T/K = 0.05$
The results are reported as activity coefficients, which are the mole	$\delta \gamma / \gamma = 0.01$
fraction solubility ratio, x^0/x , where x^0 is the gas mol fraction solubility	
in water, and x is the gas mol frac-	REFERENCES:
tion solubility in the aqueous KOH solution, both at a gas partial	l. Gubbins, K. E.; Carden, S. N.; Walker, R. D. Jr.
pressure of one atm. Solubility values were corrected to one atm assuming	J. Gas Chromatog. <u>1965</u> , 3, 98.
Henry's law is obeyed. The activity coefficients are the average of at	
least four measurements.	

COMPONENTS			ORIGINAL	MEASUREMENTS:	
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>		Steiner, P.			
	r; H_2O ; [7732-18-5]	1		der Phys. Chem.	
1	ssium chloride; KCl;		1	52, 275-299.	
	7-40-7]		<u>1094</u> ,	02, 215 255.	
	/-40-/]				1
VARIABLES:			PREPARED	BY:	
	()		i iui inuo		
	Concentration of salt			C. L. Young	·
EXPERIMENT	AT VALUES.				
	NL VALUES:				
	_				D -2
T/K		sity of at 288.2		Bunsen coefficient,	Bunsen coefficient [#]
	/mol dm ⁻³	/g cm		α	at 288.2 K
288.2	0	0.999		0.01883 0.01618	0.01883 0.01667
292.15	0.526 1.051	1.0240		0.01447	0.01489
291.86 291.97	1.755	1.0794		0.01246	0.01279
291.97	2.909 3.554	1.1294		0.00985 0.00869	0.01012 0.00892
	[#] given in origi	inal, met	hod of	calculation from	n
	Bunsen coeffic	cient at	experin	mental temperatur	ce
	not clear.				
		AUXILIARY	INFORMAT	10N	
METHOD /APP	ARATUS/PROCEDURE:			ND PURITY OF MATERI	AT C .
,	RATUS/FROCEDURE.		SUURCE A	NO FURITI OF MATERI	ALS;
		i			
1.			ā		
volumetr	ic method using an Ost			No details	given.
		olvent			
	ssed before being admi				
to the p	pipet. Details in sou	irce.			
			ESTIMATE	D ERROR:	
]			δα/α =	= ±0.02.	
			DEPODENC		
			REFERENC	JES:	
,					

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Knopp, W.		
2. Water; H ₂ O; [7732-18-5]	Z. Phys. Chem.		
3. Potassium chloride; KCl;	1904, 48, 97-108.		
[7447-40-7]			
VARIABLES:	PREPARED BY:		
Concentration of salt	C. L. Young		
EXPERIMENTAL VALUES:			
	Bunsen 10 ⁴ mole		
Conc. of salt Wt. of salt /mol dm ⁻³	Density of absorption fraction soln. coefficient, of hydrogen,		
T/K in 100 g soln. $(soln.)$	/g cm ⁻³ α 10 ⁴ x_{H_2}		
	112		
293.15 0 0	0.99823 0.01883 0.1511		
1.089 0.1475	1.00520 0.01823 0.1464		
2.123 0.2907 4.070 0.5687	1.01182 0.01757 0.1413 1.02431 0.01661 0.1339		
6.375 0.9127	1.03936 0.01531 0.1239		
7.380 1.0682 13.612 2.1222	1.04600 0.01472 0.1194 1.08754 0.01255 0.1030		
13.012 2.1222	1.00754 0.01255 0.1050		
AUXILIAR	Y INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
	1 Despaced from pure ging and		
Manager that with abcountion	1. Prepared from pure zinc and dil. sulfuric acid in a Kipp's		
Manometric method with absorption	apparatus, passed through		
pipet and gas buret were used.	silver nitrate, potassium hydroxide and permanganate		
Densities were determined using a	solutions.		
Sprengel pyknometer.	2 and 3. No details given.		
	ESTIMATED ERROR:		
	$\delta \alpha / \alpha = \pm 3$ % (estimated by compiler).		
	REFERENCES :		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Gerecke, J.; Bittrich, HJ.		
 (2) Water; H₂O; [7732-18-5] (3) Potassium chloride; KC1; 	Wiss. Z. Tech. Hocsch. Chem. "Carl Schorlemmer" Leuna-Merseburg <u>1971</u> , 115 - 122, 313 - 321.		
[7747-40-7]	Chem. Abstr. <u>1972</u> , 76,77239 ,77,66741		
VARIABLES:	PREPARED BY:		
T/K: 288 P/kPa: 101.325 (1 atm) m _{KC1} /mol kg ⁻¹ : 0.50, 1.0	H. L. Clever		
EXPERIMENTAL VALUES:			
T/K m _{KCl} /mol kg ⁻¹	log (5°/S)		
288 0.50 1.00	0.043 0.084		
Values were taken from a by the compiler.	graph in the paper		
The solubility ratio, S ⁰ Kuenen coefficients.	/S, is a ratio of		
The authors value of the solubility of hydrogen in water at 298.15 K and one atm partial pressure is a Bunsen coefficient of 0.0177.			
	-		
· · ·			
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
	SOURCE AND TORITI OF PATERIALS;		
The hydrogen solubilities appear to have been determined by the method	(l) Hydrogen.		
Of Morrison and Billett (1).	(2) Water.		
	(3) Potassium chloride.		
	No information on the materials.		
	ESTIMATED ERROR:		
	$\delta \log (S^0/S) = \pm 0.003$ from graph.		
	REFERENCES:		
	l. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u> , 2033.		

COMPONENTS : ORIGINAL MEASUREMENTS: (1) Hydrogen; H₂; [1333-74-0] Morrison, T. J.; Billett, F. (2) Water; H₂O; [7732-18-5] J. Chem. Soc. 1952, 3819 - 3822. (3) Potassium Iodide; KI; [7681-11-0] VARIABLES: PREPARED BY: T/K:285.75 - 344.85 H. L. Clever 101.325 (1 atm) P/kPa: EXPERIMENTAL VALUES: Salt Effect Parameters Temperature <u>T/K</u> 1/(T/K) $(1/m) \log (S^{\circ}/S)^{1}$ $(1/m)\log(x^{O}/x)$ t∕°C 0.088 12.6 285.75 0.0035 0.103 30.0 303.15 0.0033 0.081 0.096 322.55 0.0031 0.066 0.081 49.4 344.85 0.0029 0.043 0.058 71.7 ¹The authors used $(1/c)\log(S^{O}/S)$ with c defined as g eq salt per kg of water. For the 1-1 electrolyte the compiler changed the c to an m for The hydrogen solubility S is $cm^3(STP) kq^{-1}$. m_{NaCl}/mol kg⁻¹. The salt effect parameters were calculated from two measurements. The solubility of hydrogen in water, S^o, and in the one molal salt solution, S. Only the solubility of the hydrogen in water, and the value of the salt effect parameter are given in the paper. The solubility values in the salt solution are not given. The compiler calculated the values of the salt effect parameter using the mole fraction gas solubility ratio. AUXILIARY INFORMATION METHOD / APPARATUS / PROCEDURE : SOURCE AND PURITY OF MATERIALS: The degassed solvent flows in a thin (1) Hydrogen. Prepared from pure film down an absorption helix zinc and dilute hydrochloric containing the hydrogen gas plus acid. solvent vapor at a total pressure of one atmosphere. The volume of gas (2) Water. No information given. absorbed is measured in an attached (3) Potassium Iodide. "AnalaR" buret system (1). material. **ESTIMATED ERROR:** $\delta k = 0.010$ **REFERENCES:** 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.

COMPONENTS	:		ORIGINAL	MEASUREMENTS:	
1. Hydrogen; H_2 ; [1333-74-0]		Steiner, P.			
2. Water; H_2O ; [7732-18-5]		Ann. der Phys. Chem.			
1	ssium nitrate; KN			52, 275-299.	
l .	7-79-1]		·		
_	-				
VARIABLES	· · · · · · · · · · · · · · · · · · ·		PREPARED BY:		
	Concentration of	salt		C. L. Young	
EXPERIMENT	AL VALUES:				
1					
		Density of	soln.	Bunsen coefficient,	Bunsen
т/к	Conc. of salt /mol dm ⁻³	at 288.2 /g cm ⁻	к з	coefficient, a	at 288.2 K
288.2	0	0.999		0.01883	0.01883
290.97		1.0295	5	0.01650 0.01530	0.01683 0.01501
289.96	1.541	1.0936	5	0.01373	0.01391
290.42	1.820 2.430	1.1101 1.1460		0.01290 0.01157	0.01311 0.01180
			······		
	Bunsen Co not clear		experim	ental temperatu	
		AUXILIARY	INFORMATI	ION	
METHOD/APP	ARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERI	ALS:
Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted to the pipet. Details in source.			No details	given.	
			ESTIMATE	D FREOR.	
)			COLIMATE	D ERROR:	
			δα/α =	= ±0.02.	
			REFERENC	CES:	
			ļ		
			1		

COMPONENTS :	•	·	ORICINAL MEACH	DEMENTE .			
				ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]		Knopp, W.					
2. Water; H ₂ O; [7732-18-5]		Z. Phys. C]			
1	3. Potassium nitrate; KNO ₃ ;		<u>1904</u> , 48,	97-108.			
[7757-79-1]							
VARIABLES:			PREPARED BY:				
Con	centration of sa	lt		C. L. Young			
EXPERIMENT	AL VALUES:						
				-			
		Conc. of salt	Density of	Bunsen absorption	10 ⁴ mole fraction		
	Wt. of salt	/mol dm ⁻³	soln.	coefficient,	of hydrogen l		
Т/К	in 100 g soln.	(soln.)	/g cm ⁻³	α	10 ⁴ x _{H2}		
293.15	0	0	0.99823	0.01883	0.1511		
	1.244 2.094	0.1245 0.2114	1.00593 1.01133	0.01835 0.01818	0.1475 0.1464		
	2.094 4.010	0.4127	1.02362	0.01785	0.1443		
	5.925	0.6225	1.03592	0.01743 0.01667	0.1415 0.1358		
	7.742 13.510	0.8293 1.5436	1.04768 1.08646	0.01436	0.1198		
		AUXILIARY	INFORMATION				
METHOD /APP.	ARATUS/PROCEDURE:	· · · · · · · · · · · · · · · · · · ·	SOURCE AND PUR	AITY OF MATERIALS			
			1. Prepare	ed from pure z	inc and		
	ic method with a		dil. sulfuric acid in a Kipp's apparatus, passed through				
	nd gas buret beir	-	silver	nitrate, pota	assium		
	s were determine	ed using a	solutio	ide and perman	iganate		
Sprengel	pyknometer.		2 2 2 2 2 2 2	No details o	rivon		
1			2 and 5.	NO decarts g	jiven.		
			1				
			ESTIMATED ERRO	DR:			
			$\delta \alpha / \alpha = \pm 3$	<pre>% (estimated b</pre>	by compiler).		
			REFERENCES :				
			ALFERENCES:				
L			L				

COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>	Steiner, P.		
2. Water; H ₂ O; [7732-18-5]	Ann. der Phys. Chem.		
3. Potassium carbonate; K ₂ CO ₃ ;	<u>1894</u> , <i>52</i> , 275-299.		
[584-08-7]			
VARIABLES:	PREPARED BY:		
Concentration of salt	C. L. Young		
EXPERIMENTAL VALUES:			
Density	of soln. Bunsen Bunsen "		
T/K Conc. of salt at 28	38.2 K coefficient, coefficient [*]		
/mol dm ⁻³ /g	cm ⁻³ α at 288.2 K		
288.2 0 0.9	0.01883 0.01883		
284.38 0.209 1.0	0.01675 0.01628		
285.44 0.341 1.0	0405 0.01532 0.01501		
	0807 0.01216 0.01183 555 0.00775 0.00761		
	2353 0.00470 0.00462		
285.92 2.939 1.3	0.00290 0.00285		
286.32 4.352 1.4	395 0.00162 0.00160		
AUXILIA	ARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method using an Ostwald	No details given.		
type gas buret and pipet. Solvent			
was degassed before being admitted			
to the pipet. Details in source.			
	ESTIMATED ERROR:		
	ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$		
	$\delta \alpha / \alpha = \pm 0.02.$		
	$\delta \alpha / \alpha = \pm 0.02.$		
	$\delta \alpha / \alpha = \pm 0.02.$		

COMPONENTS :	ORIGINAL M	EASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Hüfner, G.		
(2) Water; H ₂ O; [7732-18-5]	Z. Physik. Chem. 1907, 57, 611-624.		
(3) Urea; CH_4N_2O or $(NH_2)_2CO;$ [57-13-6]	2. Ingetk. onem. <u>1907</u> , 07, 0.		
VARIABLES:	PREPARED B	Y:	
T/K: 293.29, 293.36 H ₂ P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
Temperature C _{urea} /molcm ⁻³ t/°C T/K Pi	Gas ressure/ mmHg	Absorbed Gas Volume ¹	
20.11 293.26 0.0			1.810 ²
20.21 293.36 1.0 20.14 293.29 1.0	668.4 699.3	6.13 6.39	1.700 1.706
490.94 cm ³ solution at stated pressure. ² Average of three runs, see Hüfner's H ₂ + H ₂ O data sheet.			et.
AUXILIARY	INFORMATIO	N	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND		
The apparatus, described in reference (1), was the Bunsen absorption type.		PURITY OF N	LATERIALS:
It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 694.3 mmHg. The author reported both the volume of gas absorbed at the final pressure in 409.94 cm ³ of solvent reduced to	of di The o manga and s (2) Water	ogen. For ilute sulf gas was was anate and o stored ove:	med by the reaction uric acid on zinc. shed with per- caustic solutions r mercury.
It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 694.3 mmHg. The author reported both the volume of gas absorbed at the final pressure	of di The o manga and s (2) Water	ogen. For ilute sulf gas was was anate and o stored over r. Pure. Source a	med by the reaction uric acid on zinc. shed with per- caustic solutions r mercury.
It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 694.3 mmHg. The author reported both the volume of gas absorbed at the final pressure in 409.94 cm ³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen coefficient, which was calculated	of di The o manga and s (2) Water (3) Urea	egen. For ilute sulf gas was wa anate and stored ove r. Pure. Source p ERROR:	med by the reaction uric acid on zinc. shed with per- caustic solutions r mercury.
It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 694.3 mmHg. The author reported both the volume of gas absorbed at the final pressure in 409.94 cm ³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen coefficient, which was calculated assuming Henry's law.	of di The o manga and s (2) Water (3) Urea. (3) Urea. ESTIMATED REFERENCES 1. Hüfne Archi Physt	egen. Formilute sulf gas was was anate and observed stored over c. Pure. Source p ERROR: & T/K S: er, G. & F. Ana	<pre>med by the reaction uric acid on zinc. shed with per- caustic solutions r mercury. not given. = 0.01</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Geffcken, G.Z. Phys. Chem.
2. Water; H ₂ O; [7732-18-5]	<u>1904</u> , <i>49</i> , 257-302
3. Chloroacetic acid; C ₂ H ₃ ClO ₂ [79-11-8]	
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	
T/K Conc of acid/mol dm ⁻³ (sol	<pre>In) Ostwald coefficient, L</pre>
288.15 0.527 0.990 1.773	0.01905 0.01852 0.01783
	INFORMATION
Volumetric method using simple adsorption pipet and buret. Diagram and detailed description given in original paper.	 SOURCE AND PURITY OF MATERIALS: Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chlor- ide. Washed in potassium hydroxide solution and potassium permanganate solution. Dried. Degassed.
	$\delta T/K = \pm 0.1; \delta L = \pm 1$ %. (estimated by compiler).
	REFERENCES :

l. Hydr	5:		ORIGINAL MEASU	JREMENTS:			
-	cogen; H ₂ ; [13]	33-74-0]	Knopp, W.				
2. Wate	er; H ₂ O; [7732.		Z. Phys. C	Chem.			
3. 2,2,	,2-Trichloro-1,1	-Ethanediol	1904, 48,	97-108.			
	Loralhydrate); (
	2-17-0]						
VARIABLES	:		PREPARED BY:				
	Concentration of	of colt		C. L. Youn	a		
	concentration of	JI SAIC		C. I. 1001	9		
EXPERIMEN	TAL VALUES:		. <u></u>		<u> </u>		
	_		- •	Bunsen	10 ⁴ × Mole		
	Wt. of salt in 100gsoln.	Conc. of salt /mol dm ⁻³	Density of soln.		hydrogon		
T/K	/g	(soln.)	$/g \text{ cm}^{-3}$	a	10 ⁴ x _{H₂}		
					11 2		
293.15	0	0	0.99823	0.01883	0.1511		
233.23	4.911	0.310	1.02017	0.01839	0.1509		
	7.69	0.504	1.03199 1.06687	0.01802 0.01712	0.1501 0.1476		
	14.56 18.77	1.030 1.397	1.08844	0.01653	0.1460		
	29.50	2.530	1.14659	0.01542	0.1461		
	32.00 38.42	2.845 3.770	1.16175 1.19817	0.01518 0.01440	0.1463 0.1463		
	49.79	6.000	1.27242	0.01353	0.1530		
	60.12 63.90	9.120 10.700	1.34522 1.37426	0.01324 0.01307	0.1697 0.1768		
		AUXILIARY	INFORMATION				
MERLIOD /AD	PARATUS / PROCEDURE :						
METHOD/AP			SOURCE AND PU	RITY OF MATERIALS	3:		
METHOD/AP1				RITY OF MATERIALS			
	ric method with	absorption	l. Prepare	ed from pure z:	inc and		
Manomet	ric method with		l. Prepare dil. su	ed from pure z: Ilfuric acid in	inc and n a Kipp's		
Manomet pipet a	and gas buret wer	e used.	l. Prepare dil. su apparat	ed from pure z: llfuric acid in us, passed the	inc and n a Kipp's rough silver		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	l. Prepare dil. su apparat nitrate	ed from pure z: llfuric acid in us, passed thus, potassium by	inc and n a Kipp's rough silver ydroxide		
Manomet pipet a Densiti	and gas buret wer	e used.	l. Prepare dil. su apparat nitrate and per	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu	inc and n a Kipp's rough silver ydroxide utions.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	l. Prepare dil. su apparat nitrate and per	ed from pure z: Ilfuric acid in us, passed thus, potassium by	inc and n a Kipp's rough silver ydroxide utions.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	l. Prepare dil. su apparat nitrate and per	ed from pure z: Ilfuric acid in us, passed the e, potassium hy manganate solu No details g:	inc and n a Kipp's rough silver ydroxide utions.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per and 3. 	ed from pure z: Ilfuric acid in us, passed the e, potassium hy manganate solu No details g:	inc and n a Kipp's rough silver ydroxide utions. iven.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per 2 and 3. ESTIMATED ERR δα/α = ± 	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu No details g: OR:	inc and n a Kipp's rough silver ydroxide utions. iven.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per and 3. 	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu No details g: OR:	inc and n a Kipp's rough silver ydroxide utions. iven.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per 2 and 3. ESTIMATED ERR δα/α = ± 	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu No details g: OR:	inc and n a Kipp's rough silver ydroxide utions. iven.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per 2 and 3. ESTIMATED ERR δα/α = ± 	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu No details g: OR:	inc and n a Kipp's rough silver ydroxide utions. iven.		
Manomet pipet a Densiti	nd gas buret wer .es were determir	e used.	 Prepare dil. su apparat nitrate and per 2 and 3. ESTIMATED ERR δα/α = ± 	ed from pure z: alfuric acid in cus, passed the c, potassium hy cmanganate solu No details g: OR:	inc and n a Kipp's rough silver ydroxide utions. iven.		

COMPONENTS:	· · · · · · · · · · · · · · · · · · ·		ORIGINAL MEASUREMENT	······································			
	ogen; H ₂ ; [13	33-74-01	Muller, C.				
	-						
2. Water; H ₂ O; [7732-18-5]			Z. Phys. Chem. <u>1912-13</u> , 81,				
(Chio	2-Trichloro-1,1 pralhydrate); -17-0]		483-503.				
VARIABLES:	·	<u> </u>	PREPARED BY:				
Concentr	ation of compo	nent 3	c.	L. Young			
					· · · · · · · · · · · · · · · · · · ·		
EXPERIMENTA			Bunsen [#]	D			
T/K	Conc. of comp. (3) (wt-%)	Bunsen coefficient	coefficient	Density of soln. at t/°C	t/°C		
	Fir	st set of expe	rimental data				
288.15	10	0.01740	0.01740	1.045	4		
289.55	16.1	0.01719	0.01737	1.0772	16		
288.95	33.35 39.4	0.01475 0.01470	0.01484 0.01470	1.1734 1.2144	15 15		
288.75	59.4 51	0.01470	0.01306	1.2848	16		
289.35	60.8	0.01281	0.01230	1.3585	16		
288.65	70.7	0.01282	0.01287	1.44	16		
288.15	79	0.01320	0.01320	1.5105	15		
200 55		ond set of expe		1 0720	19		
292.55	15.5 28.3	0.01732 0.01569	0.01724 0.01540	1.0728 1.1444	17,4		
291.85	46.56	0.01388	0.01375	1.2527	18.7		
289.65	52	0.01314	0.01280	1.2899	17		
290.15	63	0.01270	0.01243	1.3735	17		
290.35 291.05	66	0.01285	0.01260 0.01270	1.398 1.4121	17.5 18		
291.05	68 78.4	0.01286 0.01398	0.01380	1.4997	18		
	-	-	hod of calculation ental temperature				
		AUXILIARY	INFORMATION				
METHOD/APPA	RATUS/PROCEDURE:		SOURCE AND PURITY OF	MATERIALS:			
Volumetr	ic method in w	hich pressure	1. Prepared by	reaction of a	acid on		
	ermined using a	-	zinc, washed with caustic potash				
manomete	5	-	solution.				
	by boiling under		Boaucron.				
			2 and 2 No d	lotaila airean			
pressure		able amount	2 and 3. No d	lecalis given	•		
of water	was removed b	y this					
process.	Gas was sat	urated with					
water va	por before bei	ng admitted	ESTIMATED ERROR:		······································		
	ption buret.		$\delta T/K = \pm 0.1; \delta T/K = \pm 0.1;$	$SP/P = \pm 0.001$;		
	-		$\delta \alpha / \alpha = \pm 3$ % (est				
			DEPENDENCE				
			REFERENCES:				
			ł				

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COMPONENTS :	<u></u>	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ;	[1333-74-0]	Geffcken, G.Z. Phys. Chem.
2. Water; H ₂ O;		1904,49,257-302
		,,
3. Acetic acid;	$C_2H_4O_2$; [64-19-7]	
VARIABLES:		PREPARED BY:
Concentration	n	C.L. Young
EXPERIMENTAL VALUES:		
т/к	Conc of acid/mol	dm ³ (soln) Ostwald coefficient,
298.15	0.517	0.01925
	0.528	0.01923 0.01903
	1.20	0.01895
	1.963 1.980	0.01885 0.01882
	3.178 3.220	0.01862 0.01858
	4.157	0.01849
	AUXILIARY	INFORMATION
METHOD /APPARATUS/ Volumetric metho adsorption pipet Diagram and deta given in origina	od using simple and buret. iled description	 SOURCE AND PURITY OF MATERIALS; Prepared by the action of dilute hydrochloric acid on aluminium in the presence of mercury chloride. Washed in potassium hydroxide solution and potassium permanganate solution. Dried.
		2. Degassed.
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.1; \ \delta L = \pm 1$ %. (estimated by compiler).
		REFERENCES :

Organic Solve		51		95	
COMPONENTS:	ORIGINAL ME	ASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]	Hüfner, G.				
(2) Water; H ₂ O; [7732-18-5]	Z. Physik	. Chem. <u>19(</u>	<u>07</u> , 57, 611-624		
(3) Acetamide; C ₂ H ₅ NO or CH ₃ CONH ₂ ;					
[60-35-5]					
VARIABLES: PREPARED BY:					
T/K: 293.10, 293.43 H ₂ P/kPa: 101.325 (1 atm)		H. L. Clev	<i>l</i> er		
EXPERIMENTAL VALUES:					
Temperature C _{2H5} NO/moldm ⁻³ t/°C T/K	Gas Pressure/ mmHg	Absorbed Gas Volume ¹	Bunsen Coefficient $\alpha \times 10^2$		
20.11 293.26 0.0			1.810 ²		
20.28 293.43 1.0 19.95 293.10 1.0	662.5 682.0	6.42 6.60	1.796 1.794		
¹ Volume of gas reduced to 273.15 K solution at the stated pressure.	and 760 mm	Hg absorbed	1 in 490.94 cm ³		
² Average of three runs, see Hüfner's		2.1		-	
	2 2				
				1	
AUXILIARY	INFORMATION		·····		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND	PURITY OF MAT	FERIALS :		
The apparatus, described in reference			ed by the reacti		
(1), was the Bunsen absorption type. It consisted of an absorption flask,			ric acid on zinc ned with per-	:.	
which holds 409.94 cm ³ of solvent, and gas burets.		nate and ca tored over	ustic solutions mercury.	5	
The final partial pressure of the gas	(2) Water	. Pure.			
ranged between 662.5 and 694.3 mmHg. The author reported both the volume	(3) Aceta	mide. Sour	ce not given.		
of gas absorbed at the final pressure	l				
in 409.94 cm ³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen					
Coefficient, which was calculated assuming Henry's law.	ESTIMATED F				
ussuming Henry's law.		δТ/К =	0.01		
	REFERENCES	:			
	Physi	v. F. Anato	omie und siolog. Abtly.		
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COMDONIENTE .	ODICINAL MEACUDENTING
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Hüfner, G.
(2) Water; H ₂ O; [7732-18-5]	Z. Physik. Chem. <u>1907</u> , 57, 611-624.
(3) Glycine; C ₂ H ₅ NO ₂ or CH ₂ (NH ₂)COOH; [56-40-6]	
VARIABLES:	PREPARED BY:
T/K: 293.26, 293.31 H ₂ P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
Temperature C _{2H5} NO ₂ /mol dm ⁻³ t/°C T/K	Gas Absorbed Bunsen Pressure Gas Coefficient mmHg Volume ¹ $\alpha \ge 10^2$
20.11 293.26 0.0	1.810 ²
20.16 293.31 1.0	666.7 5.67 l.577
² Average of three runs, see Hüfner	s H ₂ + H ₂ O data sheet.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
(1), was the Bunsen absorption type. It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets.	 Hydrogen. Formed by the reaction of dilute sulfuric acid on zinc. The gas was washed with perman- ganate and caustic solutions and stored over mercury. Water. Pure.
The final partial pressure of the gas ranged between 662.5 and 688.1 mmHg. The author reported both the volume of gas absorbed at the final pressure	(3) Glycine. Merck.
in 409.94 cm ³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen coefficient, which was calculated assuming Henry's law.	ESTIMATED ERROR:
Glycine name glykoholl (aminoessig- saure) in the paper.	$\delta T/K = 0.01$

COMPONENTS:	
1. Hydrogen; H ₂ ; 1333-74-0	ORIGINAL MEASUREMENTS:
 ². Ethanol or Ethyl Alcohol; C₂H₅OH; 64-17-5 	Cargill, R.W.
	J Chem. Soc., Faraday Trans. 1
3. Water; H ₂ O; 7732-18-5	<u>1978</u> , <i>74</i> , 1444-1456
_	
VARIABLES:	PREPARED BY:
T/K : 277.4 - 335.2	
P/kPa : 101.325 (1 atm) C _{2H5OH} /X ₂ : 0.0 - 1.0	R.W. Cargill
	<u> </u>
EXPERIMENTAL VALUES: Mol Fraction	
Ethanol/X ₂ T/K 10 ⁴ T	$1 \log (S_0/cm^3kg^{-1}) = S_0/cm^3kg^{-1}$
0.98 278.9 35.8 0.98 289.2 34.5	
0.98 289.2 34.5 0.98 299.2 33.4	
0.98 309.2 32.3	
0.98 320.2 31.2	
0.98 333.2 30.0	2 2.061 115
^a Values from reference 3.	
The Solubility, S , calculated as cm ³ gas of 101.325 kPa (1 atm) per kg of solvent	s at 273.15 K and Ar partial pressure
The Solubility, S , calculated as cm ³ gas of 101.325 kPa (1 atm) per kg of solvent	s at 273.15 K and Ar partial pressure
The Solubility, S , calculated as cm ³ gas of 101.325 kPa (1 atm) per kg of solvent	s at 273.15 K and Ar partial pressure
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The Solubility, S, calculated as cm ³ gas of 101.325 kPa (1 atm) per kg of solvent AUXILIARY METHOD/APPARATUS/PROCEDURE: METHOD: Absorption of gas by a thin film of liquid. The Morrison and Billett (1) method was modified by replacing valve A with a constant flow pump and by measuring the mass of the solvent leaving the absorption. tube (instead of the volume) on a top-pan balance. APPARATUS/PROCEDURE: The solvent is degassed using the vapor pump principle (1). Fach determination absorbs about 20 cm ³ of gas in up to 500 cm ³ of caluart which was	INFORMATION SOURCE AND FURITY OF MATERIALS: 1. Hydrogen. British Oxygen Co. Gas 99.9 percent pure, stored over saturated brine. 2. Ethanol. Absolute alcohol. 3. Water. Distilled then deionized.
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COMPONENTS :						
	1222. 74. 0	ľ	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ;			Cargill, R.W. J. Chem. Soc., Faraday Trans I			
2. Ethanol or Ethy	yl Alcohol; C ₂ 1	H ₅ OH; 64-17-5				
3. Water; H ₂ O; 773	32-18-5		1978, 74, 1444-1456.			
		l	·····			
EXPERIMENTAL V	VALUES :					
Mol Fraction Ethanol/X ₂	т/к	10 ⁴ T ⁻¹	log(S _o /cm ³ kg ⁻¹)	S _o /cm ³ kg ⁻¹		
0.18	279.1	35.84	1.296	19.8		
0.18	289.3	34.58	1.325	21.1		
0.18	298.9	33.47	1,330	21.4		
0.18	309.8	32.29	1.354	22.6		
0.18	321.2	31.24	1.403	25.3		
0.18	332.9	30.05	1.433	27.1		
0.22	278.4	35.93	1.327	21.2		
0.22	286.6	34.91	1.348	22.3		
0.22	295.9	33.81	1.365	23.2		
0.22	304.7	32.83	1.400	25.1		
0,22	315.4	31.72	1.422	26.4		
0.22	324.7	30.80	1.457	28.6		
0.22	333.5	29.99	1.487	30.7		
0.22	335.1	29.85	1.506	32.1		
0.31	279.1	35.84	1,433	27.1		
0.31	289.5	34.55	1.475	29.9		
0.31	298.8	33.48	1.496	31.3		
0.31	309.8	32.29	1.536	34.4		
0.31	321.9	31.07	1.573	37.4		
0.31	333.4	30.00	1.600	39.8		
0.41	278.4	35.95	1.542	34.8		
0.41	286.7	34.90	1.561	36.3		
0.41	305.2	32.78	1.649	44.6		
0.41	315.0	31.76	1.679	47.8		
0.41	324.7	30.80	1.709	51.2		
0.41	335.2	29.84	1.735	54.3		
0.59	278.6	35.90	1.699	50.0		
0.59	288.8	34.64	1.729	53.6		
0.59	297.7	33.60	1.753	56.6		
0.59	310.9	32.18	1.795	62.4		
0.59	321.3	31.13	1.827	67.1		
0.59	332.9	30.05	1.865	73.3		
0.68	279.7	35.76	1,786	61.1		
0.68	288.8	34.80	1.802	63.4		
0.68	309.7	32.30	1.865	73.3		
0.68	320.6	31.20	1.889	77.5		
0.68	332.7	30.07	1.919	83.0		
0.89	278.6	35.90	1.904	80.2		
0.89	294.9	33.92	1.944	87.9		
0.89	314.3	31.83	1.996	99.1		
0.89	328.8	30.42	2.046	111		
0.89	332.2	30.11	2.036	108		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; 1333-74-0	Cargill, R.W.
2. Ethanol or Ethyl Alcohol; C ₂ H ₅ OH; 64-17-5	J. Chem. Soc., Faraday Trans.I
3. Water; H ₂ O; 7732-18-5	1978, 74, 1444-1456
EXPERIMENTAL VALUES:	

Nol Fraction Ethanol/X ₂	т/к	10 ⁴ T ⁻¹	log(S _o /cm ³ kg ⁻¹)	S _o /cm ³ kg ⁻¹
0.00	277.8	36.01	1.319	20.8
0.00	278.4	35.93	1,320	20.9
0.00	284.1	35.21	1.289	19.5
0.00	285.5	35.04	1.284	19.2 ^a
0.00	289.3	34.58	1.272	18.7 ^a
0.00	290.5	34.42	1.268	18.5 ^a
0.00	294.5	33.97	1.257	18.1
0.00	296.2	33.77	1.252	17.9a
			1.251	17.8
0.00	297.0	33.68		17.7 ^a
0.00	298.2	33.55	1.248	
0.00	305.3	32.77	1.233	17.1
0.00	306.4	32.63	1.230	17.0 ^a
0.00	318.2	31.44	1.214	16.4 ^a
0.00	320.5	31.20	1.212	16.3 ^a
0.00			1.206	16.2 ^a
	327.6	30.53		
0.00	332.4	30.09	1.212	16.3
0.00	333.5	29.99	1.206	16.1 ^a
0.00	338.7	29.54	1.208	16.1 ^a
0.00	344.9	29.00	1.208	16.1 ^a
0.008	277.4	36.06	1.330	21.4
0.008	278.8	35.88	1.326	21.2
0.008	285.5	35.04	1.295	19.7
				18.5
0.008	294.2	34.00	1.267	
0.008	304.0	32.90	1.244	17.5
0.008	314.3	31.83	1.222	16.7
0.008	324.6	30.81	1.222	16.7
0.008	332.8	30.06	1.218	16.5
0.021	277.9	36.00	1.327	21.2
0.021	285.3	35.07	1.312	20.5
0.021			1.269	18.6
	294.3	33.99		
0.021	303.5	32.96	1.253	17.9
0.021	313.2	31.94	1.232	17.1
0.021	323.0	30.95	1.231	17.0
0.021	332.7	30.07	1.228	16.9
0.048	277.4	36.06	1.338	21.8
0.048	285.8	35.01	1.307	20.3
0.048	295.4	33.87	1.272	18.7
0.048	303.8	32.93	1.257	18.0
0.048	314.3	31.83	1.245	17.6
0.048	323.9	30.88	1.238	17.3
0.048	334.5	29.90	1.251	17.8
0.075	281.6	35.53	1.296	19.8
0.075	285.5	35.04	1,286	19.3
0.075	298.8	33.48	1.262	18.3
0.075	298.8 313.7	31.89	1.264	18.4
0.10				10 5
0.10	277.9	36.00	1.290	19.5
0.10	285.4	35.05	1.278	19.0
0.10	293.2	34.00	1.278	19.0
0.10	304.1	32.89	1.259	18.2
0.10	312.6	32.00	1.264	18.4
0.10		30.94	1.296	19.8
0.10	323.6 333.5	29,99	1.325	21.1
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS:
(2) Water; H ₂ O; [7732-18-5]	Symons, E. A.
(3) Sulfinylbismethane or dimethyl	
<pre>sulfoxide; C2H6OS; [67-68-5]</pre>	Can. J. Chem. <u>1971</u> , 49, 3940 - 3947.
(4) N,N,N-Trimethylmethanaminium hydroxide; C ₄ H ₁₂ N.HO; [75-59-2]	
VARIABLES: T/K: 298.15 - 353.15	PREPARED BY:
P/kPa: 101.325 (1 atm)	H. L. Clever
C ₂ H ₆ SO/mol %: 0 - 100 C _{salt} /mol dm-3: 0.0 - 0.42	
EXPERIMENTAL VALUES:	
See precedin	g page.
SOURCE AND PURITY OF MATERIALS:	
 Hydrogen. Matheson Co., Inc. Lect received. 	ure bottle, extra dry, used as
(2) Water. Deionized distilled water.	
(3) Dimethylsulfoxide. Fisher Co. Ce.	rtified Reagent grade. Dried at least
48 h over Linde type 4A molecular a nitrogen bled through a 16 in Vegre	sieves, then vacuum distilled with
(4) N,N,N-Trimethylmethanaminium hydro: Matheson, Coleman and Bell Co., Ind in a polyethylene bottle, titrated solution.	xide or tetramethyl ammonium hydroxide. c., A 25 per cent aqueous solution against standard sulfuric acid
	INFORMATION
METHOD/APPARATUS/PROCEDURE: Gas chromatographic method (1).	SOURCE AND PURITY OF MATERIALS:
The gas-liquid equilibrium cell was a	See above.
modified 100 cm ³ round bottom flask	
equipped with magnetic stirrer,	
syringe sampling portal, and vacuum/ gas line. The solvent was added, the	
flask evacuated several minutes to	
remove dissolved gases. Then the gas was introduced to a partial pressure	
of one atm. The solution was stirred	
for five minutes, then sampled. Three to four successive samples were	
taken.	ESTIMATED ERROR:
The 5.0 cm ³ samples were taken by gas	$\delta T/K = 0.05$
tight syringe. The sample was intro- duced to a stripping cell, stripped	$\delta c/c = 0.02$ (author's
out over a period of 1-2 minutes by	estimate)
the nitrogen carrier gas and then passed into a Varian Aerograph (No.	REFERENCES:
1420) equipped with an injection	1. Gubbins, K. E.; Carden, S. N.;
portal, column (10' ¼" stainless steel, packed with 40-60 mesh 13X	Walker, R. D. Jr.
laceet' backed with 40-00 Wesu 13X	J. Gas Chromatogr. 1965, 98.
molecular sieve) at ambient tempera- ture, and a thermal conductivity	J. Gas Chromatogr. <u>1965</u> , 98. 2. Symons, E. A.; Buncel, E.

COMPONENTS:	····.			OPTOTN	AT MEACH	
	L) Hydrogen; H ₂ ; [1333-74-0]				ORIGINAL MEASUREMENTS: Symons, E. A.	
	H ₂ O; [7732-18-5]					071 (0
(3) Sulfinyl sulfoxid	- bismeth	ane or d	imethyl	Can. J. 3940 -	<u>.971</u> , 49,	
(4) N,N,N-Tr: hydroxid	imethyl	methanam	inium			
EXPERIMENTAL	VALUE	5:				
	Tempe	rature	Dimethylsu	lfoxide	c _{base} 1	Solubility
	t/°C	т/к	mol		Dube	C _{H2} /mol dm ⁻³
						<u> </u>
	25.0 35.0 50.0 65.0 80.0	298.15 308.15 323.15 338.15 353.15	100		0	1.05,1.08 1.18 1.37 1.54 1.73
	35.0 50.0 65.0 80.0	308.15 323.15 338.15 353.15	96.9		0.022	1.13,1.15 1.33 1.50,1.52,1.53 1.71
	35.0 50.0 65.0 80.0	308.15 323.15 338.15 353.15	87.5		0.096	1.07 1.27 1.44,1.45,1.48 1.64
	25.0 35.0 50.0 65.0 80.0	298.15 308.15 323.15 338.15 353.15	77.9		0.13	0.93 1.03 1.20 1.35,1.39,1.40 1.49
	25.0 35.0 50.0 65.0 80.0	298.15 308.15 323.15 338.15 353.15	59.0		0.42	0.78 0.87 0.98 1.16,1.18 1.31
	25.0 35.0 50.0 65.0 80.0	298.15 308.15 323.15 338.15 353.15	40.1		0.36	0.61 0.66 0.77 0.92,0.95 1.10
	25.0 35.0 50.0 65.0	298.15 308.15 323.15 338.15	20.2		0	0.58 0.60 0.69 0.80
	25.0	298.15	0		0	0.80,0.80 ²

 $c_{base} \equiv c_{C_4H_{12}N.OH}/mol dm^{-3}$.

² See reference 2. Equivalent to a mole fraction of 1.45 x 10^{-5} .

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COMPONENT	rs :		ORIGINAL MEASUREMENTS:			
1. Hyd	rogen; H ₂ ; [133	3-74-0]	Braun, L.			
2. Wat	er; H ₂ O; [7732-	18-51	Z. phys. Chem.			
	panoic acid; C ₃ H	-	1900, <i>33</i> , 721-741			
l '	-09-4]	6027	<u> </u>			
[[/9	-09-4]					
VARIABLE				·····		
VARIABLE	5:		PREPARED	BY:		
Temper	ature, concentrat	ion of acid		C. L. Young	a	
EXPERIME	NTAL VALUES:			· · · · · · · · ·		
	Wt. of acid	Bunsen		Wt. of acid	Bunsen	
Т/К	per 100 g soln.		т/К			
	/g	α		/g	α	
278.2	0	0.02366	288.2	6,500	0.01925	
2.0.2	2.634	0.02245		9.763	0.01929	
	3.373	0.02221	000 -	9.910	0.01908	
	5.267 6.500	0.02239 0.02181	293.2	0 2.634	0.01905 0.01876	
1	9.763	0.02120		3.373	0.01866	
	9.910	0.02129		5.267	0.01842	
283.2	0	0.02213		6.500	0.01829	
	2.634 3.373	0.02142 0.02120		9.763 9.910	0.01788	
	5.267	0.02117	298.2	0	0.01750	
	6.500	0.02093		2.634	0.01722	
	9.763	0.02042		3.373 5.267	0.01706 0.01705	
288.2	9.910 0	0.02029 0.02059		5.267	0.01690	
20012	2.634	0.02003		9.763	0.01638	
	3.373	0.01987		9.910	0.01602	
	5.267	0.01983				
N.B	. The Bunsen co	efficients at	the lowe	est temperatures a	re thought	
	to be conside	rably in error	but the	salting out para	imeters	
	at the lower water evaluat		re proba	bly more reliable	e (see	
	water evaluat	1011).				
	·····					
		AUXILIARY	INFORMATI	ON		
METHOD / AI	PPARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERIA	LS:	
Ostwald	d method, using g	as buret and	No details given.			
pipet.	Measurement of	volume of	1			
	fore and after ab					
-		-				
	pressure of water					
for by	assuming Raoult'	s law.				
Solutio	on was degassed.	Concentra-				
tion of	f acid was estima	ted by				
titrati	ion with base.		ESTIMATE	D ERROR:		
				$\delta \alpha / \alpha = \pm 0.0$	3	
			REFERENC	ES:		

1

	ents and water		IL IL
COMPONENTS: (1) Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEAS Hüfner, G.	UREMENTS :	<u> </u>
<pre>(2) Water; H₂O; [7732-18-5] (3) D-Alanine; C₃H₇NO₂ or CH₃CH(NH₂)COOH; [338-69-2]</pre>	Z. Physik.	Chem. <u>190</u>	<u>7</u> , 57, 611-624.
VARIABLES: T/K: 293.23 H ₂ P/kPa: 101.325 (1 atm)	PREPARED BY:	H. L. Cl	ever
EXPERIMENTAL VALUES:			<u></u>
Temperature $C_{C_3^{H_7^{NO_2}}/mol dm^{-3}}$ t/°C T/K	Gas Pressure/ mmHg	Absorbed Gas Volume ¹	Bunsen Coefficient α x 10 ²
20.11 293.26 0.0			1.810 ²
20.08 293.23 1.0	664.2	5.57	1.555
AUXILIARY	INFORMATION		<u></u>
METHOD/APPARATUS/PROCEDURE: The apparatus, described in reference (1), was the Bunsen absorption type. It consisted of an absorption flask, which holds 409.94 cm ³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 688.1 mmHg. The author reported both the volume of gas absorbed at the final pressure in 409.94 cm ³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen coefficient, which was calculated assuming Henry's law.	SOURCE AND P (1) Hydrog of dil The gas mangana and sto (2) Water. (3) D-Alan ESTIMATED ER REFERENCES: 1. Hüfner Archiv Physio	en. Forme ute sulfur s was wash ate and car ored over r Pure. ine. Merc. ROR: ST/K = 0.0	d by the reaction ic acid on zinc. ed with per- ustic solutions mercury. k.

			ORIGINAL MEASUREMENTS:			
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Water; H₂O; [7732-18-5]</pre>			Muller, C.			
			Z. Phys. Chem. <u>1912–13</u> , 81, 483–503.			
<pre>3. 1,2,3-Propanetriol (Glycerol, Glycerine); C₃H₈O₃; [56-81-5]</pre>						
VARIABLES: Concentration of component 3		PREPARED BY:				
		C. L. Young				
						EXPERIMENTAL
	0 a		Bunsen [#]	Density		
	Conc. of comp. (3)	Bunsen	coefficient	of soln.		
т/к	(wt-%)	coefficient	at 288.2 K	at t/°C	t∕°C	
	(
287.65	14.9	0.01654	0.01647	1.0366	14	
286.15	22.8	0.01532	0.01510	1.0536	12.5	
286.95	38	0.01226	0.01216	1.0966	14	
287.65	43.5	0.01117	0.01110	1.1115	15	
286.85	49.15	0.01019	0.01010	1.1268	14.5	
288.05	51.5	0.01026	0.01025	1.1333	14.5	
285.45 291.15	68 90.7	0.00822 0.00853	0.00806 0.00870	1.181 1.2386	12.5 18	
		AUXILIARY	INFORMATION			
METHOD /ADDAL	RATUS / PROCEDURE :			MANDIALO		
ME I HOD / AP P AI	KAIUS/PROCEDURE:		SOURCE AND PURITY OF	MATERIALS:		
Volumetri	c method in wh	ich pressure	1. Prepared by	reaction of	acid	
		-		shed with cau		
	mined using a	-			GUIG	
manometer	-		potash solut	tion.		
gassed by	boiling under	reduced				
pressure.			2 and 3. No details given.			
	_	this process.				
	aturated with	_	ESTIMATED ERROR:			
before be	ing admitted t	o absorption	$\delta T/K = \pm 0.1;$	$SP/P = \pm 0.001$;	
buret.			$\delta \alpha / \alpha = \pm 3\%$ (est	timated by co	mpiler).	
			REFERENCES:		<u></u>	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Druker, K; Moles, E.
2. Water; H ₂ O; [7732-18-5]	Z. Physik. Chem.
3. 1,2,3-Propanetriol (Glycerol,	<u>1910</u> , <i>75</i> , 405-436.
Glycerin); $C_3H_8O_3$;	
[56-81-5]	
VARIABLES:	PREPARED BY:
Wt. fraction of 1,2,3-Propanetriol	C. L. Young
EXPERIMENTAL VALUES:	
Wt. fraction T/K of 1,2,3-Propanetriol p/mmHe	Ratio Ostwald density H₂O/ g p/kPa coefficient, density soln.
	L
298.2 0.0 760 0.040 716.3 0.105 736.1 0.220 684.3	101 0.01962 1.0 95.50 0.0186 1.0101 98.14 0.0178 1.0260 91.23 0.0154 1.0542
0.498 709.9 0.505 730.1	94.65 0.0099 1.1290 97.34 0.0097 1.1300
0.526 672.2	89.62 0.0090 1.1365
0.670 741.1 0.800 708.0	98.81 0.0067 1.1752 94.39 0.0051 1.2113
0.820 665.5	88.73 0.0051 1.2159
0.880 662.3 0.950 741.8	88.30 0.0044 1.2307 98.90 0.0034 1.2502
AUXILIA	Y INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Volumetric method using an Ostwald type gas buret and pipet. Solvent degassed before being admitted to	 Electrolytically prepared from aqueous potassium hydroxide soln. Passed over hot platinum-asbestos to remove oxygen. Distilled. "Pure" sample, purity about 98
pipet. Density of solution determined using a Sprengel pykno- meter.	mole per cent.
	ESTIMATED ERROR:
	$\delta L/L = \pm 1-3$ % for dil. soln.;
	±5-7% in concentrated soln.
	REFERENCES:

COLL ONENID .		ΟΡΤ	GINAL MEASUREMENTS:		
COMPONENTS: 1. Hydrogen; H ₂ ; 1333-74-0					
 2-Methyl-2-propanol or t-Butanol; C4H9OH; 75-65-0 Water; H2O; 7732-18-5 			Cargill, R.W. J. Chem. Soc., Faraday Trans. I <u>1978</u> , 74, 1444-1456		
VARIABLES :		PPF	PARED BY		
T/K : 277.5-334.6 P/kPa : 101.325 (1 atm) C4H9OH/X2 : 0.0-0.85			PREPARED BY: R.W. Cargill		
EXPERIMENTAL VALUES:					
Mol Fraction Alcohol/X2	т/к	10 ⁴ T ⁻¹	log(S ₀ /cm ³ kg ⁻¹)	S _o /cm ³ kg ⁻¹	
0.85 0.85 0.85 0.85 0.85 0.85	281.4 289.2 298.7 309.2 320.3 332.8	35.55 34.59 33.49 32.35 31.23 30.06	1.910 1.932 1.968 1.997 2.026 2.054	81.3 85.5 92.9 99.3 106 113	
of 101.325 kPa (1	atm) per kg of sol	lvent.	273.15 K and Ar partial pre		
	AUXI	LIARY INF	ORMATION		
liquid. The Morrison was modified by replace constant flow pump, ar of the solvent leaving	gas by a thin fil	1	JRCE AND PURITY OF MATERIALS		
(instead of the volume APPARATUS/PROCEDURE: degassed using the var Each determination abs gas in up to 500 cm ³ c	d by measuring the the absorption tu) on a top-pan bal The solvent is por pump principle sorbs about 20 cm ³ of solvent, which w	a mass 2. abe lance. 3. (1). of vas	Hydrogen. British Oxygen (per cent pure, stored over brine. 2-Methyl-2-propanol. Reag (98 percent boils 82-83°C) Water. Distilled then deion	Co Gas 99.9 saturated ent grade,	
APPARATUS/PROCEDURE: degassed using the var Each determination abs	the value A with a by measuring the the absorption tu b) on a top-pan bal The solvent is por pump principle sorbs about 20 cm ³ of solvent, which we of the solvent wa a, so that the exact	a mass 2. abe 3. (1). of vas ES' per RE	per cent pure, stored over brine. 2-Methyl-2-propanol. Reag (98 percent boils 82-83°C)	Co Gas 99.9 saturated ent grade, nized. within 0.5	

COMPONENTS:

- 1. Hydrogen; H₂; 1333-74-0
- 2-Methyl-2-propanol or <u>t</u>-Butanol; C₄H₉OH; 75-65-0
- 3. Water; H₂O; 7732-18-5

ORIGINAL MEASUREMENTS:

Cargill, R.W.

J. Chem. Soc., Faraday Trans. I <u>1978</u>, 74, 1444-1456

EXPERIMENTAL VALUES:

	1110100			
Mol Fraction Alcohol/X ₂	T/K	104 T ⁻¹	log(S ₀ /cm ³ kg ⁻¹)	S _o /cm ³ kg ⁻¹
0.072	278.2	35,96	1,271	18.7
0.072	286.7	34.90	1.265	18.4
0.072	296.8	33.70	1.282	19.1
	306.1	32.68	1.301	20.0
0.072				21.5
0.072	320.7	31.19	1.333	23.7
0.072	331.7	30.16	1.374	23.1
0.10	280.7	35.64	1,300	20.0
0.10	285.7	35.02	1.316	20.7
		33.54	1.342	22.0
0.10	298.3			21.7
0.10	299.6	33.38	1.336	
0.10	308.2	32.46	1.359	22.9
0.10	318.4	31.42	1.387	24.4
0.10	319.7	31.29	1.391	24.6
0.10	332.8	30.06	1.459	28.8
0.14	270 0	35.98	1.373	23.6
0.14	278.0		1.408	25.6
0.14	286.9	34.87		27.8
0.14	299.5	33.40	1.444	
0.14	307.5	32.53	1.475	29.9
0.14	322.1	31.06	1.520	33.1
0.14	333.9	29.96	1.559	36.2
0.31	278.1	35.97	1.625	42.2
0.31	287.3	34.82	1.657	45.4
0.31	296.6	33,72	1.677	47.5
		32.44	1.715	51.9
0.31	308.4		1.755	56.9
0.31	321.8	31.08		63.5
0.31	333.9	29.96	1.803	03+5
0.53	277.5	36.05	1.786	61.1
0.53	287.3	34.82	1.808	64.3
0.53	297.2	33.66	1.836	68.6
0.53	308.7	32.41	1.867	73.6
		31.19	1.903	80.0
0.53	320.7			
0.53	334.6	29.90	1.954	90.0
0.71	279.2	35.83	1.849	70.6
0.71	289.8	34.52	1,870	74.1
0.71	303.2	33.01	1.930	85.1
0.71	319.5	31.30	1.977	94.8
		30.06	2.023	105
0.71	332.8	30.00	2.023	****

COMPONENTS:	
-------------	--

- 1. Hydrogen; H₂; 1333-74-0
- 2. 2-Methyl-2-propanol or t-Butanol; C4H9OH; 75-65-0
- 3. Water; H₂O; 7732-18-5

ORIGINAL MEASUREMENTS: Cargill, R.W. J. Chem. Soc., Faraday Trans. I 1978, 74, 1444-1456

EXPERIMENTAL VALUES:

Mol Fraction Alcohol/X ₂	T/K	104 T ⁻¹	log(S _o /cm ³ kg ⁻¹)	S _o /cm ³ kg ⁻¹
0.00	277.8	36.01	1.319	20.8
0.00	278.4	35.93	1.320	20.9
0.00	284.1	35.21	1.289	19.5
0.00	285.5	35.04	1,284	19.2 ^a
0.00	289.3	34.58	1.272	18.7 ^a
0.00	290.5	34.42	1,268	18.5 ^a
0.00	294.5	33.97	1,257	18.1
0.00	296.2	33.77	1.252	17.9 ^a
0.00	297.0	33.68	1.251	17.8
0.00	298.2	33.55	1.248	17.7 ^a
0.00	305.3	32.77	1.233	17.1
0.00	306.4	32.63	1.230	17.0 ^a
0.00	318.2	31.44	1.214	16.4ª
0.00	320.5	31.20	1.212	16.3 ^a
0.00	327.6	30.53	1.206	16.2 ^a
0.00	332.4	30.09	1,212	16.3
0.00	333.5	29.99	1.206	16.1 ^a
0.00	338.7	29.54	1.208	16.1 ^a
	344.9			16.1ª
0.00	544.9	29.00	1.208	10.14
0.006	277.8	36.01	1.331	21.4
0.006	286.1	34.97	1.288	19.4
0.006	293.8	34.05	1.265	18.4
0.006	304.8	32.82	1.243	17.5
0.006	314.4	31.82	1.227	16.9
0.006	323.6	30.91	1.212	16.3
0.006	333.5	29.99	1.208	16.1
0.011	277.9	36.00	1.323	21.0
0.011	285.2	35.08	1.291	19.5
0.011	294.8	33.93	1.259	18.2
0.011	304.7	32.83	1.236	17.2
0.011	313.2	31.94	1.226	16.8
0.011	324.1	30.86	1.218	16.5
0.011	333.9	29.97	1.223	16.7
0.029	278.3	35.94	1.291	19.5
0.029	285.8	35.01	1.275	18.8
0.029	294.9	33.92	1.246	17.6
0.029	303.2	32.99	1.236	17.2
0.029	319.0	31.36	1.229	16.9
0.029	333.4	30.00	1.240	17.4
0.046	279.2	35.83	1.250	17.8
0.046	285.2	35.08	1.244	17.5
0.046	294.9	33.92	1.236	17.2
0.046	303.7	32.96	1.231	17.0
0.046	313.9	31.87	1.256	18.0
0.046	324.1	30.86	1.273	18.8

COMPONENTS:			ORIGINAL MEASUREMEN	TS	
		00 74 01			
1. Hydrogen; H_2 ; [1333-74-0]		Muller, C.			
2. Water; H ₂ O; [7732-18-5]		Z. Phys. Chem. <u>1912-13</u> , 81,			
 D-glucose (Grape sugar); 		483-503.			
C ₆ H ₁₂ O ₆ ; [50-99-7]					
VARIABLES:			PREPARED BY:		
Concentration of component 3				C. L. Young	
EXPERIMENTA	L VALUES:		L	- 	
			#		
T/K	Conc. of comp. (3) (wt-%)	Bunsen coefficient	Bunsen [#] coefficient at 293.2 K	Density of soln. at t/°C	t/°C
293.7	12.2	0.01595	0.01600	1.048	20.5
293.7 294.3	20.7	0.01445	0.01450	1.083	20.5
295.0	32.56 45.8	0.01243 0.01000	0.01250 0.01015	1.198	21 21.8
294.7	59.0	0.00775	0.00775	1.265	21
	-	AUXILIARY	INFORMATION		
ME THOD / APP A	RATUS / PROCEDURE :	AUXILIARY	INFORMATION SOURCE AND PURITY O	OF MATERIALS:	
	RATUS/PROCEDURE: .c method in wh				acid
Volumetri		ich pressure	SOURCE AND PURITY O		
Volumetri was deter manometer	c method in wh mined using a m . Solution wa	ich pressure mercury as de-	SOURCE AND PURITY O	reaction of a shed with cause	
Volumetri was deter manometer gassed by	c method in wh mined using a m . Solution wa boiling under	ich pressure mercury as de- reduced	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu	reaction of a shed with caus tion.	stic
Volumetri was deter manometer gassed by pressure.	c method in wh mined using a m . Solution wa boiling under A consideral	ich pressure mercury as de- reduced ble amount	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu	reaction of a shed with cause	stic
Volumetri was deter manometer gassed by pressure. of water	c method in wh mined using a r . Solution wa boiling under A consideral was removed by	ich pressure mercury as de- reduced ble amount this process.	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu	reaction of a shed with caus tion.	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu	reaction of a shed with caus tion.	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s	c method in wh mined using a r . Solution wa boiling under A consideral was removed by	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No	reaction of a shed with caus tion. details given.	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR:	$\delta^{P/P} = \pm 0.001;$	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	<pre>SOURCE AND PURITY O I. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR:</pre>	$\delta^{P/P} = \pm 0.001;$	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR: $\delta T/K = \pm 0.1;$ $\delta \alpha / \alpha = \pm 3$ % (es	$\delta^{P/P} = \pm 0.001;$	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR: $\delta T/K = \pm 0.1;$ $\delta \alpha / \alpha = \pm 3$ % (es	$\delta^{P/P} = \pm 0.001;$	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR: $\delta T/K = \pm 0.1;$ $\delta \alpha / \alpha = \pm 3$ % (es	$\delta^{P/P} = \pm 0.001;$	stic
Volumetri was deter manometer gassed by pressure. of water Gas was s before be	c method in wh mined using a m Solution w boiling under A consideral was removed by aturated with w	ich pressure mercury as de- reduced ble amount this process. water vapor	SOURCE AND PURITY O 1. Prepared by on zinc, wa potash solu 2 and 3. No ESTIMATED ERROR: $\delta T/K = \pm 0.1;$ $\delta \alpha / \alpha = \pm 3$ % (es	$\delta^{P/P} = \pm 0.001;$	stic

COMPONENTS :	ORIGINAL MEASUREMENTS:		
(l) Hydrogen; H ₂ ; [1333-74-0]	Hüfner, G.		
(2) Water; H ₂ O; [7732-18-5]	Z. Physik. Chem. <u>1907</u> , 57, 611-624.		
(3) D-Glucose; C ₆ H ₁₂ O ₆ ; [50-99-7]			
VARIABLES:	PREPARED BY:		
T/K: 293.15 - 293.50 H ₂ P/kPa: 101.325 (l atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
Temperature D-Glucose t/°C T/K g dm ⁻³ mol dm ⁻³ P:	GasAbsorbedBunsenressureGasCoefficientmmHgVolume1 $\alpha \times 10^2$		
20.11 293.26 0 0	1.810 ²		
	570.4 6.36 1.759		
	688.1 6.12 1.649 682.2 6.02 1.664 ³		
	670.6 5.60 1.514 ⁴ 670.2 5.48 1.516		
⁴ Compiler calculated a value of 1.54	x 10 - from data in the paper.		
AUXILIARY	INFORMATION		
 METHOD/APPARATUS/PROCEDURE: The apparatus, described in reference (1), was the Bunsen absorption type. It consisted of an absorption flask, which holds 409.94 cm³ of solvent, and gas burets. The final partial pressure of the gas ranged between 662.5 and 688.1 mmHg. The author reported both the volume of gas absorbed at the final pressure in 409.94 cm³ of solvent reduced to 273.15 K and 760 mmHg, and the Bunsen coefficient, which was calculated assuming Henry's law. D-Glucose name Traubenzucker (grape 	<pre>SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Formed by the reaction of dilute sulfuric acid on zinc. The gas was washed with per- manganate and caustic solutions and stored over mercury. (2) Water. Pure. (3) D-Glucose. Source not given. ESTIMATED ERROR:</pre>		
sugar) in the paper.	REFERENCES: 1. Hüfner, G. Archiv. F. Anatomie und Physiologie, Physiolog. Abtly.		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Steiner, P.	
2. Water; H_2O ; [7732-18-5]	Ann. der Phys. Chem.	
3. β-D-Fructofuranosyl-α-D-gluco-	1894, 52, 275-299.	
pyranoside (Sucrose); C ₁₂ H ₂₂ O ₁₁ ;		
[57-50-1]		
VARIABLES:	PREPARED BY:	
Concentration of salt	C. L. Young	
Concentration of sait	C. D. Toding	
EXPERIMENTAL VALUES:		
- DATIENTAL VALUES.		
Density of T/K Conc. of salt at 288.2	soln. Bunsen Bunsen K coefficient, coefficient	
/mol dm ⁻³ /g cm ⁻	α at 288.2 K	
288.2 0 0.999		
287.31 0.520 1.067		
287.34 0.993 1.1286 286.95 1.699 1.2184		
	INFORMATION	
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE:		
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald	SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent		
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS;	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given.	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS; No details given. ESTIMATED ERROR:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS; No details given. ESTIMATED ERROR:	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$	
METHOD/APPARATUS/PROCEDURE: Volumetric method using an Ostwald type gas buret and pipet. Solvent was degassed before being admitted	SOURCE AND PURITY OF MATERIALS: No details given. ESTIMATED ERROR: $\delta \alpha / \alpha = \pm 0.02.$	

HAD - I

COMPONENTS: 1. Hvdro		ORIGINAL MEASUREMENTS:				
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Water; H₂0; [7732-18-5]</pre>			ORIGINAL MEASUREMENTS:			
			Muller, C.			
	Fructofuranosyl			17_17 01		
	Slucopyranoside		Z. Phys. Chem. <u>1912-13</u> , 81,			
$C_{12}H_{22}O_3;$ [57-50-1]		483-503.				
VARIABLES:	<u></u>		PREPARED BY:			
Concentration of component 3			••			
		C. L. Young				
EXPERIMENT	AL VALUES:	<u> </u>	L			
	Conc. of		Bunsen [#]	Density		
m /**	comp. (3)	Bunsen	coefficient	of soln.		
т/к	(wt-%)	coefficient	at 288.2 K	at t/°C	t∕°C	
288.4	5.04	0.01723	0.01726	1.019	15	
284.8	14.70	0.01547	0.01510	1.060	11.6	
285.2	20.26	0.01500	0.01462	1.084	11.8	
285.9	29.86	0.01290	0.01257	1.128	13	
285.0 286.5	31.74 39.65	0.01220	0.01185	1.138	12	
285.8	42.94	0.01047 0.00956	0.01033 0.00939	1.175 1.195	13.5 12.5	
		AUXILIARY	INFORMATION			
ME THOD / APP	ARATUS/PROCEDURE:	AUXILIARY	INFORMATION SOURCE AND PURITY OF 1	MATERIALS:		
	ARATUS/PROCEDURE:				acid	
Volumetr		ich pressure	SOURCE AND PURITY OF	eaction of a		
Volumetr was dete	ic method in wh ermined using a	ich pressure mercury	SOURCE AND PURITY OF I 1. Prepared by r on zinc, wash	eaction of a ed with caus		
Volumetr was dete manomete	ic method in wh rmined using a r. Solution	ich pressure mercury was de-	SOURCE AND PURITY OF 1	eaction of a ed with caus		
Volumetr was dete manomete gassed b	ic method in wh rmined using a r. Solution y boiling under	ich pressure mercury was de- reduced	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti	eaction of a ed with caus on.	stic	
Volumetr was dete manomete gassed b pressure	ic method in wh ormined using a r. Solution y boiling under . A considera	ich pressure mercury was de- reduced ble amount	SOURCE AND PURITY OF I 1. Prepared by r on zinc, wash	eaction of a ed with caus on.	stic	
Volumetr was dete manomete gassed b pressure	ic method in wh rmined using a r. Solution y boiling under	ich pressure mercury was de- reduced ble amount	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti	eaction of a ed with caus on.	stic	
Volumetr was dete manomete gassed b pressure of water	ic method in wh ormined using a r. Solution y boiling under . A considera	ich pressure mercury was de- reduced ble amount this process.	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti	eaction of a ed with caus on.	stic	
Volumetr was dete manomete gassed b pressure of water Gas was	ic method in wh rmined using a r. Solution y boiling under . A considera was removed by	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti	eaction of a ed with caus on.	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de	eaction of a ed with caus on. tails given	stic	
Volumetr was dete manomete gassed b pressure of water Gas was	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR:	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$ $\delta \alpha / \alpha = \pm 3$ % (esti	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	<pre>SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR:</pre>	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$ $\delta \alpha / \alpha = \pm 3$ % (esti	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$ $\delta \alpha / \alpha = \pm 3$ % (esti	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$ $\delta \alpha / \alpha = \pm 3$ % (esti	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	
Volumetr was dete manomete gassed b pressure of water Gas was before b	ic method in wh ormined using a r. Solution y boiling under . A considera was removed by saturated with	ich pressure mercury was de- reduced ble amount this process. water vapor	SOURCE AND PURITY OF 1 1. Prepared by r on zinc, wash potash soluti 2 and 3. No de ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$ $\delta \alpha / \alpha = \pm 3$ % (esti	reaction of a led with caus on. tails given $P/P = \pm 0.001;$	stic	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Shkol'nikova, R. I.	
(2) Water; H ₂ O; [7732-18-5]	Uch. Zp. Leningr. Gos. Univ., Ser. Khim. Nauk. <u>1959</u> , Nr. 18, 64 - 86.	
(3) Serum albumin	Chem. Abstr. <u>1961</u> , 55, 25443b.	
	Chem. AD3011 <u>1501</u> , 007 2011001	
VARIABLES:	PREPARED BY:	
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm)	A. L. Cramer	
serum albumin/Wt %: 0.575 - 1.99	H. L. Clever	
EXPERIMENTAL VALUES:		
T/K serum 0.575	albumin/Wt % 1.15	
Bunsen Ostwald Coefficient Coefficien	Bunsen Ostwald t Coefficient Coefficient	
$\frac{\alpha \times 10^3}{10^3} = \frac{10^3}{10^3}$	$\frac{\alpha \times 10^3}{10^3} = \frac{1 \times 10^3}{10^3}$	
283.15 18.9 19.6	16.1 16.7	
288.15 18.3 19.3	15.4 16.2 14.4 15.4	
293.15 17.1 18.3 298.15 16.7 18.2	14.4 15.4 13.9 15.2	
303.15 15.3 17.0	11.9 13.2	
308.15 14.5 16.4	11.6 13.1	
<u></u>	11.3 12.9	
· ·	albumin/Wt %	
l.68 Bunsen Ostwald	1.99 Bunsen Ostwald	
Coefficient Coefficien	t Coefficient Coefficient	
$\frac{\alpha \times 10^3}{10^3} = \frac{L \times 10^3}{L \times 10^3}$	$\underline{\alpha \times 10^3} \underline{L \times 10^3}$	
283.15 15.9 16.5	14.6 15.1	
288.15 15.2 16.0		
293.15 13.1 14.0 298.15 12.8 14.0	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
298.15 12.8 14.0 303.15 10.7 11.9	9.9 11.0	
308.15 10.5 11.8	9.6 10.8	
<u></u>	9.4 10.8	
	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
^{The} apparatus and procedure of	(1) Hydrogen. Source not given. Stated to be 99.99 per cent.	
Lannung were modified (1).	-	
	(2) Water. No information.	
	(3) serum albumin. No information.	
The author calculated the enthalpy		
of solution from the temperature coefficient of the Bunsen coef-		
1 ¹ Clent. It is 1590, 1760, 2210.		
$1^{-5/0}$, and 2360 cal mol ⁻¹ in water,		
1 and 10,575, 1,15, 1,68, and 1,99		
wt % serum albumin respectively.	ESTIMATED ERROR:	
The values of the solubility of		
hydrogen in water were not given in the paper.		
	REFERENCES:	
	1. Lannung, A.	
1	J. Am. Chem. Soc. <u>1930</u> , 52, 68.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Findlay, A.; Shen, B.
2. Water; H ₂ O; [7732-18-5]	J. Chem. Soc. <u>1912</u> , 101,1459-68.
3. Dextrin (colloidal)	
VARIABLES :	PREPARED BY:
Concentration	C.L. Young
EXPERIMENTAL VALUES:	200.15
Colubility C minun of concentratio	298.15 on of gas in liquid phase
concentration concentration	on of gas in gaseous phase.
Conc of dextrin Density of /10 ⁻² g cm ⁻³	solution S^+
/10 g chi	<u></u>
3.98 1.012	
5.59 1.019 8.12 1.028	
19.20	
S^+ solubility independent of	pressure over range 1-2 atm.
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Gas buret and absorption pipet. Manometer tube was of such a length	No details given.
as to allow measurements up to	
2×10^5 Pa (2 atm).	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta S = \pm 1.5$ %. (estimated by compiler).
	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Findlay, A.; Shen, B.
2. Water; H ₂ O; [7732-18-5]	J. Chem. Soc. <u>1912</u> , 101, 1459-68.
3. Gelatin (colloidal)	
VARIABLES:	PREPARED BY:
Pressure, concentration	C.L. Young.
EXPERIMENTAL VALUES: T/K =	298.15
Solubility, S , given as concentrat	ion of gas in liquid phase ion of gas in gaseous phase
Conc. of gelatin Density of /10 ⁻² g cm ⁻³ solution /	p ⁺ _{H2} S p ⁺ _{H2} S 10 ⁵ Pa /10 ⁵ Pa
	1.004 0.0194 1.149 0.0188 1.336 0.0193 1.471 0.0195 1.664 0.0195 1.845 0.0194
	0.995 0.0189 1.157 0.0185 1.316 0.0189 1.468 0.0190 1.660 0.0189 1.840 0.0191
	1.004 0.0185 1.152 0.0181 1.332 0.0186 1.483 0.0186 1.673 0.0186 1.860 0.0185
	1.000 0.0182 1.155 0.0173 1.300 0.0183 1.464 0.0184 1.659 0.0181 1.844 0.0183
+ partial pressure of hydrog	gen.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas buret and absorption pipet. Manometer tube was of such a length as to allow measurements up to 2×10^5 Pa (2 atm)	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta S = \pm 1.5$ (estimated by compiler)
	REFERENCES:

COMPONENTS : ORIGINAL MEASUREMENTS: Shkol'nikova, R. I. (1) Hydrogen; H₂; [1333-74-0] (2) Water; H₂O; [7732-18-5] Uch. Zp. Leningr. Gos. Univ., Ser. Khim. Nauk. <u>1959</u>, Nr. 18, 64 - 86. (3) Gelatin Chem. Abstr. 1961, 55, 25443b. VARIABLES: PREPARED BY: 283.15 - 313.15 т/к: A. L. Cramer P/kPa: 101.325 (1 atm) H. L. Clever Gelatin/Wt %: 1, 5, 10 EXPERIMENTAL VALUES: Gelatin/Wt % 5 Gelatin/Wt % 1 T/K Bunsen Ostwald Bunsen Ostwald Coefficient Coefficient Coefficient Coefficient <u>a x 10</u>3 <u>L x</u> 10³ $\alpha \times 10^3$ <u>L x</u> 10³ 15.8 17.9 18.5 15.2 283.15 14.3 14.8 16.9 288.15 16.1 14.4 13.0 14.0 15.5 293.15 11.0 12.9 13.1 14.3 298.15 11.6 12.9 10.5 11.6 303.15 11.6 9.8 308.15 10.6 12.3 11.7 9.3 10.7 313.15 10.2 T/K Gelatin/Wt % 10 Ostwald Bunsen Coefficient Coefficient $\alpha \times 10^3$ <u>L x 10³</u> 14.8 283.15 14.2 13.2 13.8 288.15 293.15 12.1 13.0 298.15 12.1 11.0 303.15 10.0 11.1 9.1 10.3 308.15 8.2 9.1 313.15 The author calculated the enthalpy of solution of hydrogen from the temperature coefficient of the Bunsen coefficients. It is 1590, 3260, 3060, and 3240 cal mol-1 in water, and 1, 5, and 10 wt % gelatin, respectively. AUXILIARY INFORMATION METHOD / APPARATUS / PROCEDURE : SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Source not given. The apparatus and procedure of Stated to be 99.99 per cent. Lannung were modified (1). (2) Water. No information. (3) Gelatin. No information. The values of the solubility of hydrogen in water were not given ESTIMATED ERROR: in the paper. **REFERENCES**: 1. Lannung, A. J. Am. Chem. Soc. 1930, 52, 68.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Findlay, A.; Shen, B.
2. Water; H ₂ O; [7732-18-5]	J. Chem. Soc. <u>1912</u> , 101, 1459-68.
3. Starch (colloidal)	
VARIABLES:	PREPARED BY:
Concentration	C.L. Young
EVEDITORIA	L
EXPERIMENTAL VALUES: T/K = 1	298.15
	ion of gas in liquid phase
Solubility, S, given as concentrat:	ion of gas in gaseous phase
	s^+
Conc. of starch Density of so /10 ⁻² g cm ⁻³	Siution S
2.01 1.005	0.0194
3.56 1.011	0.0189
7.13 9.29 1.032	0.0181 0.0182
S^+ Solubility independent of	pressure over range 1-2 atm.
AUXILIARY	INFORMATION
METHOD / AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Gas buret and absorption pipet. Manometer tube was of such a length	No details given.
as to allow measurements up to 2×10^5 Pa (2 atm).	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta S = \pm 1.5$ (estimated
	by compiler).
	REFERENCES :
	1
L	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Power, G.G.; Stegall, H.
 Phosphate buffer and human red cell ghosts in phosphate buffer. 	J. Appl. Physiology, <u>1970</u> , 29, 145-9
VARIABLES:	PREPARED BY:
	C.L. Young
EXPERIMENTAL VALUES:	
T/K Bunsen coefficient α	S.D. No. of measurements
Phosphate	e Buffer
310.15 0.01588	0.00007 4
Ghosts suspension in	n phosphate buffer
310.15 0.01602	0.00006 5
510.15 0.01001	-
* Standard deviation.	
α° ghost = (α ghosts suspension	$-\alpha$ buffer)/g ghosts cm ⁻³
$= 0.024 \pm 0.008$	
	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
5 to 12 cm ⁻³ samples placed in a stirrer cell and gas, saturated with	 Matheson sample, purity better than 99.7 mole per cent.
water vapor passed through liquid	_
for 30-60 mins. Samples of saturated liquid withdrawn and transferred to	2. See method.
Van Slyke apparatus. Dissolved gas removed under reduced pressure.	
Red cell ghosts prepared by	
centrifugation of human blood and lysing the cells using phosphate	
buffer of pH 7.4. Ghost separated by high speed centrifugation.	
Washed with phosphate buffer contain-	ESTIMATED ERROR:
ing 0.01 M sodium nitrite.	$\delta T/K = \pm 0.1$
	REFERENCES:

COMPONENTS:	EVALUATOR:
(l) Hydrogen; H ₂ ; [1333-74-0] (2) Alkanes	H. L. Clever Chemistry Department Emory University Atlanta, GA 30322 USA 1980, September

CRITICAL EVALUATION:

The solubility of hydrogen at a partial pressure of 101.325 kPa (1 atm) in alkanes.

The data on the solubility of hydrogen in alkanes at hydrogen partial pressures less than 200 kPa are evaluated in this section. The hydrogen solubility data at hydrogen partial pressures greater than 200 kPa are compiled and evaluated in another part of the volume, which should be consulted along with this section. In general, a simple Henry's law treatment, uncorrected for non-idealality in either gas or liquid phase, of the solubility data measured at hydrogen partial pressures greater than 200 kPa, usually results in a mole fraction solubility at a hydrogen partial pressure of 101.325 kPa (1 atm) that is 50 to 100 per cent higher than the value actually measured at atmospheric pressure.

Most of the hydrogen solubility values at pressures less than 200 kPa were measured at a hydrogen partial pressure near 101.325 kPa (1 atm). The mole fraction solubility is calculated for a hydrogen partial pressure of 101.325 kPa (1 atm) from the experimental measurement, assuming that the gas is ideal, Henry's law is obeyed, and in some cases, that the Ostwald coefficient is independent of pressure. For most systems these assumptions are justified for the less than 200 kPa solubility experiments.

Hydrogen + Pentane [109-66-0]

Makranczy, Megyery-Balog, Rusz, and Patyi (1) report an Ostwald coefficient at 298.15 K which is equivalent to a mole fraction solubility of 6.7×10^{-4} . Frolich, Tauch, Hogan, and Peer (2) measured the hydrogen solubility in pentane at 298.15 K and pressures of 10 MPa and greater. A simple Henry's law treatment of the Frolich *et al.* data gives a mole fraction solubility that is 50 - 70 per cent greater than the Makranczy *et al.* value. The Makranczy *et al.* values at 298.15 K have proven to be reliable for other systems. Thus their value is accepted as a tentative value.

Hydrogen + Hexane [110-54-3]

Four laboratories have reported values of the solubility of hydrogen in hexane at or near 101.325 kPa partial pressure of hydrogen. Guerry (3) reported values at 293.15 and 298.15 K, Waters, Mortimer, and Clements (4) reported solubility values at four temperatures between 263.15 and 293.15 K, Makranczy *et al.* (1) reported a value at 298.15 K, and Katayama and Nitta (5) reported values at five temperatures between 213.15 and 298.15 K.

The Waters *et al*. data was extrapolated to obtain a solubility value at 298.15 K. That value, along with the 298.15 K values from the other three papers, has an arithmetic mean of 6.61×10^{-4} and has a standard deviation of 0.13. The values range from 6.43 to 6.99 $\times 10^{-4}$.

It is the judgement of the evaluator that Katayama and Nitta used the most reliable method. The data from all four papers was treated by a linear regression with the Katayama and Nitta data given a weight of two. The 263.15 K value of Waters *et al.* deviated over two standard deivations from the regression line. Both the 263.15 and 273.15 K values of Waters *et al.* were discarded, and the following equation obtained on a linear regression of the remaining data with a weight of two to the Katayama and Nitta data and a weight of one to the data of the others.

The tentative equation for the temperature interval of 213.15 to 298.15 K is

$$\ln x_1 = -5.8952 - 4.2455/(T/100K)$$

with a standard error about the regression line of 2.34 x 10^{-5} .

From the equation, the temperature independent thermodynamic quantities are

 $\Delta \overline{H}^{\circ}_{i}/kJ \mod^{-1}$ 3.53 and $\Delta \overline{S}^{\circ}_{i}/J K^{-1} \mod^{-1}$ -49.0.

Table 1. Solubility of hydrogen in hexane at a hydrogen partial pressure of 101.325 kPa (1 atm). Tentative mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

T/K	Mol Fraction $10^4 x_1$	∆G ₁ °/kJ mol ⁻¹
213.15 223.15 233.15 243.15 253.15 263.15 273.15 283.15 283.15 288.15 293.15	3.76 4.11 4.46 4.80 5.15 5.48 5.82 6.15 6.31 6.47	13.977 14.467 14.957 15.447 15.937 16.428 16.918 17.408 17.653 17.898
298.15	6.63	18.144

Hydrogen + Heptane [142-82-5]

Four laboratories have reported solubility measurements near a partial pressure of 101.325 kPa of hydrogen in heptane. The work of Cook, Hanson and Alder (7) is one of the first successful attempts to measure high accuracy, high precision gas solubility values. They report eleven measurements between temperatures of 243.15 and 328.15 K, which the evaluator believes to be of good accuracy.

The early value of Ijams (6) at 298.15 K is 14 per cent lower than the value of Cook *et al*. The solubility values reported at 298.15 K by Makranczy *et al*. (1) and by Guerry (3) agree well, but they are 4 per cent lower than the Cook *et al*. value.

The temperature of one solubility measurement made by Cook, Hanson and Alder is in question. In their paper (7) they give a temperature of 238.15 K (-35°C), but in Cook's thesis (8) the temperature is given as 243.15 K (-30°C). The latter value smooths the data better and appears to be the correct temperature.

The tentative equation for the temperature interval of 243.15 to 328.15 K is based entirely on the data of Cook $et \ al.$ (7). The equation is

 $\ln x_1 = -5.6689 - 4.8099/(T/100K)$

with a standard error about the regression line of 4.60 x 10^{-6} .

From the equation the temperature independent thermodynamic quantities are

 $\Delta \overline{H}_{1}^{\circ}/kJ \mod^{-1} 4.00 \text{ and } \Delta \overline{S}_{1}^{\circ}/J \text{ K}^{-1} \mod^{-1} - 47.1.$

Smoothed values of the mole fraction solubility and partial molar Gibbs energy of solution are in the following table.

Table 2. Solubility of hydrogen in heptane at a hydrogen partial pressure of 101.325 kPa (1 atm). Tentative mole fraction solubility and partial molal Gibbs energy of solution are a function of temperature.

т/к	Mol Fraction	∆G _l /kJ mol ⁻¹
243.15	4.77	15.460
253.15	5.16	15.931
263.15	5.55	16.402
273.15	5.93	16.873
283.15	6.31	17.345
288.15	6.50	17.580
293.15	6.69	17.816
298.15	6.88	18.051
303.15	7.06	18.287
313.15	7.43	18.759
323.15	7.79	19.230

Hydrogen + Octane [111-65-9]

Cook, Hanson and Alder (7) report four solubility measurements between temperatures of 248.15 and 308.15 K. Makranczy, Megyery-Balog, Rusz, and Patyi (1) report one measurement of 298.15 K which is 6.3 per cent lower than the Cook *et al.* value, and Ijams (6) reports one value of 298.15 K which is 1.4 per cent greater than the Cook *et al.* value.

As discussed in connection with the hydrogen + heptane system, the Cook $e^t al$. data are considered the most reliable for this system. The tentative equation and smooth values are based entirely on their data.

Although a three constant equation will fit the Cook $et \ al$. data almost exactly, we are justified in using only a two constant equation. The linear regression of the data gives the tentative equation for the mole fraction solubility over the temperature interval of 248.15 to 308.15 K as

 $\ln x_1 = -5.6624 - 4.8438/(T/100K)$

with a standard error about the regression line of 3.08 x 10^{-6} .

 F^{rom} the equation the temperature independent thermodynamic quantities are

$$\Delta \overline{H}_{1}^{\circ}/kJ \mod^{-1}$$
 4.03 and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \mod^{-1}$ -47.1.

^{Smoo}thed values of the mole fraction solubility and partial molal Gibbs ^{energy} of solution are in Table 3.

> Table 3. Solubility of hydrogen in octane at a hydrogen partial pressure of 101.325 kPa (1 atm). Tentative mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

T/K	Mol Fraction $10^4 x_1$	∆Ğ _l ⁄kJ mol ⁻¹
253.15 263.15 273.15 283.15 288.15 293.15 298.15 303.15	5.13 5.51 5.90 6.28 6.47 6.66 6.84 7.03	15.945 16.416 16.887 17.358 17.593 17.828 18.064 18.299
308.15	7.03	18.535

Hydrogen + 2,2,4-Trimethylpentane [540-84-1]

Cook, Hanson, and Alder (7) have reported data at a hydrogen partial pressure of 101.325 kPa (1 atm) on the system. Their data were carefully obtained, and are classed as tentative. Ijams (6) reports one solubility value of 298.15 K which is 4.3 per cent smaller than the Cook *et al*. value.

A linear regression of the data of Cook $et \ all$ gives the equation for the mole fraction solubility over the temperature interval of 248.15 to 308.15 K

 $\ln x_1 = -5.6469 - 4.4889/(T/100K)$

with a standard error about the regression line of 4.34×10^{-6} .

The enthalpy and entropy changes for transfer of one mole of gas from the gas phase at 101.325 kPa (1 atm) to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \text{ mol}^{-1}$ 3.73 and $\Delta \overline{S}_1^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1}$ -46.9

The smoothed values of mole fraction solubility and partial molal Gibbs energy of solution are given in Table 4.

Table 4. Solubility of hydrogen in 2,2,4-trimethylpentane at a hydrogen partial pressure of 101.325 kPa (1 atm). Tentative mole fraction solubility and partial molar Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction	∆G̃°∕kJ mol ⁻¹
253.15	5.99	15.618
263.15	6.41	16.087
273.15	6.82	16.557
283.15	7.23	17.026
293.15	7.63	17.496
298.15	7.83	17.730
303.15	8.03	17.965
308.15	8.22	18.200

Hydrogen + Nonane [111-84-2]

Thomsen and Gjaldbaek (9) report three solubility measurements at temperatures between 298.05 and 308.05 K. Makranczy *et al.*(1) report one value at 298.15 K. Both data sets are classed as tentative, but the Thomsen and Gjaldbaek data at three temperatures were measured with higher precision. Thus the Thomsen and Gjaldbaek data are preferred. An equation and smoothed data table appears on their data sheet. The equation corresponds to temperature independent enthalpy and entropy changes for the transfer of hydrogen from the gas at 101.325 kPa (1 atm) to the infinitely dilute solution of

$$\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$$
 3.74 and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \text{ mol}^{-1}$ -47.9

Hydrogen + Decane [124-18-5]

Both Ijams (6) and Makranczy $et \ all$. (1) report a single value at 298.15 K. The values differ by nearly 20 per cent. The Makranczy value is classed as tentative and the Ijams value as doubtful.

Hydrogen + Undecane [1120-21-4] + Dodecane [112-40-3] + Tridecane [629-50-5] + Tetradecane [629-59-4]

+ Pentadecane [629-62-9]

Makranczy, Megyery-Balog, Rusz, and Patyi (1) report one solubility value at 298.15 K for each of the above five systems. The data are classed as tentative. Hydrogen + Hexadecane [544-76-3]

Makranczy *et al.* (1) report one solubility value at 298.15 K. Cukor and Prausnitz (10) report eight values between the temperatures of 300 and 475 K. The Cukor and Prausnitz value at 300 K is 20 per cent greater than the Makranczy *et al.* value at 298.15 K. Although both results are classed as tentative, the Cukor and Prausnitz value is preferred.

The Cukor and Prausnitz data were fitted to a three constant equation by a linear regression. The equation for the mole fraction solubility at a hydrogen partial pressure of 101.325 kPa (1 atm) over the 300 to 475 K temperature interval is

 $\ln x_1 = -11.01165 + 3.8183/(T/100K) + 2.4811 \ln (T/100K)$

with a standard error around the regression line of 2.36×10^{-6} . The equation reproduces the Cukor and Prausnitz mole fraction values to within almost one part per thousand.

The equation results in the following values of the enthalpy, entropy, and heat capacity change for the transfer of one mole of hydrogen from the gas phase at 101.325 kPa hydrogen pressure to the infinitely dilute solution.

Table 5. Hydrogen + Hexadecane thermodynamics of transfer of one mole of hydrogen from gas at 101.325 kPa to infinitely dilute solution.

T/K	$\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$	$\Delta \overline{S}_{1}^{\circ}/J K^{-1} mol^{-1}$	Δ [¯] C°/J K ⁻¹ mol ⁻¹
325	3.53	-46.6	20.6
400	5.08	-42.3	20.6
475	6.62	-38.8	20.6

Hydrogen + 2,6,10,15,19,23-Hexamethyltetracosane or Squalane [111-01-3]

Chappelow and Prausnitz (11) report eight values of the solubility of hydrogen in squalane over the temperature interval of 300 to 475 K which are classed as tentative. The mole fraction values at 101.325 kPa hydrogen partial pressure were fitted to a three constant equation by a linear regression. The equation is

 $\ln x_1 = -8.1089 + 0.07805/(T/100K) + 1.3623 \ln (T/100K)$

with a standard error about the regression line of 3.15×10^{-6} . The equation reproduces the mole fraction values (see data sheet) to within two parts per thousand.

The equation results in the following values of the thermodynamic changes.

Т/К	$\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$	$\Delta \overline{S}_{1}^{\circ}/J K^{-1} mol^{-1}$	ΔĒpj /J K ⁻¹ mol ⁻¹
325	3.33	-43.6	11.3
400	4.47	-40.4	11.3
475	5.32	-38.4	11.3

Table 6. Hydrogen + Squalane. Thermodynamic changes on transfer of one mole of hydrogen from the gas phase at 101.325 kPa (1 atm) to the infinitely dilute solution.

References: Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. Hung. J. Ind. Chem. <u>1976</u>, 4, 269. 1. 2. Frolich, P. K.; Tauch, E. J.; Hogan, J. J.; Peer, A. A. Ind. Eng. Chem. 1931, 23, 548. Guerry, D. Jr. Ph.D. Thesis, Vanderbilt University, Nashville, TN з. 1944. 4. Waters, J. A.; Mortimer, G. A.; Clements, H. E. J. Chem. Eng. Data 1970, 15, 174, 462. 5. Katayama, T.; Nitta, T. J. Chem. Eng. Data 1976, 21, 194. б. Ijams, C. C. Ph.D. Thesis, Vanderbilt University, Nashville, TN 1941. 7. Cook, M. W.; Hanson, D. N.; Alder, B. J. J. Chem. Phys. 1957, 26, 748. 8. Cook, M. W. University of California Radiation Lab, Report UCRL-2459, 1954. Thomsen, E. S.; Gjaldbaek, J. C. 9. Acta Chem. Scand. 1963, 17, 127. Cukor, P. M.; Prausnitz, J. M. J. Phys. Chem. <u>1972</u>, 76, 598. 10. Chappelow, C. C.; Prausnitz, J. M. Am. Inst. Chem. Eng. J. <u>1974</u>, 20, 1097. 11.

COMPONENTS:			ORIGINAL MEASURE	MENTS:	
(l) Hydrogen; H	lo: [1333-	-74-07		; Megyery-Balog	r. K. •
			Rusz, L.; Pa		,,,
(2) Pentane; C ₅	H ₁₂ ; L109	9-66-0]	Hung. J. Ind.	Chem. 1976, 4,	269-280.
					205 200.
VARIABLES:			PREPARED BY:		·
	298.15			A. Johnson	
P/kPa:	101.325	(l atm)	н.	L. Clever	
EXPERIMENTAL VALUES	<u> </u>		l		
ALUEATRI VALUEA	•				
					-
	T/K	Mol Fraction	Bunsen	Ostwald Coefficient*	
		$x_{1} \times 10^{4}$	<u></u>	L	
	298.15	6.7	0.130	0.142	
					-
	*original	datum			
			INFORMATION		
METHOD /ADDA DA DIA		AUXILIARY	INFORMATION		
METHOD/APPARATUS/PR	OCEDURE :	AUXILIARY	INFORMATION SOURCE AND PURIT	Y OF MATERIALS:	
		9788	SOURCE AND PURIT		tigal
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
	od The av	pparatus of	SOURCE AND PURIT Both compone	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of	ents were analy ts of either Hu rigin.	tical ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent	ents were analy ts of either Hu rigin.	ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of	ents were analy ts of either Hu rigin.	ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of	ents were analy ts of either Hu rigin.	ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of	ents were analy ts of either Hu rigin.	ngarian
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagen or foreign of ESTIMATED ERROR: REFERENCES:	ents were analy ts of either Hur rigin. $\delta x_1/x_1 = 0.03$	ngarian (authors)
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of ESTIMATED ERROR: REFERENCES: 1. Bodor, E.; Sipos, G	ents were analy ts of either Hur rigin. $\delta x_1/x_1 = 0.03$; Bor, Gy.; Moha	(authors) ai, B.;
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of ESTIMATED ERROR: REFERENCES: 1. Bodor, E.; Sipos, G. Veszpremi	ents were analy ts of either Hur rigin. $\delta x_1/x_1 = 0.03$; Bor, Gy.; Moha Vegyip. Egy. Ka	(authors) ai, B.;
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of ESTIMATED ERROR: REFERENCES: 1. Bodor, E. Sipos, G Veszpremi 1957, 1, 5	ents were analy ts of either Hur rigin. $\delta x_1/x_1 = 0.03$; Bor, Gy.; Moha Vegyip. Egy. Ka	(authors) ai, B.;
Volumetric meth Bodor, Bor, Moh	od The av	pparatus of	SOURCE AND PURIT Both compone grade reagent or foreign of ESTIMATED ERROR: REFERENCES: 1. Bodor, E. Sipos, G Veszpremi 1957, 1, 5	ents were analy ts of either Hu rigin. $\delta x_1/x_1 = 0.03$; Bor, Gy.; Moha Vegyip. Egy. Ka	(authors) ai, B.;

ORIGINAL MEASUREMENTS: Guerry, D. Jr. Ph.D. thesis, <u>1944</u> Vanderbilt University Nashville, TN		
Ph.D. thesis, <u>1944</u> Vanderbilt University		
Vanderbilt University		
Thesis Director, L. J. Bircher		
PREPARED BY:		
H. L. Clever		
I		
Bunsen Ostwald pefficient Coefficient αL		
0-54-3]		
0.110 0.118		
0.111 0.121		
42-82-5]		
0.0975 0.105 0.101 0.110		
The Ostwald coefficients were calculated by the compiler.		
AUXILIARY INFORMATION		
SOURCE AND PURITY OF MATERIALS:		
Hexane. Eastman Kodak Co. B.p. (760.3 mmHg) t/°C 68.85 - 68.90.		
Heptane. B.p. (753.9 mmHg) t/°C 98.27 - 98.28 (corr.).		
ESTIMATED ERROR:		
$\delta T/K = 0.05$		
<pre>REFERENCES: 1. Van Slyke, D. D. J. Biol. Chem. 1939, 130, 545. 2. Ijams, C. C. Ph.D. thesis, 1941 Vanderbilt University</pre>		

ORIGINAL MEASUREMENTS:

<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Hexane; C₆H₁₄; [110-54-3] VARIABLES:</pre>	Waters, J. A.; Mortimer, G. A.; Clements, H. E. J. Chem. Eng. Data <u>1970</u> , 15, 174- 176 and 462 (correction). PREPARED BY: P. L. Long H. L. Clever
	Fraction Bunsen Ostwald
$t/^{\circ}C$ T/K H_{2} 10 ³ x	1×10^4 Coefficient Coefficient α L
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	4.77 0.0852 0.0821 5.26 0.0926 0.0926 5.70 0.0991 0.1027 6.09 0.104 0.112
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The authors reported two methods of solubility measurement. The hydrogen solubilities were measured by their method A. The apparatus consisted of two glass bulbs connected by ¼" stainless steel tubing fitted with Hoke valves and a strain gage. The strain gage signal was measured by a potentiometer. The bulbs were immersed in an oil bath. The temperature was measured with a Pt resistance thermometer and Mucling in the temperature was measured	 Hydrogen. Air Reduction Co. Minimum purity 99.50 per cent. Hexane. Phillips Petroleum Co. Maximum impurities 0.5% benzene and 0.5% methyleyclopentane.
Mueller bridge. The solvent was degassed three times at liquid N ₂ temperature. The solvent vapor pressure was measured in the apparatus. Gas in the second bulb at a known P and T was allowed into the bulb containing the solvent. The change in P was followed until equilibrium was reached. The gas uptake was calculated using Charles law. A correction was made for H ₂ adsorption on the walls.	ESTIMATED ERROR: $\delta P/mmHg = 0.1$ $\delta T/K = 0.01$
	REFERENCES:

COMPONENTS:

COMPONENTS:		ORIGINAL MEASUREMENTS:		
	en; H ₂ ; [1333-74-0]	Katayama, T.; Nitta, T.		
r. nyurug	en; n ₂ ; [1333-74-0]	Katayama, I.; Mitta, I.		
2. Hexane; C ₆ H ₁₄ ; [110-54-3]		J. Chem. Engng. Data. <u>1976</u> , 21,194-6		
VARIABLES:		PREPARED BY:		
Temperature		C.L. Young		
EXPERIMENTAL	VALUES:			
т/к		s Constant Mole fraction* of /atm hydrogen in liquid, ^x H ₂		
	······			
298,15	0.130	430 0.000699		
298.15		570 0.000599		
253.15		0.000521		
233.15		230 0.000448		
213.15		590 0.000372		
	* at a partial pressure	ce of 1 atmosphere		
	AUXILIARY	INFORMATION		
METHOD /ADD	ARATUS/PROCEDURE:			
Volumetric cell of ap Magnetic s degassed.	apparatus with equilibrium proximately 0.08 litres. tirrer. Solvent carefully Equilibrium established ours. Details in ref. (1).	 SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per cent. 2. Merck Uvasol spectral grade sample. 		
		ESTIMATED ERROR: $\delta T/K = \pm 0.12$ at T = 213.15K, ± 0.05 at other temperatures; $\&_{H_2} = \pm 1.5$ REFERENCES: 1. Nitta, T.; Tatsuishi. A.; Katayama, T. J. Chem. Eng. Jpn. <u>1973</u> , 6, 475.		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ : [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.		
(2) Hexane; C ₆ H ₁₄ ; [110-54-3]			
	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.		
VARIABLES:	PREPARED BY:		
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient* α L		
298.15 6.5	0.110 0.120		
*original datum			
Mol fractions and Bunsen coefficients	were calculated by the compiler.		
	-		
	-		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both components were analytical grade reagents of either Hungarian or foreign origin.		
	ESTIMATED ERROR:		
	$\delta x_1/x_1 = 0.03$ (authors)		
	REFERENCES:		
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Begyip. Egy. Kozl. 1957, 1, 55.</pre>		
	<i>Chem. Abstr.</i> <u>1961</u> , <i>55</i> , 3175h.		

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Hydrogen; H₂; [1333-74-0] Ijams, C. C. (2) Alkanes; C_7H_{16} , C_8H_{18} , and Ph.D. thesis, 1941 Vanderbilt University $C_{10}^{H}22$ Nashville, TN Thesis Director: L. J. Bircher VARIABLES: PREPARED BY: T/K: 298.15 P/kPa: 101.325 (1 atm) H. L. Clever EXPERIMENTAL VALUES: T/K Ostwald Mol Fraction Bunsen Coefficient Coefficient $x_{1} \times 10^{4}$ ____α ____L Heptane; C7^H16; [142-82-5] 298.15 5.90 0.0897 0.0979 Octane; C₈H₁₈; [111-65-9] 0.0950 6.93 298.15 0.1037 2,2,4-Trimethylpentane or isooctane; $C_8^{H_{18}}; [540-84-1]$ 298.15 0.1010 0.1102 7.48 Decane; C₁₀H₂₂; [124-18-5] 5.37 0.0615 298.15 0.0671 The mole fraction and Ostwald coefficient values were calculated by the compiler. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: A Van Slyke-Neill Manometric (1) Hydrogen. Air Reduction Co. Purity 99.5 per cent. Apparatus manufactured by the Eimer and Amend Co. was used. (2) Alkanes. Purified. Vapor pressure and boiling point The procedure of Van Slyke (1) for pure liquids was modified so that also reported in the thesis. small solvent sample (2 cm³) could be used with almost 100 per cent recovery of the solvent. An improved temperature control system was used. **ESTIMATED ERROR:** $\delta T/K = 0.05$ **REFERENCES**: 1. Van Slyke, D. D. J. Biol. Chem. <u>1939</u>, 130, 545.

COMPONENTS:	ORIGINAL	MEASUREMENT	S:	
 (1) Hydrogen; H₂; [1333-74-0] (2) Honton a 2 H = [140, 00, 1] 		Cook, M. W.; Hanson, D. N.; Alder, B. J.		
(2) Heptane; C ₇ H ₁₆ ; [142-82-5]			26, 748 - 751.	
EXPERIMENTAL VALUES:				
T/K Solubility ¹ Mol	Fraction	Bunsen Coefficient		
		$\frac{\alpha \times 10^2}{7.00}$	$\underline{L \times 10^2}$	
	4.804	7.80	6.94	
115/0 415/0	4.985	8.04	7.31	
372.24	5.522	8.76	8.43	
	5.903	9.25	9.25	
0	6.290 6.363 ³	9.74	10.09	
0.004	6.363° 6.475 ³	9.82	10.26	
	6.475	9.96	10.51	
$\begin{array}{c} 6.871 \\ 6.875 \\ 6.875 \\ 6.874^{1} \\ \underline{6.872} \\ 6.871^{1} \end{array}$	6.879	10.43	11.39	
308.15 7.281	0.075	10.43	11.37	
$\begin{array}{c} 7.281 \\ 7.278 \\ 7.280 \\ 7.273 \\ 7.273 \\ 7.274 \\ 7.276 \\ 7.283 \\ 7.282 \\ 7.283 \\ 7.282 \\ 7.283 \\$				
7.282 7.281^{1} 7.282^{2}				
	7.288	10.94	12.34	
	7.71^{3}	11.43	13.31	
	7.92 ³	11.59	13.92	
¹ Data from (1). ² Data from (2). ³ Values calculated by the compiler. ¹ Data from (1). ⁴ The paper gives the temperature as -35 °C (238.15 K), but reference (1) gives the temperature as -30 °C (243.15 K). The higher temperature smooths the data better.				
The Bunsen and Ostwald coefficients w	vere calcul	lated by the	compiler.	
			-	
Smoothed Data: ln x _l = -5.6689 - 4.8				
Standard error about	the regres	ssion line =	4.60 x 10 ⁻⁶	
See the hydrogen + heptane evaluation for the recommended equation.				
-			-	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Cook, M. W.; Hanson, D. N.;		
2	Alder, B. J.		
(2) Heptane; C ₇ H ₁₆ ; [142-82-5]	J. Chem. Phys. <u>1957</u> , 26, 748 - 751.		
	5. chem. Phys. <u>1557</u> , 20, 148 - 151.		
VARIABLES:	PREPARED BY:		
T/K: 243.15 - 328.15 P/kPa: 101.325 (1 atm)	P. L. Long H. L. Clever		
T/RFd. 101.525 (1 adm)	n. h. cievei		
EXPERIMENTAL VALUES:			
See prece	eding page.		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus, designed especially	(1) Hydrogen. Matheson Co. Mass		
for the determination of the solubil- ity of hydrogen in liquids, consists	spectrographic analysis showed gas 99.75 per cent pure.		
of a gas bulb, a gas buret, a solvent	Impurity mostly N ₂ .		
bulb, and a manometer system. All	(2) Wantana Dhilling Dotuoloum		
are attached to a mounting plate, and the assembly is shaken in an air bath.			
	Distilled, center portion used,		
The solvent is degassed in the solv- ent bulb by heat and evacuation. The	b.p. 371.45K. Other solvent properties given in reference (1).		
gas is placed in the gas bulb, after	propercies given in reference (1).		
temperature equilibrium is reached,			
the gas is contacted with the de- gassed solvent. The system is shaken	ESTIMATED ERROR:		
until solubility equilibrium is			
attained. Mercury is used as the	$\delta x_1/x_1 = 0.001 \text{ (authors)}$		
displacement fluid.			
The solubility is calculated from the	REFERENCES:		
initial and final quantities of gas,	1. Cook, M. W.		
the pressure measurements, the vapor pressure of the solvent, and the	University of California Radiation Lab, Report UCRL-2459, <u>1954</u> .		
solvent volume.			
	2. Cook, M. W.; Hanson, D. N.		
	Rev. Sci. Instr. <u>1957</u> , 28, 370.		
1			

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.		
(2) Heptane; C ₇ H ₁₆ ; [142-82-5]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.		
VARIABLES:	PREPARED BY:		
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient* α L		
298.15 6.6	0.100 0.109		
*original datum			
Mol fractions and bunsen coefficients	were calculated by the compiler.		
	-		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both components were analytical grade reagents of either Hungarian or foreign origin.		
	ESTIMATED ERROR:		
	$\delta x_1 / x_1 = 0.03 \text{ (authors)}$		
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl.		
	1957, 1, 55. Chem. Abstr. 1961, 55, 3175h.		

COMPONENTS:	t	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Cook, M. W.; Hanson, D. N.;			
(1, marogen, m2, [1999-14-0]	Alder, B. J.			
(2) Octane; C ₈ H ₁₈ ; [111-65-9]		J. Chem. Phys. <u>1957</u> , 26, 748 - 751.		
VARIABLES:		PREPARED BY:		
т/к: 248.15 - 308.15		P. L. Long		
P/kPa: 101.325 (1 atm)		H. L. Clever		
	l			
EXPERIMENTAL VALUES:				
T/K Solubility ¹ Mol Fract mol $g^{-1} \times 10^6 x_1 \times 10^6$				
248.15 4.331	4.947			
273.15 5.139	5.869			
	6.832			
308.15 6.343	7.241	9.81 11.07		
¹ Data from (1).				
The Bunsen and Ostwald coeffici	ents we	ere calculated by the compiler.		
Smoothed Data: $\ln x_1 = -8.5728$	- 0.86	577/(T/100K) + 1.4425 ln (T/100K)		
<u>+</u>		_		
		the regression line = 5.97×10^{-7}		
For the recommended equation see	e the h	nydrogen + octane evaluation.		
AU2	KILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
The apparatus, designed especial for the determination of the sol		(1) Hydrogen. Matheson Co. Mass spectrographic analysis showed		
ity of hydrogen in liquids, con		gas 99.75 per cent pure.		
of a gas bulb, a gas buret, a so		Impurity mostly N2.		
bulb, and a manometer system. A are attached to a mounting plate	All	(2) Octane. Eastman Kodak Co.		
the assembly is shaken in an air				
_		b.p. 398.65K. Other solvent		
The solvent is degassed in the second bulb by heat and evacuation		properties given in reference (1).		
gas is placed in the gas bulb, a		(1).		
temperature equilibrium is reach	hed,			
the gas is contacted with the de		ESTIMATED ERROR:		
gassed solvent. The system is a until solubility equilibrium is				
attained. Mercury is used as the		$\delta x_1 / x_1 = 0.001 \text{ (authors)}$		
displacement fluid.		+ +		
The solubility is calculated from	om the	REFERENCES :		
initial and final quantities of	gas,	1. Cook, M. W.		
the pressure measurements, the		University of California Radiation		
pressure of the solvent, and the solvent volume.	-	Lab, Report UCRL-2459, <u>1954</u> .		
		2. Cook, M. W.; Hanson, D. N.		
		Rev. Sci. Instr. <u>1957</u> , 28, 370.		

COMPONENTS:		ODICINAL MEAC	UDENENIEC .		
(1) Hydrogen; H _a ; [1333-74-01	ORIGINAL MEASUREMENTS:			
2		Rusz, L	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.		
(2) Octane; C ₈ H ₁₈ ; [111-65-9]		Hung. J. I	nd. Chem. 1976, 4, 269-280.		
		nung	<u></u> , 1, 200 200.		
VARIABLES:		DDEDADED BY.			
VARIABLES: T/K: 298.15		PREPARED BY: S. A. Johnson			
P/kPa: 101.32	5 (l atm)		H. L. Clever		
	·				
EXPERIMENTAL VALUES:					
T/K		Bunsen Coefficient	Ostwald Coefficient*		
	$x_1 \times 10^4$	α	L		
298.1	5 6.4	0.088	0.096		
	al datum				
Mol fractions and bu	nsen coefficients	were calcula	ated by the compiler.		
	1				
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDU	RE:	••			
Volumetric method	The apparatus of	SOURCE AND PU	RITY OF MATERIALS:		
	the apparatus or	Both compor	nents were analytical		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian		
used.	nd Sipos (1) was	Both compor grade reage or foreign	nents were analytical ents of either Hungarian origin.		
used.	nd Sipos (1) was	Both compor grade reage	nents were analytical ents of either Hungarian origin.		
used.	nd Sipos (1) was	Both compor grade reage or foreign	nents were analytical ents of either Hungarian origin. OR:		
used.	nd Sipos (1) was	Both compor grade reage or foreign	nents were analytical ents of either Hungarian origin.		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERR	nents were analytical ents of either Hungarian origin. OR:		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERR REFERENCES: 1. Bodor, E	hents were analytical ents of either Hungarian origin. DR: $\delta x_1/x_1 = 0.03$ (authors) C.; Bor, Gy.; Mohai, B.;		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERR REFERENCES: 1. Bodor, E Sipos, G	hents were analytical ents of either Hungarian origin. DR: $\delta x_1/x_1 = 0.03$ (authors) :; Bor, Gy.; Mohai, B.;		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERRO REFERENCES: 1. Bodor, E Sipos, G Veszprem 1957, 1,	hents were analytical ents of either Hungarian origin.		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERRO REFERENCES: 1. Bodor, E Sipos, G Veszprem 1957, 1,	hents were analytical ents of either Hungarian origin.		
used.	nd Sipos (1) was	Both compor grade reage or foreign ESTIMATED ERRO REFERENCES: 1. Bodor, E Sipos, G Veszprem 1957, 1,	hents were analytical ents of either Hungarian origin.		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Cook, M. W.; Hanson, D. N.;		
	Alder, B. J.		
(2) 2,2,4-Trimethylpentane or isooctane; C ₈ H ₁₈ ; [540-84-1]	J. Chem. Phys. 1957, 26, 748-751.		
1300ccane, c ₈ "18, [540 04 1]	1. onem: 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.		
VARIABLES: T/K: 283.15 - 318.15	PREPARED BY: P. L. Long		
P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Solubility ¹ Mol Frac	tion Bunsen Ostwald		
_1 6	4 Coefficient Coefficient		
$\frac{\text{mol } g^{-1} \times 10^{\circ}}{2} x_{1} \times 1$	$\frac{0^{4}}{\alpha \times 10^{2}} \underline{L \times 10^{2}}$		
248.15 5.080 5.80			
273.15 5.937 6.77 298.15 6.845 7.81			
308.15 7.234 8.25			
¹ Data from (1).			
The Bunsen and Ostwald coefficients w	_		
Smoothed Data: $\ln x_1 = -9.2505 + 0.4$	341/(T/100K) + 1.7861 ln (T/100K)		
Standard error around	the regression line = 5.79×10^{-7}		
T/K	Mol Fraction		
-, -:	$x_1 \times 10^4$		
253.15	<u> </u>		
263.15	6.379		
273.15	6.777		
283.15 293.15	7.186 7.605		
298.15	7.820		
303.15	8.036		
308.15	8.255		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus, designed especially	(1) Hydrogen. Matheson Co. Mass		
for the determination of the solubil-	spectrographic analysis showed		
ity of hydrogen in liquids, consists of a qas bulb, a qas buret, a solvent	gas 99.75 per cent pure. Impurity mostly N ₂ .		
bulb, and a manometer system. All			
are attached to a mounting plate, and			
the assembly is shaken in an air bath	. Petroleum Co. Pure Grade, 99+ mol per cent. Distilled, center		
The solvent is degassed in the solv-	portion used, b.p. 372.35 K.		
ent bulb by heat and evacuation. The			
gas is placed in the gas bulb, after temperature equilibrium is reached,	in reference (1).		
the gas is contacted with the de-	ESTIMATED ERROR:		
gassed solvent. The system is shaken until solubility equilibrium is			
attained. Mercury is used as the	$\delta x_1 / x_1 = 0.001 \text{ (authors)}$		
displacement fluid.			
The solubility is calculated from the	REFERENCES :		
initial and final quantities of gas,	1. Cook, M. W.		
the pressure measurements, the vapor	University of California Radiation		
pressure of the solvent, and the solvent volume.	Lab, Report UCRL-2459, <u>1954</u> .		
SOTVENC VOTUME.	2. Cook, M. W.; Hanson, D. N. Pour Soi Instr. 1957 28 370		
	<i>Rev. Sci. Instr.</i> <u>1957</u> , 28, 370.		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]	Thomsen, E. S.; Gjaldbaek, J. C.			
(2) Nonane; C ₉ H ₂₀ ; [111-84-2]	Acta Chem. Scand. <u>1963</u> , 17, 127-133.			
VARIABLES:	PREPARED BY:			
T/K: 298.05 - 308.05	E. S. Thomsen			
Total P/kPa: 101.325 (1 atm)				
EXPERIMENTAL VALUES:				
T/K Mol Fraction	Bunsen Ostwald			
$x_1 \times 10^4$ Co	$\frac{\alpha \times 10^2}{L \times 10^2}$			
298.05 6.87	$\frac{11}{8.58}$ 9.36			
298.15 6.98 308.05 7.27	8.71 9.51 8.98 10.1			
The mole fraction and Ostwald solubility				
compiler. Solubility values are for 1 hydrogen assuming Henry's law is obeye	.01.325 (1 atm) partial pressure			
Smoothed Data: $\ln x_1 = -5.7654 - 4.50$				
Standard error about t	the regression line = 7.53×10^{-6}			
	101 Fraction			
	$\frac{x \times 10^4}{2}$			
298.15	6.93			
308.15 308.15	7.10 7.27			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
A calibrated all-glass combined man- Ometer and bulb was enclosed in an	(1) Hydrogen. Source not given. Contained 0.02 per cent 0 ₂ and			
air thermostat and shaken until	0.03 per cent N_2 .			
equilibrium. Mercury was used for Calibration and as the confining	2			
liquid. The solvents were degassed	(2) Nonane. Fluka "purum." Frac- tionated, distillation range			
in the apparatus. Details are in references 1 and 2.	0.08 K.			
The absorped volume of gas was cal-				
Culated from the initial and final				
amounts, both saturated with solvent vapor. The amount of solvent was				
determined by the weight of displaced	ESTIMATED ERROR:			
mercury.	$\delta T/K = 0.05$ $\delta x_1/x_1 = 0.015$			
The saturation of the liquid with the	1, 1, 1			
gas was carried out close to atmos- Pheric pressure. The solubility	REFERENCES:			
Values were reported for one atmos-				
Phere gas pressure assuming Henry's law is obeyed.	1. Lannung, A.			
	 Lannung, A. J. Am. Chem. Soc. <u>1930</u>, 52, 68. 			
-4w is obeyed.	J. Am. Chem. Soc. <u>1930</u> , 52, 68. 2. Gjaldbaek, J. C.			
-aw is obeyed.	J. Am. Chem. Soc. <u>1930</u> , 52, 68.			

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
(2) Nonane; C ₉ H ₂₀ ; [111-84-2]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction x _l × 10 ⁴ C	Bunsen Ostwald oefficient Coefficient* α L
298.15 6.5	0.081 0.088
*original datum	
Mol fractions and bunsen coefficients	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	SOURCE AND PURITY OF MATERIALS: Both components were analytical grade reagents of either Hungarian or foreign origin. ESTIMATED ERROR: $\delta x_1/x_1 = 0.03$ (authors)
	<pre>REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. <u>1957</u>, 1, 55. Chem. Abstr. <u>1961</u>, 55, 3175h.</pre>

COMPONENTS: (1) Hydrogen; H_{a} : [1333-74-0]			ORIGINAL MEASUREMENTS: Makranczy, J.; Megyery-Balog, K.;		
			Rusz, L.;	.; Megyery-Balog, Patyi, L.	K• j
(2) Decane; C ₁₀ H ₂₂ ; [124-18-5]		}		260 200	
		Hung. J. Ind	. Chem. <u>1976</u> , 4,	269-280.	
VARIABLES: T/K: 298.15			PREPARED BY: S. A. Johnson		
P/kPa: 101.325 (1 atm)		H. L. Clever			
EXPERIMENTAL VALU	UES:				
	т/к	Mol Fraction		Ostwald	
		$x_1 \times 10^4$	Coefficient	Coefficient* L	
	298.15	6.5	0.074	0.081	
	*original	datum			
Mol fractions	and bunsen	coefficients	were calculat	ed by the compile	r.
		AUXILIARY	INFORMATION		l
METHOD /APPARATUS	/PROCEDURE :		SOURCE AND PURT	TY OF MATERIALS:	
Volumetric met	hod. The	apparatus of	1	nts were analytic;	al
Bodor, Bor, Mc	hai, and S	ipos (1) was	grade reagen	ts of either Hunga	
used.			or foreign of	rigin.	
			4		
			ł		
			ESTIMATED ERROR	:	
			4	$\delta x_1 / x_1 = 0.03$ (aut	thors)
			REFERENCES:		
-				Bor, Gy.; Mohai	. B. :
			Sipos, G.		
			Veszpremi	Vegyip. Egy. Koz:	ι.
			<u>1957</u> , 1, 9 Chem. Absi	tr. <u>1961</u> , 55, 317	5h.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.		
(2) Undecane; C ₁₁ H ₂₄ ; [1120-21-4]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.		
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: S. A. Johnson H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $x_1 \times 10^4$ C	BunsenOstwaldoefficientCoefficient* α L		
298.15 6.8	0.072 0.079		
*original datum			
Mol fractions and bunsen coefficients			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE: Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	SOURCE AND PURITY OF MATERIALS; Both components were analytical grade reagents of either Hungarian or foreign origin.		
	ESTIMATED ERROR:		
	$\delta x_1/x_1 = 0.03$ (authors)		
	<pre>REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. 1957, 1, 55. Chem. Abstr. 1961, 55, 3175h.</pre>		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.;
-	Rusz, L.; Patyi, L.
(2) Dodecane; C _{12^H26} ; [112-40-3]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
	,,,,,,,,,
VARIABLES:	PREPARED BY:
T/K: 298.15	S. A. Johnson
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
	Coefficient Coefficient*
	<u>α L</u>
298.15 7.3	0.071 0.078
*original datum	
Mol fractions and bunsen coefficients	were calculated by the compiler.
AIIXII.TARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Volumetric method. The apparatus of	SOURCE AND PURITY OF MATERIALS: Both components were analytical
19940E. Bor. Mohai, and Sinos (1) was	grade reagents of either Hungarian
used.	or foreign origin.
	ESTIMATED ERROR:
	$\delta x_1/x_1 = 0.03$ (authors)
	$5^{2}1^{2}1 = 5.55$ (authors)
	REFERENCES:
	1. Bodor, E.; Bor, Gy.; Mohai, B.;
	Sipos, G.
	Veszpremi Vegyip. Egy. Kozl. <u>1957</u> , 1, 55.
	Chem. Abstr. 1961, 55, 3175h.
Calina and a second	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
(2) Tridecane; C _{13^H28} ; [629-50-5]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever
EXPERIMENTAL VALUES:	I
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient* α L
298.15 7.4	0.068 0.074
*original datum	
Mol fractions and bunsen coefficients	were calculated by the compiler
FOI Hattions and bunsen coefficients	were calculated by the comprise.
AUXILIARY	INFORMATION
ME THOD /AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both components were analytical grade reagents of either Hungarian or foreign origin.
	ESTIMATED ERROR: $\delta m \ (m = 0.03 \ (authors))$
	$\delta x_1 / x_1 = 0.03 \text{ (authors)}$
	REFERENCES:
	1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Vesapremi Vegyip. Egy. Kozl. 1957, 1, 55.
	<i>Chem. Abstr.</i> <u>1961</u> , <i>55</i> , 3175h.

COMPONENTS:	
	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ : [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
(2) Tetradecane; C ₁₄ H ₃₀ ; [629-59-4]	
	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
VARIABLES: T/K: 298.15	PREPARED BY: S. A. Johnson
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_{1} \times 10^{4}$	Coefficient Coefficient* α L
298.15 6.8	0.059 0.064
*original datum	
Mol fractions and bunsen coefficients	were calculated by the compiler.
	carearadea si ene compriser
AUXILLARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of ^{Bo} dor, Bor, Mohai, and Sipos (1) was	Both components were analytical grade reagents of either Hungarian
used.	or foreign origin.
	ESTIMATED ERROR:
	$\delta x_1/x_1 = 0.03$ (authors)
	REFERENCES:
	1. Bodor, E.; Bor, Gy.; Mohai, B.;
	Sipos, G. Veszpremi Vegyip. Egy. Kozl.
	<u>1957</u> , 1, 55.
	Chem. Abstr. <u>1961</u> , 55, 3175h.
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
(2) Pentadecane; C ₁₅ H ₃₂ ; [629-62-9]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever
EXPERIMENTAL VALUES:	
	Bunsen Ostwald
	Bunsen Ostwald Coefficient Coefficient*
298.15 7.0	0.057 0.062
*original datum	
Mol fractions and busnen coefficients	were calculated by the compiler.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was	Both components were analytical grade reagents of either Hungarian
used.	or foreign origin.
	ESTIMATED ERROR:
	$\delta x_1 / x_1 = 0.03 \text{ (authors)}$
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.;
	Sipos, G.
	Veszpremi Vegyip. Egy. Kozl. 1957, 1, 55.
	<i>Chem. Abstr.</i> <u>1961</u> , <i>55</i> , 3175h.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Cukor, P.M.; Prausnitz, J.M.
<pre>2. Hexadecane; C16H34; [544-76-3]</pre>	J. Phys. Chem. <u>1972</u> , 76,598-601.
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	
T/K Henry's Constan /atm	t ^a Mole fraction of ^b hydrogen in liquid, ^{°°} H ₂
paper.	0.000900 0.000996 0.00110 0.00121 0.00134 0.00147 0.00161 0.00176 y material for original for a partial pressure
	ΤΝΕΩΡΜΑΤΙΩΝ
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).	SOURCE AND PURITY OF MATERIALS: No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 2\%.$ REFERENCES:
	 1. Dymond, J.; Hildebrand, J.H. Ind. Eng. Chem. Fundam. <u>1967</u>, 6, 130. 2. Cukor, P.M.; Prausnitz, J.M. Ind. Eng. Chem. Fundam. <u>1971</u>, 10,638.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
(2) Hexadecane; $C_{16}^{H}_{34}$; [544-76-3]	Hung. J. Ind. Chem. <u>1976</u> , 4, 269-280.
	<u> </u>
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	S. A. Johnson H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient* α L
298.15 7.2	0.055 0.060
*original datum	
Mol fractions and bunsen coefficients	were calculated by the compiler.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was	Both components were analytical grade reagents of either Hungarian
used.	or foreign origin.
	ESTIMATED ERROR:
	$\delta x_1 / x_1 = 0.03 \text{ (authors)}$
	REFERENCES:
	1. Bodor, E.; Bor, Gy.; Mohai, B.;
	Sipos, G. Veszpremi Vegyip. Egy. Kozl.
	<u>1957, 1, 55.</u> Chem. Abstr. <u>1961</u> , 55, 3175h.
	,,,,,
	1

COMPONENTS:			ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]		-01	Chappelow, C.C.; Prausnitz, J.M.
2. 2, 6, 10,	15, 19, 23 -		Am. Inst. Chem. Engnrs. J. <u>1974</u> , 20, 1097-
C ₃₀ H ₆₂ ; [tetracosane, 111-01-3]	(Squalane)	1104.
VARIABLES:			PREPARED BY:
Tem	perature		C.L. Young
EXPERIMENTAL VALU	VES:		
т/к		Henry's Con /atm	stant ^a Mole fraction ^b of hydrogen at 1 atm partial pressure, ^x H ₂
			••• 2
300		726	0.001377
325		650	0.001538
350		589	0.001698
375		538	0.001859
400		494	0.002024
425		455	0.002198
450		421	0.002375
475		391	0.002558
 a. Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's-Law region. b. Calculated by compiler assuming linear relationship between mole fraction and pressure. 			
		AUXILIARY	INFORMATION Y
METHOD/APPARATU	S/PROCEDURE.		SOURCE AND PURITY OF MATERIALS:
Volumetric app described by D (1). Pressure detector and p in ref. (2).	ymond and Hi measured wi	ldebrand th a null	Solvent degassed, no other details given.
			ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 1$ %. (estimated by compiler). REFERENCES: 1. Dymond, J.; Hildebrand, J.H. Ind.Eng.Chem. Fundam. <u>1967</u> , 6, 130. 2. Cukor, P.M.; Prausnitz, J.M. Ind.Eng.Chem. Fundam. <u>1971</u> , 10, 638.

COMPONENTS: **EVALUATOR:** (1) Hydrogen; H₂; [1333-74-0] H. L. Clever Department of Chemistry (2) Cyclohexane; C₆H₁₂; [110-82-7] Emory University GA 30322 USA Atlanta, 1980, September CRITICAL EVALUATION: Four laboratories have reported values of the solubility of hydrogen in cyclohexane at atmospheric pressure. Guerry (1) reported measurements at 293.15 and 298.15 K, Kruyer and Nobel (2) reported a value at 298.15 K, Dymond (3) reported four values over the 293.95 to 309.53 K temperature range, and Kraus and Gestrich (4) reported four values over the 283.15 to 313.15 K temperature range, which were presented on a graph. It is the judgement of the evaluator that Dymond's measurements were carried out with more care and on better designed apparatus than the measurements of the others. Kruyer and Nobel's single value is 1.2 per cent less than Dymond's value, and the other data ranges 6 to 8 per cent below the values of Dymond. A linear regression was applied to the data of Dymond to obtain the tentative equation $\ln x_1 = -5.6962 - 6.2403/(T/100K)$ with a standard error about the regression line of 4.73 x 10^{-7} . The temperature independent values of the thermodynamic changes in enthalpy and entropy for transfer of one mole of hydrogen from the gas at 101.325 kPa (1 atm) to the infinitely dilute solution are $\Delta \overline{H}_{\gamma}^{\prime}/kJ \mod^{-1} 5.19$, and $\Delta \overline{S}_{\gamma}^{\prime}/J K^{-1} \mod^{-1} -47.4$. Smoothed values of the mole fraction solubility and Gibbs energy of solution are in the table. Table 1. Solubility of hydrogen in cyclohexane at a hydrogen partial pressure of 101.325 kPa (1 atm). Tentative mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature. Mol Fraction $\Delta \overline{G}_1^{\circ}/kJ \mod^{-1}$ T/K 10⁴x₁ 293.15 4.00 19.07 298.15 4.14 19.31 303.15 4.29 19.54 308.15 4.43 19.78 References: 1. Guerry, D. J Ph.D. thesis, Vanderbilt University, Nashville, TN 1944. 2. Kruyer, S.; Nobel, A. P. P. Rec. Trav. Chim. 1961, 80, 1145. з. Dymond, J. H. J. Phys. Chem. 1967, 71, 1829. 4. Krauss, W.; Gestrich, W. Chem. Tech. (Heidelberg) 1977, 6, 35. ADDED NOTE: Puri and Ruether (5) measured the solubility of hydrogen in mixtures of acetone and cyclohexane at 298.15 K and a total pressure of about 10^5 Pa. Their Ostwald coefficient value, measured for hydrogen + cyclohexane, converts to a mole fraction solubility of 4.24×10^{-4} at a hydrogen partial pressure of 101.325 kPa. The value is classed as tentative. The values of Dymond are still preferred.

5. Puri, P. S.; Ruether, J. A. Can. J. Chem. Eng. 1974, 52, 636.

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Aliphatic Hydrocarbons			
COMPONENTS: (1) Hydrogen; H ₂ ; [1333-7	4-0]	ORIGINAL MEASUREME Guerry, D. Jr.	
(2) Cyclic hydrocarbons; C ₆ H ₁₀ and C ₆ H ₁₂		Ph.D. thesis, Vanderbilt Un: Nashville, TN	
		Thesis Directo	or: L. J. Bircher
VARIABLES:	- <u></u>	PREPARED BY:	
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)		н.	L. Clever
EXPERIMENTAL VALUES:			
	Fraction 1 × 10 ⁴ C	Bunsen Os Defficient Coes α	stwald fficient L
Cycloh	exene; C ₆ H ₁₀		
293.15 298.15	3.35 3.42		.0796 .0822
Cycloh	exane; C ₆ H ₁₂	; [110-82-7]	
293.15 298.15	3.79 3.80		.0845 .0857
	AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY	OF MATERIALS:
A Van Slyke-Neill Manometrus manufactured by the Er Amend Co. was used.	ric Appara- imer and		B.p. (756.6 mmHg)
The procedure of Van Slyke (1) for Pure liquids was modified (2) so that small solvent samples (2 cm ³)		Cyclohexane. t/°C 80.90 (cc	B.p. (760.7 mmHg) orr.).
recovery of the sample.	complete		cy, refractive index ssure are in the
An improved temperature co system was used.	ontrol		
SOURCE AND PURITY OF MATE	RIALS:	ESTIMATED ERROR:	
(1) Hydrogen. Air Reducts Purity 99.5 per cent.	ion Co.		<pre>< = 0.05</pre>
(2) Hydrocarbons. Both we Eastman Kodak Co. prod They were purified by methods, and distilled in a nitrogen atm.	standard	REFERENCES: 1. Van Slyke, J. Biol. C	, D. D. Chem. <u>1939</u> , 130, 545.
		2. Ijams, C. Ph.D. thes Vanderbilt	

EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole find hydrod	
2. Cyclohexane; C ₆ H ₁₂ ; [110-82-7] VARIABLES: PREPARED BY: C. L. EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole frick hydrodi	Young [a] raction of gen, x _{H2}
VARIABLES: PREPARED BY: C. L. EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole f: hydrod	[a] raction of gen, x _{H2}
EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole f: hydro	[a] raction of gen, x _{H2}
EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole f: hydro	[a] raction of gen, x _{H2}
EXPERIMENTAL VALUES: T/K Ostwald coefficient, L Mole f: hydro	[a] raction of gen, x _{H2}
T/K Ostwald coefficient, L Mole f hydrod	raction of gen, x _{H2}
hydro	raction of gen, x _{H2}
298.15 0.092 0.0	00409
l	
[a] Calculated by compiler for a partial pressure of :	101.325 kPa
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
	argon passed through
Technique consisted of saturating 1. Hydrogen and	A in liquid oxygen
Technique consisted of saturating1. Hydrogen andliquid with hydrogen in a spiralmolecular sieve 4adsorption tube and then strippingand nitrogen trap	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was 2. Distilled.	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was 2. Distilled.	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was 2. Distilled.	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was 2. Distilled.	A in liquid oxygen
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer.	A in liquid oxygen respectively.
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer. ESTIMATED ERROR:	A in liquid oxygen respectively.
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer. ESTIMATED ERROR:	A in liquid oxygen respectively.
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L$	A in liquid oxygen respectively.
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L$	A in liquid oxygen respectively.
AUXILIARY INFORMATION	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Dymond, J. H.
(2) Cyclohexame; C ₆ H ₁₂ ; [110-82-	7] J. Phys. Chem. <u>1967</u> , 71, 1829-1831.
VARIABLES: T/K: 293.95 - 309.53	PREPARED BY: M. E. Derrick
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fractic	on Bunsen Ostwald
$x_1 \times 10^4$	Coefficient Coefficient
	$\alpha \times 10^2$ L $\times 10^2$
293.95 4.02	8.33 8.96
298.16 4.14	8.54 9.32
304.77 4.34 309.53 4.47	8.88 9.91 9.09 10.3
The Bunsen and Ostwald coefficien	nts were calculated by the compiler.
Smoothed Data: $\ln x_1 = -5.6962$ ·	- 6.2403/(T/100K)
Standard error al	bout the regression line = 4.73×10^{-7}
	/K Mol Fraction
	$x_{1} \times 10^{4}$
293.	
298.	15 4.14
303. 308.	
AUX	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The liquid is saturated with the	(1) Hydrogen. Stuart Oxygen Co.
gas at a gas partial pressure of l atm.	Dried.
	(2) Cyclohexane. Matheson, Coleman
The apparatus is that described h Dymond and Hildebrand (1). The	by and Bell chromatoquality reagent. Dried and fractionally
apparatus uses an all-glass pumpi	
system to spray slugs of degassed	1102en. m.p. 6.45 C.
solvent into the gas. The amount gas dissolved is calculated from	
initial and final gas pressure.	
	ESTIMATED ERROR:
	DEPENDING
	REFERENCES:
	 Dymond, J.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. 1967, 6,
	130.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Krauss, W.; Gestrich, W.	
2. Cyclohexane; C ₆ H ₁₂ ; [110-82-7]	Chem. Tech (Heidelberg), <u>1977</u> , 6, 35-37.	
VARIABLES:	PREPARED BY:	
Temperature,	C.L. Young	
EXPERIMENTAL VALUES:		
T/K Solubility*/ mol dm ⁻³ bar ⁻¹ Mole fraction [§] of hydrogen in liquid, [°] H ₂		
283.15 0.0032	0.00035	
293.15 0.0034 303.15 0.0036	0.00037 0.00040	
313.15 0.0038	0.00042	
* read off graph, the equations appear to be in error.	given in the original paper	
<pre>\$ calculated by compiler for a</pre>	partial pressure of 101.325 kPa.	
· ••••••••••••••••••••••••••••••••••••		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell. Volumetric apparatus in which a known volume of gas was added to a known volume of liquid and the equilibrium pressure measured. Details in source.	No details given.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 10^{-5}$	
	(estimated by compiler)	
	REFERENCES :	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Puri, P.S.; Ruether, J.A.
2. 2-Propanone, (Acetone); C ₃ H ₆ O; [67-64-1]	Can. J. Chem. Eng. <u>1974</u> 52, 636-640.
3. Cyclohexane; C ₆ H ₁₂ ; [110-82-7]	
VARIABLES:	PREPARED BY:
Liquid phase composition	C.L. Young.
EXPERIMENTAL VALUES:	
T/K Mole fraction acetone in lic	
298.15 1.000 0.8285 0.7769 0.5406 0.3914 0.2466 0.0000	0.0943 0.0929 0.0900 0.1028 0.1058 0.1030 0.0953
* total pressure approx	cimately 10 ⁵ Pa.
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Volumetric apparatus similar to that described in ref. (1). Degassed solution placed in calibrated dissolution vessel, gas saturated with solvent vapor	 Liquid Carbonic Canadian Corp., sample purity 99.97 mole per cent. 2 & 3 Baker Reagent grade.
introduced from a calibrated gas buret. Amount of gas dissolved determined from pressure and volume Changes.	1
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.01; \ \delta L = \pm 0.5$ %
	(estimated by compiler)
	REFERENCES :
	<pre>I. Ben-Naim, A.; Baer, S. Trans. Faraday. Soc. <u>1963</u>, 59, 2735.</pre>

COMPONENTS:	
1. Hydrogen; H,; [1333-74-0]	ORIGINAL MEASUREMENTS: Kruyer, S.; Nobel, A.P.P.
-	
2. Benzene; C ₆ H ₆ ; [71-43-2]	<i>Rec. Trav. Chim.</i> <u>1961</u> , <i>80</i> , 1145-56
3. Cyclohexane; C ₆ H ₁₂ ; [110-82-7]	
VARIABLES:	PREPARED BY:
VARIABLES :	
	C. L. Young
EXPERIMENTAL VALUES:	l
EXPERIMENTAL VALUES:	
T/K Ostwald coeffic	ient, L Mole fraction of hydrogen, $x_{\rm H_2}$
299.05 0.088	0.00036
312.75 0.095	0.00037
323.15 0.104	0.00040
333.15 0.110	0.00042
Liquid was an equimolar mixture of be	nzene and cyclohexane
Liquid was an equimolar mixture of be	nzene and cyclohexane
	nzene and cyclohexane
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping	INFORMATION SOURCE AND PURITY OF MATERIALS; 1. Hydrogen and argon psssed through
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively.
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively.
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively.
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled.
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR:
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled.
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR:
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR:
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3\%$
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3$ %
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3$ %
AUXILIARY METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon psssed through molecular sieve 4A in liquid nitrogen and oxygen trap respectively. 2. and 3. Distilled. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3$ %

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Kruyer, S.; Nobel, A.P.P.
2. Decahydronaphthalene ^[a] [Decalin]; C ₁₀ H ₁₈ ; [91-17-8]	Rec. Trav. Chim. <u>1961</u> , 80, 1145-56
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·
T/K Ostwald coeffic	[b] ient, L Mole fraction of hydrogen, x _{H2}
298.15 0.065	0.000422
 [a] Probably contained about 15% <i>ci</i> [b] Calculated by compiler assuming mixture) of 0.87 g cm⁻¹. Partia 	a density of decalin (cis, trans
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping Out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer.	 Hydrogen and argon passed through molecular sieve 4A in liquid oxygen and nitrogen trap respectively. "Chemically pure".
~	ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3$ % REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Hydr	ogen; H ₂ ; [1333-74-0]	Krauss, W.; Gestrich, W.	
2. Cis-	decahydronaphthalene	ChemTech. (Heidelberg) <u>1977</u> , 6,	
	alin); $C_{10}H_{18}$; [493-01-6]	35-37.	
VARIABLES:		PREPARED BY:	
	Temperature	C. L. Young	
EXPERIMENTAL VALUES:			
EAFEKINDN 17	WI VALUES:	5	
T/K	Solubility [*] S/mol dm ⁻³ bar ⁻¹	Mole fraction [§] of hydrogen in liquid, ${}^{x}H_{2}$	
283.15	0.0021	0.000325	
293.15	0.00225	0.000352	
303.15	0.00235	0.000370	
313.15	0.00250	0.000397	
	AUXILIARY	INFORMATION	
METHOD/APP.	ARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stirred	equilibrium cell.		
	ric apparatus in which a		
	olume of gas was added to a	No details given.	
	olume of liquid and the		
-	rium pressure measured.		
Details	in source.		
		ESTIMATED ERROR:	
		$\delta T/K = \pm 0.05; \delta x_{H_2} = \pm 10^{-5}$	
		(estimated by compiler).	
		REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Krauss, W.; Gestrich, W.;
	ChemTech. (Heidelberg) 1977, 6,
2. Trans-decahydronaphthalene	35-37.
(Decalin); C ₁₀ H ₁₈ ; [493-02-7]	
VARIABLES:	PREPARED BY:
Temperature	C. L. Young
EXPERIMENTAL VALUES: T/K Solubility [*] S/mol dm ⁻³ bar ⁻¹	Mole fraction [§] of hydrogen in liquid, ${}^{x}_{\mathrm{H}_{2}}$
283.15 0.0022	0.00035
293.15 0.0023	0.00037
303.15 0.0025	0.00041
313.15 0.0026	0.00043
⁵ Calculated by compiler for a p	artial pressure of 101.325 kPa.
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Stirred equilibrium cell. Volumetric apparatus in which a known volume of gas was added to a known volume of liquid and the equilibrium pressure measured. Details in source.	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05; \delta x_{H_2} = \pm 10^{-5}$
	(estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Cukor, P.M.; Prausnitz, J.M.	
<pre>2. l,l- Bicyclohexyl; C12H22; [92-51-3]</pre>	J. Phys. Chem. <u>1972</u> ,76,598-601.	
VARIABLES: Temperature	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES:		
T/K Henry's Constant ^a /atm	Mole fraction of ^b hydrogen in liquid, ^x H ₂	
300 2252 325 2060 350 1864 375 1669 400 1479 425 1296 450 1124 475 964 a. Quoted in supplementary	0.000444 0.000485 0.000536 0.000599 0.000676 0.000772 0.000890 0.001037 material for original	
b. Calculated by compiler for a partial pressure of 1 atmosphere.		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE: Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).	SOURCE AND PURITY OF MATERIALS: No details given.	
	ESTIMATED ERROR: $\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 2$ %.	
	 REFERENCES: 1. Dymond, J.; Hildebrand, J.H. Ind. Eng. Chem. Fundam. <u>1967</u>, 6, 130. 2. Cukor, P.M.; Prausnitz, J.M.; Ind. Eng. Chem. Fundam. <u>1971</u>, 10, 638. 	

COMPONENTS:	EVALUATOR:		
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Benzene; C₆H₆; [71-43-2]</pre>	H. L. Clever Chemistry Department Emory University Atlanta, GA 30322 USA		
	1980, September		
CRITICAL EVALUATION:			
The solubility of hydrogen in benzene at a hydrogen partial pressure of 101.325 kPa (1 atm) over the temperature interval of 283.15 to 338.15 K.			
Eight laboratories have reported solubility values on the hydrogen + benzene system at hydrogen partial pressures near 101.325 kPa (l atm). Another six laboratories have reported solubility values of hydrogen partial pressures greater than 200 kPa which are compiled and evaluated in another part of the volume.			
The atmospheric pressure measurements	were:		
Just (1) values of 293.15 and 298.15 K, Horiuti (2) four values between 280.15 and 335.95 K, Maxted and Moon (3) five values between 273.65 [sic] and 313.15 K, Cook <i>et al</i> . (4) five values between 283.15 and 318.15 K, Kruyer and Nobel (5) a value of 298.15 K, deWet (6) three values between 291.65 and 304.55 K, and Krauss and Gestrich (7) four values between 283.15 and 313.15 K, and Puri and Ruether (8) one value at 298.15 K.			
It is generally accepted by workers in gas solubility that the measurements of Horiuti (2), and of Cook, Hanson, and Alder (4) were carried out with exceptional care and accuracy.			
Linear regressions were made of two arrangements of the mole fraction solubility data from the papers above. Both data sets were fitted to two and to three constant equations.			
The first data arrangement was to use all of the data except the mole fraction solubility at 273.65 K of Maxted and Moon (3). Benzene freezes near 278.7 K, thus that temperature appears to be in error. The second data arrangement was to use just the nine data points of Horiuti (2) and Cook <i>et al.</i> (4).			
The three constant equations could not be justified for either of the two data arrangements. There was no significant change in the standard error about the regression line between the two and three constant equations.			
When all of the data were used, only the 298.15 K value of Just (1) fell more than two standard deviations from the regression line. It was Omitted and all of the remaining data were fitted by a linear regression to a two constant equation.			
The two constant equations obtained from the two data arrangements were essentially identical except that the equation from all of the data had a standard error about the regression line of 8.10 x 10^{-6} and the Horiuti and the Cook <i>et al</i> . data had a standard deviation of 2.89 x 10^{-6} . The two equations gave the same values of smoothed mole fraction solubilities at 5 degree intervals from 283.15 to 338.15 K to three digits.			
The recommended equation for the mole fraction solubility over the temperature interval of 283.15 to 338.15 K is			
$\ln x_1 = -5.5284 -$	$\ln x_1 = -5.5284 - 8.1390/(T/100K)$		
with a standard error about the regres	ssion line of 2.89 x 10^{-6} .		
The temperature independent thermodynamic changes from the equation for the transfer of one mole of hydrogen gas from the gas phase at 101.325 $^{\rm kPa}$ to the infinitely dilute solution are			
$\Delta \overline{H}_{1}^{*}/kJ \text{ mol}^{-1}$ 6.767, and	$\Delta \overline{s}_{1}/J \ \kappa^{-1} \ mol^{-1} -45.96.$		
Values of the mole fraction solubility solution are in Table 1.	y and partial molal Gibbs energy of		

,

Table 1. Solubility of hydrogen in benzene at a hydrogen partial pressure of 101.325 kPa (1 atm). Recommended mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

T/K	Mol Fraction	∆G°1/kJ mol ⁻¹
283.15 288.15 293.15 298.15 303.15 308.15 313.15 318.15 323.15 328.15 333.15	2.242 2.357 2.473 2.591 2.710 2.831 2.953 3.076 3.200 3.326 3.452 3.579	19.782 20.012 20.242 20.471 20.701 20.931 21.161 21.391 21.621 21.850 22.080 22.310

References:

1. Just, G. Z. Phys. Chem. 1901, 37, 342.

2. Horiuti, J. Sci. Pap. Inst. Phys. Chem. Res. (Jpn) 1931/32, 17, 125.

3. Maxted, E. B.; Moon, C. H. Trans. Faraday Soc. 1936, 32, 769.

4. Cook, M. W.; Hanson, D. M.; Alder, B. J. J. Chem. Phys. <u>1957</u>, 26, 748.

5. Kruyer, S.; Nobel, A. P. P. Rec. Trav. Chim. 1961, 80, 1145.

6. deWet, W. J. J. S. Afr. Chem. Inst. 1964, 17, 9.

7. Krauss, W.; Gestrich, W. Chem. Tech. (Heidelberg) 1977, 6, 35.

8. Puri, P. S.; Ruether, J. A. Can. J. Chem. Eng. 1974, 52, 636.

COMPONENTS:			ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]		33-74-0]	Just, G.
(2) Benzene; C ₆ H ₆ ; [71-43-2]		1-43-2]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.
			*
VARIABLES:			PREPARED BY:
Т/К:	293.15 -	298.15	M. E. Derrick
P/kPa: 101.325 (1 atm)		(1 atm)	H. L. Clever
EXPERIMENTAL VA	LUES:		
}	т/к	Mol Fraction	Bunsen Ostwald
		$x_1 \times 10^4$ Co	Defficient Coefficient
	<u></u>		$\frac{\alpha \times 10^2}{10^2} = \frac{L \times 10^2}{10^2}$
	293.15 298.15	2.61 2.76	6.589 7.071 6.926 7.560
		or measured the (of about 746 mm)	Dstwald coefficient at a Hg. The compiler assumed
	the Ostw	ald coefficient i	to be independent of
			the mole fraction and s at 101.325 kPa (1 atm)
1	partial	pressure of the g	jas.
}			
	4		INFORMATION
METHOD/APPARATU	S/PROCEDURE	:	SOURCE AND PURITY OF MATERIALS:
An Ostwald apparatus as modified by		as modified by	(1) Hydrogen. Prepared by the reaction of water with aluminum
			amalgam accelerated with mercury
		ion flask, and The system is	(II) chloride.
a mercury manometer. The system is thermostated with a water jacket.		ater jacket.	(2) Benzene. No information.
The gas is in	ntroduced	into the de-	
gassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is determined at the end of the experi- ment by pouring the solvent into a graduated flask.		as volume	
		it volume is	
		of the experi- lvent into a	ESTIMATED ERROR:
second fla	ask.		
			$\delta L/L = 0.03$ (compiler)
{			REPROPAGIO
			REFERENCES: 1. Timofejew, W. <i>Z. Physik. Chem.</i> <u>1890</u> , 6, 141.
			2. Steiner,
			Ann. Phys. (Leipzig) <u>1894</u> , 52, 275.
			· · · · · · · · · · · · · · · · · · ·

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Hydrogen; H₂; [1333-74-0] Horiuti, J. (2) Benzene; C₆H₆; [71-43-2] Sci. pap. Inst. Phys. Chem. Res. (Jpn) 1931/32, 17, 125-256. VARIABLES: PREPARED BY: M. E. Derrick H. L. Clever т/к: 280.15 - 335.95 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald $x_1 \times 10^4$ Coefficient Coefficient $\alpha \times 10^2$ $L \times 10^2$ 280.15 2.170 5.56 5.85 296.05 2.570 6.46 7.00 314.45 2.982 7.33 8.44 335.95 3.570 8.545 10.51 The mole fraction and Bunsen coefficient values were calculated by the compiler. $\ln x_1 = -5.4671 - 8.3096/(T/100K)$ Smoothed Data: Standard error about the regression line = 2.32×10^{-6} See hydrogen + benzene evaluation for the recommended equation. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The apparatus consists of a gas buret, (1) Hydrogen. Prepared by a solvent reservoir, and an absorpelectrolysis. tion pipet. The volume of the pipet (2) Benzene. Merck. Extra pure, free from sulfur sample refluxed is determined at various meniscus heights by weighing a quantity of with sodium amalgam. Boiling water. The meniscus height is read with a cathetometer. point 80.18^OC (760 mmHg). The dry gas is introduced into the degassed solvent. The gas and solvent are mixed with a magnetic stirrer until saturation. Care is taken to prevent solvent vapor from ESTIMATED ERROR: mixing with the solute gas in the gas The volume of gas is deterburet. $\delta T/K = 0.05$ mined from the gas buret readings, $\delta x_1 / x_1 = 0.005$ the volume of solvent is determined from the meniscus height in the REFERENCES : absorption pipet.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Maxted, E.B., Moon, C.H.,	
2. Benzene, C ₆ H ₆ ; [71-43-2]	Irans. Faraday Soc. <u>1936</u> , 32,769-75.	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:		
	Volo for stien of	
T/K Bunsen coefficie	Mole fraction of nt, hydrogen, $x_{\rm H_2}$	
α	**2	
273.65 0.0526 281.45 0.0572	0.000204 0.000224	
294.35 0.0625	0.000248	
303.75 0.0672 313.15 0.0727	0.000270 0.000296	
Partial pressure of hydrog	en = 1 atm = 101.325 kPa.	
	INFORMATION .	
METHOD:/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;	
Volumetric apparatus with rocking	1. Electrolytic grade.	
absorption cell. Details in source.	2. Degassed, high purity sample,	
	no other details given.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.2; \delta x_{\rm H} = \pm 1 \text{ s.}$	
	(estimated by compiler)	
	REFERENCES :	

COMPONENTS:			ORIGI	NAL MEASUREMENTS:	
(l) Hydrogen; H ₂ ; [1333-74-0] (2) Benzene; C ₆ H ₆ ; [71-43-2]			Al	., M. W.; Hanse der, B. J.	
			J. C	hem. Phys. <u>19</u>	<u>57</u> , 26, 748 - 751.
VARIABLES:			PREPA	RED BY:	
T/K: P/kPa:	283.15 - 318.15 101.325 (1 atr	5 m)		P. L. H. L.	Long Clever
EXPERIMENTAL VALU	ES:				
Т/К	Solubility ¹ mol g ⁻¹ x 106	Mol Frac $\frac{x_1 \times 1}{x_1}$			Ostwald Coefficient L x 10 ²
283.15	2.884	2.25	3	5.75	5.96
288.25	3.030 <u>3.024</u> 3.027 av.	2.36	4 ²	6.00	6.33
298.15	3.306 3.301 <u>3.303</u> 3.303 av.	2.57	8	6.46	7.05
308.15	3.595 3.582 <u>3.596</u> 3.591	2.80	5	6.95	7.84
318.15	3.89 <u>3.88</u> 3.88 ₅ av.	3.03		7.42	8.64
¹ Data from (1)).				
	lated by compile	er from d	ata i	n (1).	
	d Ostwald coeff:				the compiler.
Smoothed Data:					
See the hydroc	Standard erro gen + benzene ev	or about valuation	the r for	egression line	$e = 1.86 \times 10^{-7}$
		AUXILIARY	INFOR	MATION	
METHOD/APPARATUS/	PROCEDURE :		SOURC	E AND PURITY OF	MATERIALS:
The apparatus, designed especially for the determination of the solubil- ity of hydrogen in liquids, consists of a gas bulb, a gas buret, a solvent bulb, and a manometer system. All are				spectrographic gas 99.75 per mostly N ₂ .	heson Co. Mass c analysis showed cent pure. Impurity r and Adamson Reagent
attached to a mounting plate, and the assembly is shaken in an air bath. The solvent is degassed in the solv- ent bulb by heat and evacuation. The gas is placed in the gas bulb, after temperature equilibrium is reached, the gas is contacted with the degassed		Grade. Distilled, used center cut boiling point 353.15 K. Other solvent properties given in reference 1.			
		lestim	ATED ERROR:		
solubility equ	solvent. The system is shaken until solubility equilibrium is attained. Mercury is used as the displacement fluid.			δ <i>x</i> 1,	$x_1 = 0.001$ (authors)
initial and fi the pressure m	y is calculated nal quantities measurements, th me solvent, and	of gas, ne vapor	1. C U L	ab, Report UCI	· <u></u>
				ook, M. W.; Ha ev. Sci. Insti	anson, D. N. r. <u>1957</u> , 28, 370.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Kruyer, S.; Nobel, A.P.P.
2. Benzene; C ₆ H ₆ ; [71-43-2]	<i>Rec. Trav. Chim.</i> <u>1961</u> , <i>80</i> , 1145-56
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	L
T/K Ostwald coeffi	[a] cient, L Mole fraction of hydrogen, $x_{\rm H_2}$
298.15 0.071	0.000258
[a] Calculated by compiler for a pa	artial pressure of 101.325 kPa
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Technique consisted of saturating	1. Hydrogen and argon passed through
liquid with hydrogen in a spiral adsorption tube and then stripping	molecular sieve 4A in liquid oxygen
Out the hydrogen with argon. The	and nitrogen trap respectively.
resulting argon-hydrogen mixture was analysed with a katharometer.	2. Distilled.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.2; \delta L = \pm 3\%$
	REFERENCES:

	ORIGINAL MEAS	IIREMENTS .
333-74-0]	de Wet, W.	
[71-43-2]	J. S. Afr. 9 - 13.	Chem. Inst. <u>1964</u> , 17,
	PREPARED BY:	P. L. Long H. L. Clever
	Bunsen oefficient α x 10 ²	Ostwald Coefficient L x 10 ²
2.65	6.36 6.65 7.11	6.79 7.26 7.93
nd Ostwald coeffic:	ient values	were calculated by
$x_1 = -5.3098 - 8.69$	944/(T/100K))
ndard error about	the regress:	ion line = 3.24×10^{-6}
AUXILIARY	INFORMATION	
RE: modification of on and Billett (1) e degassed solvent	SOURCE AND PU (1) Hydroge Gas fro	URITY OF MATERIALS: en. Source not given. om commercial cylinders ed over activated char-
	$x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{2} \times 10^{4}$ $x_{1} \times 10^{4}$ x_{2	$\frac{-304.55}{5(1 \text{ atm})}$ PREPARED BY: $\frac{-304.55}{5(1 \text{ atm})}$ Mol Fraction Bunsen $\frac{x_1 \times 10^4}{2.52}$ Coefficient $\frac{\alpha \times 10^2}{2.52}$ 6.36 5.2.86 7.11 Coefficient values $\frac{x_1 = -5.3098 - 8.6944/(T/100K)}{64ard \text{ error about the regress}}$ of the hydrogen + benzene sys $\frac{AUXILIARY \text{ INFORMATION}}{RE:}$ RE: $\frac{SOURCE \text{ AND PREPARED BY:}}{(1) \text{ Hydrog}}$

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Krauss, W.; Gestrich, W.	
2. Benzene; C ₆ H ₆ ; [71-43-2]	ChemTech. (Heidelberg), <u>1977</u> , 6, 35-37.	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:		
T/K Solubility [*] S/ mol dm	n ⁻³ bar ⁻¹ Mole fraction [§] of hydrogen in liquid, ^x H ₂	
283.15 0.00235	0.000209	
293.15 0.00265 303.15 0.00285	0.000235 0.000260	
313.15 0.00310	0.000286	
<pre>* read off graph, the equations appear to be in error.</pre>	artial pressure of 101.325 kPa.	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell. Volumetric apparatus in which a known volume of gas was added to a known volume of liquid and the equilibrium pressure measured. Details in source.	No details given.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = 5 \times 10^{-6}$	
	(estimated by compiler)	
	REFERENCES:	
l		

COMPONENTS:			
	ORIGINAL MEASUREMENTS: Puri, P.S.; Ruether, J.A.		
1. Hydrogen; H ₂ ; [1333-74-0]			
<pre>2. 2-Propanone, (Acetone); C₃H₆O; [67-64-1]</pre>	Can. J. Chem. Eng. <u>1974</u> , 52, 636-640.		
3. Benzene; C ₆ H ₆ ; [71-43-2]			
VARIABLES:	PREPARED BY:		
Liquid phase composition	C.L. Young		
EXPERIMENTAL VALUES:	····		
T/K Mole fractio acetone in l			
298.15 1.000 0.853 0.638 0.425 0.223 0.000	6 0.0919 1 0.0952 5 0.0890 3 0.0847		
	RY INFORMATION		
METHOD/APPARATUS/PROCEDURE: Volumetric apparatus similar to that described in ref. (1). Degassed solution placed in calibrated dissolution vessel, gas saturated with solvent vapor introduced from calibrated gas buret. Amount of gas dissolved determined from pressure and volume changes.	 SOURCE AND PURITY OF MATERIALS: 1. Liquid Carbonic Canadian Corp. sample purity 99.97 mole per cent. 2.& 3.Baker reagent grade. 		
	ESTIMATED ERROR: $\delta T/K = \pm 0.01; \ \delta L = \pm 0.5$ %. (estimated by compiler) REFERENCES:		
	l. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. <u>1963</u> 59, 2735.		

COMPONENTS:		EVALUATOR:			
(1) Hydrogen; H ₂ ;	[1333-74-0]	H. L. Clever Department of Chemistry			
(2) Methylbenzene (Emory University			
C ₇ H ₈ ; [108-88-3	5]	Atlanta, GA 30322 USA			
		1980, September			
CRITICAL EVALUATION:					
Six laboratories have reported on the solubility of hydrogen in methyl- benzene at a hydrogen partial pressure near 101.325 kPa. Just (1) reported two values at 293.15 and 298.15 K, Cook, Hanson, and Alder (2) reported four values between temperatures of 258.15 and 308.15 K, Saylo and Battino (3) reported one value at 298.15 K, deWet (4) reported three values between temperatures of 291.25 and 305.25 K, Waters, Mortimer and Clements (5) reported four values between temperatures of 263.15 and 293.15 K, and Krauss and Gestrich (6) reported four values between temperatures of 283.15 and 313.15 K.					
Comparison of the mole fraction solubility values at 101.325 kPa shows that the data falls into three ranges. The data of Just and of deWet agree and are greater than the other workers. The results of Cook <i>et al.</i> and of Saylor and Battino agree within 0.4 per cent and are of inter- mediate value. The data of Waters <i>et al.</i> and of Krauss and Gestrich agree within 3 to 5 per cent and are the low set of values.					
All of the data are classed as tentative, but the data of Cook $et \ all$. are preferred by the evaluator because of their well designed apparatus, and self-consistent results. The values below are based on a linear regression of the Cook $et \ all$. mole fraction solubility data.					
The equation for us	e between 258.15 a	nd 308.15 K is			
	$\ln x_1 = -6.0373 -$	6.0307/(T/100K)			
which has a standar	d error about the	regression line of 7.17 x 10^{-7} .			
	The changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at 101.325 kPa to the infinitely dilute solution are				
∆ H °/kJ	mol ⁻¹ 5.01 and	$\Delta \overline{S}^{\circ}_{1}/J \kappa^{-1} mol^{-1} -50.2.$			
Smoothed values of Solution are in Tab	the mole fraction . le l.	solubility and Gibbs energy of			
Table 1.	at a hydrogen par kPa. Mole fracti	hydrogen in methylbenzene tial pressure of 101.325 on solubility and the bs energy of solution temperature.			
-	T/K Mol Fract: 10 ⁴ x1	ion $\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{-1}$			
	258.15 2.31	17.972			
	268.152.52278.152.73	18.474 18.976			
	288.15 2.94 298.15 3.15	19.478 19.980			
	308.15 3.37	20.482			
References:					
References: 1. Just, G. Z. Phys. Chem. <u>1901</u> , 37, 342. 2. Cook, M. W.; Hanson, D. N.; Alder, B. J. J. Chem. Phys. <u>1957</u> , 26, 748. 3. Saylor, J. H.; Battino, R. J. Phys. Chem. <u>1958</u> , 62, 1334. 4. deWet, W. J. J. S. Afr. Chem. Inst. <u>1964</u> , <u>17</u> , 9. 5. Water, J. A.; Mortimer, G. A.; Clements, H. E. J. Chem. Eng. Data <u>1970</u> , 15, 174. 6. Krauss, W.; Gestrich, W. ChemTech. (Heidelberg) <u>1977</u> , 6, 35.					

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COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]			Just, G.		
(2) Methylbenzene or toluene; C ₇ H ₈ ; [108-88-3]		Z. Phys. (Chem. <u>1901</u> , 37, 34	12 - 367.	
VARIABLES:				······	
VARIABLES: T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)		PREPARED BY:	M. E. Derrick H. L. Clever		
EXPERIMENTAL VA	ALUES:			······································	
	т/к	Mol Fraction $x_1 \times 10^4$ C	Bunsen coefficient α x 10 ²	Ostwald Coefficient L x 10 ²	
	293.15 298.15	3.70 3.82	7.812 8.010	8.384 8.742	
	pressure the Ostwa pressure Bunsen co	or measured the of about 746 mm ald coefficient , and calculated pefficient value pressure of the	Hg. The co to be indep the mole f s at 101.32	mpiler assumed endent of raction and	
		AUXILIARY	INFORMATION		
METHOD/APPARATU	JS / PROCEDURE			URITY OF MATERIALS;	
An Ostwald a Timofejew (l used. The a gas buret, a a mercury ma	pparatus a), and Ste pparatus c n absorpti nometer.	: as modified by einer (2) is consists of a on flask, and The system is	SOURCE AND P (1) Hydrog reacti amalga (II) c	URITY OF MATERIALS: en. Prepared by on of water with m accelerated wit hloride. benzene. No info	aluminum h mercury
Timofejew (1 used. The a gas buret, a a mercury ma thermostated The gas is i gassed liqui absorbed is buret. The mined at the by pouring t	pparatus a), and Ste pparatus of n absorpti nometer. with a wa ntroduced d. The ga determined solvent vo end of th he solvent	: as modified by einer (2) is consists of a on flask, and The system is ater jacket. into the de- as volume d by the gas olume is deter- ae experiment	SOURCE AND P (1) Hydrog reacti amalga (II) c	en. Prepared by on of water with m accelerated wit hloride. benzene. No info	aluminum h mercury
An Ostwald a Timofejew (1 used. The a gas buret, a a mercury ma thermostated The gas is i gassed liqui absorbed is buret. The mined at the	pparatus a), and Ste pparatus of n absorpti nometer. with a wa ntroduced d. The ga determined solvent vo end of th he solvent	: as modified by einer (2) is consists of a on flask, and The system is ater jacket. into the de- as volume d by the gas olume is deter- ae experiment	SOURCE AND P (1) Hydrog reacti amalga (II) c (2) Methyl ESTIMATED ER	en. Prepared by on of water with m accelerated wit hloride. benzene. No info	aluminum h mercury rmation.

COMPONENTS:			ORIG	INAL MEASUREMENTS	· · · · · · · · · · · · · · · · · · ·	
(l) Hydrogen	(1) Hydrogen; H ₂ ; [1333-74-0]			Cook, M. W.; Hanson, D. N.; Alder, B. J.		
(2) Methylbe [108-88-	nzene or toluene 3]	; C ₇ H ₈ ;	J.	·	<u>57</u> , 26, 748-751.	
VARIABLES:			DDED	ARED BY:		
Т/К:	258.15 - 308.15 101.325 (1 atm)		TREF	P. L.	Long Clever	
EXPERIMENTAL VA	LUES:		L		· · · · · · · · · · · · · · · · · · ·	
Т/К	Solubility ¹ mol g ⁻¹ x 10 ⁶	Mol Frac $x_1 \times 10$		Bunsen Coefficient α x 10 ²	Ostwald Coefficient L x 10 ²	
258.15	2.507	2.31	1	5.06	4.78	
273.15	2.844	2.62	1	5.65	5.65	
298.15	3.438 <u>3.436</u> 3.437 av.	3.16	7	6.64	7.25	
308.15						
	<u>3.685</u> 3.685 av.	3.369	9	6.99	7.89	
		AUXILIARY	INFOF	RMATION		
METHOD /APPARATU	S/PROCEDURE:	<u> </u>	SOUR			
The apparatus for the deter ity of hydro of a gas bull	s, designed espect rmination of the gen in liquids, o	solubil-	1	CE AND PURITY OF	MATERIALS:	
are attached	b, a gas buret, a nanometer system	a solvent		CE AND PURITY OF Hydrogen. Ma spectrographi gas 99.75 per Impurity most	theson Co. Mass c analysis showed cent pure.	
The solvent : ent bulb by b gas is placed temperature of	nanometer system to a mounting p is shaken in an is degassed in th heat and evacuat d in the gas bull equilibrium is re	a solvent All late, and air bath. he solv- ion. The b, after eached,	(2)	Hydrogen. Ma spectrographi gas 99.75 per Impurity most Methylbenzene Adamson Reagen tilled, cente: b.p. 383.65K.	theson Co. Mass c analysis showed cent pure. ly N ₂ . Baker and t Grade. Dis- r portion used, Other solvent	
The solvent : ent bulb by H gas is placed temperature of the gas is co gassed solver until solubil	nanometer system to a mounting pi is shaken in an is degassed in th heat and evacuat: d in the gas bull equilibrium is re- ontacted with the ht. The system : lity equilibrium ercury is used as	a solvent All late, and air bath. he solv- ion. The b, after eached, e de- is shaken is		Hydrogen. Ma spectrographic gas 99.75 per Impurity most Methylbenzene Adamson Reage tilled, center b.p. 383.65K. properties giv	theson Co. Mass c analysis showed cent pure. ^{Ly N} 2. . Baker and nt Grade. Dis- r portion used,	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Saylor, J. H.; Battino, R.
(2) Methylbenzene or toluene; C ₇ H ₈ ; [108-88-3]	J. Phys. Chem. <u>1958</u> , 62, 1334 - 1337.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
<u> </u>	$\begin{array}{ccc} \text{Coefficient} & \text{Coefficient} \\ \hline \alpha \times 10^2 & \underline{\text{L} \times 10^2} \end{array}$
298.15 3.18	6.67 7.28
The mole fraction and Bun were calculated by the co	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solvent was degassed (2) by evacuating the space above it, shaking, and then passing it as a fine mist into another evacuated container. The degassed solvent was saturated with gas as it passed down a glass helix in a thin film. The glass helix contained the gas and solvent vapor at a total pressure of one atm (1). The volume of the liquid and the volume of the gas absorbed were determined in a system of burets.	(1) Hydrogen. No information given. (2) Methylbenzene. Malinckrodt reagent grade. Shaken with conc. H ₂ SO ₄ , water washed, dried over Drierite, distilled. Boiling point 110.40 - 110.60 °C. ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 3$ $\delta x_1/x_1 = 0.04$ (authors)
	 REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u>, 2033; <i>ibid</i>, <u>1952</u>, 3819. 2. Baldwin, R. R.; Daniel, S. G. J. Appl. Chem. <u>1952</u>, 2, 161

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	de Wet, W. J.
<pre>(2) Methylbenzene or toluene; C₇H₈; [108-88-3]</pre>	J. S. Afr. Chem. Inst. <u>1964</u> , 17, 9 - 13.
VARIABLES: T/K: 291.25 - 305.25 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long H. L. Clever
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^4$	$\begin{array}{ccc} \text{Coefficient} & \text{Coefficient} \\ \alpha & x & 10^2 & \text{L} & x & 10^2 \end{array}$
291.25 3.60 298.45 3.79 305.25 3.98	7.62 8.12 7.95 8.69 8.29 9.26
The mole fraction and Ostwald coeffici compiler.	ent values were calculated by the
Smoothed Data: $\ln x_1 = -5.7429 - 6.36$	
Standard error about r See the evaluation of hydrogen + methy	regression line = 4.19×10^{-7}
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
The apparatus is a modification of that used by Morrison and Billett (1) and others (2). The degassed solvent is saturated with gas as it flows down a glass helix containing the gas. The amount of solvent passed down the helix was such that 10 to 25 cm ³ of gas was absorbed. Degassing. The solvent is placed in a large continously evacuated bulb until the solvent boils freely with- out further release of dissolved	than 0.3 per cent. (2) Methylbenzene. Source not given. Distilled immediately before
gases. Saturation. The solvent is flowed in ^a thin film down the glass helix	δT/K = 0.05
Containing the gas. The volume of gas absorbed is measured on an attached buret system.	REFERENCES: 1. Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1948, 2033; <i>Ibid.</i> 1952, 3819.
	 Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Waters, J. A.; Mortimer, G. A.; Clements, H. E. J. Chem. Eng. Data <u>1970</u> , 15, 174- 176 and 462 (correction).		
(2) Methylbenzene or toluene; C ₇ H ₈ ; [108-88-3]			
VARIABLES: T/K: 263.15 - 293.15	PREPARED BY: P. L. Long		
$H_2 P/kPa: 101.325 (1 atm)$	H. L. Clever		
EXPERIMENTAL VALUES:			
Temperature c _{H2} /mol dm ⁻³ Mo	l Fraction Bunsen Ostwald		
$t/^{\circ}C$ T/K $\times 10^{3}$	$x_1 \times 10^4$ Coefficient Coefficient α L		
-10 263.15 2.164	2.23 0.0485 0.0467		
0 273.15 2.396	2.49 0.0537 0.0537 2.67 0.0550		
10 283.15 2.538 20 293.15 2.708	2.67 0.0569 0.0590 2.88 0.0607 0.0651		
The mole fraction and Octuald coop	ficient values were calculated from		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The authors reported two methods of solubility measurement. The hydrogen	(1) Hydrogen. Air Reduction Co. Minimum purity 99.50 per cent.		
solubilities were measured by their	(2) Methylbenzene. Fisher Co.		
method A.	Spectrophotometric grade.		
The apparatus consisted of two glass bulbs connected by $\frac{1}{4}$ " stainless steel tubing fitted with Hoke valves and a strain gage. The strain gage signal was measured by a potentiometer. The bulbs were immersed in an oil bath. The temperature was measured with a Pt resistance thermometer and Mueller bridge. The solvent was degassed three times at liquid N ₂ temperature. The solvent vapor pressure was measured in the apparatus. Gas in the second bulb at a known P and T was allowed into the bulb containing the solvent. The change in P was followed until equilibrium was reached. The gas	ESTIMATED ERROR: $\delta P/mmHg = 0.1$ $\delta T/K = 0.01$ REFERENCES:		
uptake was calculated using Charles law. A correction was made for H ₂ adsorption on the walls.			

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>	Krauss, W.; Gestrich, W.
<pre>2. Methylbenzene (Toluene); C7H₀; [108-88-3]</pre>	ChemTech. (Heidelberg), <u>1977</u> , 6, 35-37.
VARIABLES: Temperature,	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:	
T/K Solubility */ mol dm ⁻³	bar-1 Mole fraction [§] of hydrogen in liquid, ^x H ₂
283.15 0.0026 293.15 0.00275 303.15 0.0029 313.15 0.00305	0.00028 0.000295 0.000315 0.000335
* read off graph, the equations appear to be in error.	given in the original paper
	artial pressure of 101.325 kPa.
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Stirred equilibrium cell. Volumetric apparatus in which a known volume of gas was added to a known volume of liquid and the equilibrium pressure measured. Details in source.	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 10^{-5}$
	(estimated by compiler)
	REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	de Wet, W. J.
<pre>(2) 1,3-Dimethylbenzene (m-Xylene); C₈H₁₀; [108-38-3]</pre>	J. S. Afr. Chem. Inst. <u>1964</u> , 17, 9 - 13.
VARIABLES: T/K: 291.15 - 305.25 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald oefficient Coefficient $\alpha \times 10^2$ L x 10^2
291.15 3.96 298.45 4.14 305.25 4.36	7.25 7.73 7.52 8.22 7.87 8.79
The mole fraction and Ostwald coeffic compiler.	ient values were calculated by the
Smoothed Data: $\ln x_1 = -5.7584 - 6.0$	- 1
Standard error about	the regression line = 2.21×10^{-6}
т/к м	ol Fraction
	$x_1 \times 10^4$
288.15	3.87
293.15 298.15	4.01 4.15
303.15	4.29
308.15	4.43
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus is a modification of that used by Morrison and Billett (1)	(1) Hydrogen. Source not given. Gas from commercial cylinders
and others (2). The degassed solvent	purified over activated char-
is saturated with gas as it flows down a glass helix containing the	coal at liquid air temperature. Impurities estimated to be less
gas. The amount of solvent passed	than 0.3 per cent.
down the helix was such that 10 to 25 cm^3 of gas was absorbed.	<pre>(2) 1,3-Dimethylbenzene (m-Xylene). Source not given. Distilled immediately before use</pre>
Degassing. The solvent is placed in a large continuously evacuated bulb	immediately before use.
until the solvent boils freely with- out further release of dissolved	ESTIMATED ERROR:
gases.	$\delta T/K = 0.05$
Saturation. The solvent is flowed in a thin film down the glass helix	
containing the gas. The volume of	REFERENCES :
gas absorbed is measured on an attached buret system.	1. Morrison, T. J.; Billett, F. J. Chem. Soc. <u>1948</u> , 2033; Ibid. <u>1952</u> , 3819.
	 Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.
	J. Phys. Chem. <u>1957</u> , 61, 1078.

COMPONENTS:		ORIGINAL M	EASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-7	4-0]	Just, G.	-	
(2) Dimethylbenzene or xy. C ₈ H ₁₀ ; [1330-20-7]	lene;	Z. Phys.	Chem. <u>1901</u> , 37,	342 - 367.
VARIABLES:				
T/K: 293.15 - 298 P/kPa: 101.325 (1 a	-	PREPARED B	M. E. Derrick H. L. Clever	
EXPERIMENTAL VALUES:				······································
-, -,	Fraction X 10 ⁴ Co	Bunsen Defficient $\alpha \times 10^2$	Ostwald Coefficient L x 10 ²	
293.15 298.15	3.99 4.12	7.300 7.499	7.834 8.185	
mixture of 4 and 20 per co 1,4-dimethyll) per cent 1, ent each of 1 penzene, and A.; Bunger, W	3-dimethy 2,2-dimeth ethylbenz 1. B. <u>Orc</u>	ylbenzene, zene. See <u>janic Solvents</u>	
pressure of a the Ostwald o pressure, and	about 746 mmH coefficient t l calculated lcient values	Ig. The co to be inde the mole at 101.3		•
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:			PURITY OF MATERIAL	C .
An Ostwald apparatus as mo Timofejew (1), and Steiner Used. The apparatus consi gas buret, an absorption of a mercury manometer. The thermostated with a water	(2) 15 Ists of a Elask, and	(l) Hydro react amalg (II)	ogen. Prepared l ion of water with am accelerated w chloride.	by the th aluminum with mercury
The gas is introduced into degassed liquid. The gas absorbed is determined by buret. The solvent volume mined at the end of the ex- by pouring the column in	the volume the gas is deter-	ESTIMATED	FRROR•	
graduated flask.	i		δL/L = 0.03 (cor	mpiler)
			: ejew, W. ysik. Chem. <u>189</u>	<u>0</u> , 6, 141.
		2. Stein Ann. 275	e r, Phys. (Leipzig)	<u>1894</u> , 52,

78	Hydrogen Solubili	ties up to 200kPa
COMP	ONENTS:	EVALUATOR:
	<pre>Hydrogen; H₂; [1333-74-0] (1-Methylethenyl)benzene or α-methylstyrene; C₉H₁₀; [98-83-9]</pre>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1980, September
CRIT	ICAL EVALUATION:	
In α-m	spite of the importance of the sys	d accuracy. The solubility measure-
pre and Hen MPa pre and hyd a 6 Mor atm Pol ran	ejes (1,2) reports eighteen solubi issure over the 286.15 to 315.85 K the has published a graph showing try's law at 299.8 K (80°F) and hyd. (700 psia). Ma (3,4) reports eight issure over the 303.15 to 333.15 K the has published the data in a graph trogen in α -methylstyrene and its h to per cent α -methylstyrene 40 per tita, and Smith (5) report thirty f tospheric pressure over the 287.95 ejes' values are the lowest, and M tige between low and high values as a skowitz <i>et al.</i> is 30 per cent at 30	temperature interval in his thesis, the hydrogen solubility obeys rogen partial pressures up to 4.83 ht measurements at atmospheric temperature interval in his thesis aph showing the solubility of ydrogenation product cumene and in cent cumene mixture. Herskowitz, ive solubility measurements at to 346.65 K temperature range. a's values are the highest. The a per cent of the median value of
sol ava ref pub sup the Ph. 328	erseded by those of Ma, since both	the literature which were not Ma (3) and Sherwood and Farkas (6) hich apparently were never sume the data of Farkas have been sets of measurements were made in l. reference unpublished data in the tate shows a solubility maximum at
rej dat pre the The	the opinion of the evaluator there ection of any of the three available a are classed as doubtful, but the ferred for use. Herskowitz $et \ al$. For data as a function of temperature equation is on their data sheet. She they may settle the uncertage	le data sets. The three sets of data of Herskowitz <i>et al</i> . are give a smoothing equation for re with the solubility in mole cm^{-3} . If the data of Ali (7) are
Ref	erences:	
1.	Polejes, J. D. Ph.D. Thesis, Univ 1959.	versity of Wisconsin, Madison, WI,
2.	Johnson, D. L.; Saito, H.; Polejes A. I. Chem. Eng. J. <u>1957</u> , 3, 411.	s, J. D.; Hougen, O. A.
3.	Ma, Y. H. Sc.D. Thesis, Massachus Cambridge, MA, <u>1967</u> .	setts Institute of Technology,
4.	Satterfield, C. N.; Ma, Y. H.; She I. Chem. Eng. Symp. Ser. <u>1968</u> , No.	
5.	Herskowitz, M.; Morita, S.; Smith, J. Chem. Eng. Data <u>1978</u> , 23, 227.	, J. M.
~		

- Sherwood, T. K.; Farkas, E. J. Chem. Eng. Sci. <u>1966</u>, 21, 573. 6.
- Ali, J. K. Ph.D. Thesis, University of Birmingham, Birmingham, UK, 1974. 7.

COMPONENTS:	ORIGINAL MEASUREMENTS:
 (1) Hydrogen; H₂; [1333-74-0] (2) (1-Methylethenyl)benzene or α-methylstyrene; C₉H₁₀; [98-83-9] 	Polejes, J. D. Ph. D. thesis, <u>1959</u> University of Wisconsin <i>Distr. Abstr.</i> <u>1959</u> , <i>19</i> , 3261. Thesis Director O. A. Hougen
VARIABLES: T/K: 286.15 - 315.85 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Tempe	rature	Mol Fraction	c _{H2} /
t∕ºC	T/K	$x_1 \times 10^4$	mol cm ⁻³ x 10 ⁶
13.0	286.15	2.72	2.11
13.9	287.05	2.73	2.12
18.1	291.25	2.80	2.16
19.0	292.15	2.78	2.14
20.4	293.55	2.78	2.14
25.0	298.15	2.89	2.22
28.0	301.15	2.90	2.22
30.5	303.65	2.95	2.25
31.8	304.95	3.03	2.31
34.0	307.15	2.97	2.26
34.2	307.35	3.01	2.29
35.0	308.15	2.94	2.23
37.5	310.65	2.93	2.22
38.0	311.15	3.06	2.32
40.4	313.55	3.14	2.37
42.0	315.15	3.12	2.35
42.5	315.65	3.11	2.34
42.7	315.85	3.03	2.28
ata rea	d from a l	arge scale figu	ire

in the thesis.

AUXILIARY INFORMATION

METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The apparatus consisted of a water jacketed flask with magnetic stirrer, a vacuum system, and a gas supply and gas buret.	l) Hydrogen. 2) α-Methylstyrene.
The solvent was degassed by pumping for twice the time for gas bubble evolution to cease. A measured volume of gas was brought into contact with the solvent, the solvent was stirred until there was no more gas uptake.	The compiler had a copy of the gas solubility part of the thesis, pp 132 - 139. The materials were not described in that part of the thesis.
There was no mention as to whether or	
Not the gas was presaturated with Sovent vapor. The amount of solvent Was determined by weight.	ESTIMATED ERROR: $\delta x_1 / x_1 = 0.05$
The mole fraction solubility was	
fitted to an equation linear in temperature.	REFERENCES:
Reference 1 shows a figure of hydro- gen solubility in α -methylstyrene at 80 °F (299.82 K). The solubility of hydrogen (dm ³ H ₂ (273.15 K, 1 atm)dm ⁻¹ obeys Henry's law up to a hydrogen partial pressure of 700 psia. Data for the figure is not in the thesis.	

COMPONENTS:			OPTOTNAL MEACUDENENTS .	
(1) Hydrogen; H ₂ ; [1333-74-0]			ORIGINAL MEASUREMENTS:	
 (1) hydrogen; h₂; [1333-74-0] (2) (1-Methylethenyl)benzene or α-methylstyrene; C₉H₁₀; 		Ma, Y. H. Sc. D. thesis, <u>1967</u> Massachusetts Institute of Technology		
[98-83-9]			Satterfield, C. N. Sherwood, T. K.	
WARTARY FC.			I. Chem. E. Symp. 5 22 - 29.	Ser. <u>1968</u> , NO. 28,
VARIABLES: T/K: 303.15 - 333.15			PREPARED BY:	
P/kPa: 101.325 (1 atm)			н. г.	Clever
EXPERIMENTAL V	ALUES:			
Tempe	rature	Henry's Constant	$C_{\rm H_2}/\rm{mol~cm^{-3}~x~10^6}$	Mol Fraction
t/°C	T/K	cm ³ atm mol ⁻¹ H ₂	-	<i>x</i> ₁ × 10 ⁴
30	303.15	3.37×10^{5} 3.42×10^{5}	2.97 2.92	3.89 3.83
40	313.15	2.97 x 10 ⁵ 3.03 x 10 ⁵	3.37 3.30	4.46 4.37
50	323.15		3.55	4.74
		2.83 x 10^{5} 2.87 x 10^{5}	3.53 3.48	4.72 4.65
60	333.15		3.64	4.91
as figur Henry's	the thes e 2. law was c	is. The same graph of the form p/atm	tant values from a la h appears in the cite $A = K c_{H_2} / mol H_2 cm^{-3}$	ed paper 3 solvent.
as figur Henry's The valu	the thes e 2. law was c es of the	is. The same grap of the form p/atm e concentration of	h appears in the cite	ed paper ³ solvent. raction hydrogen
as figur Henry's The valu	the thes e 2. law was c es of the	is. The same grap of the form p/atm concentration of l pressure were c	h appears in the cite = K $c_{H_2} / mol H_2 cm^{-3}$ hydrogen and mole fr	ed paper ³ solvent. raction hydrogen
as figur Henry's The valu at one a	the thes e 2. law was c es of the tm partia	is. The same grap of the form p/atm concentration of l pressure were c AUXILIARY	h appears in the cite = K c _{H2} /mol H ₂ cm ⁻³ hydrogen and mole fr alculated by the comp INFORMATION	ed paper ³ solvent. caction hydrogen biler.
as figur Henry's The valu at one a METHOD/APPARAT The apparat jacketted f stirrer, a	the thes e 2. law was c es of the tm partia US/PROCEDUR us consis lask with vacuum sy eter syst	is. The same grap of the form p/atm concentration of l pressure were c AUXILIARY RE: ts of a water- a magnetic	h appears in the cite = K c _{H2} /mol H ₂ cm ⁻³ hydrogen and mole fr alculated by the comp INFORMATION SOURCE AND PURITY OF MAT (1) Hydrogen. Y (2) α -Methylstyren	ed paper ³ solvent. Faction hydrogen biler. FERIALS: Ne.
as figur Henry's The valu at one a METHOD/APPARAT The apparate jacketted f stirrer, a and a monome constant pro Between 150 degassed in vacuum pump	the thes e 2. law was c es of the tm partia US/PROCEDUF us consis lask with vacuum sy eter syst essure. and 200 the flas ing for t ime for g	is. The same grap of the form p/atm concentration of l pressure were c AUXILIARY E: ts of a water- a magnetic stem, a gas supply	h appears in the cite = K c _{H2} /mol H ₂ cm ⁻³ hydrogen and mole fr alculated by the comp INFORMATION SOURCE AND PURITY OF MAT (1) Hydrogen. Y (2) α -Methylstyren The compiler had a solubility part of	ed paper solvent. saction hydrogen biler. TERIALS: ne. a copy of the gas the thesis, 9. The materials
as figur Henry's The valu at one a METHOD/APPARAT The apparate jacketted f stirrer, a and a monome constant pro Between 150 degassed in vacuum pump times the t tion to ceas Gas is admin	the thes e 2. law was c es of the tm partia US/PROCEDUR us consis lask with vacuum sy eter syst essure. and 200 the flas ing for t ime for g se. tted to 1 intained	tis. The same grap of the form p/atm concentration of l pressure were c AUXILIARY E: ts of a water- a magnetic stem, a gas supply em to maintain cm ³ of solvent is k by stirring and hree to four	<pre>h appears in the cite = K c_{H2} /mol H₂ cm⁻³ hydrogen and mole fr alculated by the comp INFORMATION SOURCE AND PURITY OF MAT (1) Hydrogen. Y'(2) α -Methylstyren The compiler had a solubility part of pp. 72 - 77, and 9</pre>	ed paper solvent. raction hydrogen biler. YERIALS: ne. a copy of the gas the thesis, 9. The materials 1 on those pages.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Herskowitz, M.; Morita, S.;
(2) (1-Methylethenyl)benzene or	Smith, J. M.
α-methylstyrene; C ₉ H ₁₀ ; [98-83-9]	J. Chem. Eng. Data <u>1978</u> , 23, 227-228.
VARIABLES: T/K: 287.95 - 346.65	PREPARED BY:
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	·····
Temperature Hydrogen Solubility	$r, c_{H_2}/mol cm^{-3} \times 10^6$ Av. Std.Dev.
	.43 2.425 0.025 .78 2.70 2.748 0.033
41.0 314.15 2.79 2.86 2.82 2	.83 2.88 2.836 0.035
	.06 3.08 3.04 3.070 0.021 .16 3.11 3.09 3.110 0.028
65.5 338.65 3.18 3.17 3.16 3	.16 3.16 3.166 0.009
73.5 346.65 3.29 3.26 3.24 3	.27 3.265 0.021
The authors applied a linear regress	ion to their data to obtain the
equation $c_{\rm H_2}/mol\ cm^{-3} = (2.26 + 0.$	0145 t/°C) x 10 ⁻⁶
for the solubility of hydrogen in a-	methyl styrene at a hydrogen partial
Pressure of 101.325 kPa (1 atm) betw with a stanard deviation of 0.064 x	een the temperatures of 15 and 74 °C
average solubilities in the table be	low.
,	
T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^4$	Coefficient Coefficient
287.95 3.13	0.0544 0.0573
306.95 3.61 314.15 3.76	0.0616 0.0692 0.0636 0.0731
321.65 4.10	0.0688 0.0810
331.65 4.19 338.65 4.30	0.0697 0.0846 0.0710 0.0880
346.65 4.47	0.0732 0.0929
	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solvent was saturated with He	(1) Hydrogen. Liquid Carbonic Corp.
the gas through the solwort for at	Stated purity 99.99 per cent.
	(2) (1-Methylethenyl)benzene. Dow
approached from both under- and over- saturation.	Chemical Co. Stated purity was 99.2 per cent.
The saturated colution service	-
The saturated solution samples were analyzed on a gas chromatograph. Thirty microlith	
	,
H ₂ in a Gog showed were analyzed for	
	ESTIMATED ERROR:
sieve particles with situate at the	$\delta T/K = 0.1$
carrier gas. The apparatus was cali- brated with a brated	$\delta c/c = 0.03$
brated with a hydrogen + nitrogen mixture of known composition.	DEPENDING
Other solvent names:	REFERENCES:
+sopropenvlbenzene	
2-Phenyl-1-propene	
L	
	<u> </u>

COMPONENTS: (1) Hydroge			OBTOTNAL MEACUDEMENTER.	
(1)	en: H_: (1333-74-01	ORIGINAL MEASUREMENTS: Ma, Y. H.	
(2) (1-Methylethyl)-benzene or			Ma, I. H. Sc. D. thesis, <u>1967</u> Massachusetts Institute of Technology	
(2) (1-Meth	ylethyl)	-benzene or	Massachusetts Inst	itute of Technology
cumene; C ₉ H ₁₂ ; [98-82-8]		Satterfield, C. N.		
		Sherwood, T. K. I. Chem. E. Symp. Ser. <u>1968</u> , No. 28,		
			22 - 29.	·
VARIABLES:	ARIABLES:		PREPARED BY:	
	т/к: 303.15 - 333.15		H. L. Cl	ever
P/kPa: 101.325 (1 atm)				
EXPERIMENTAL	VALUES:		L	·····
Temp	erature	Henry's Constant	$C_{\rm H_2}$ /mol cm ⁻³ x 10 ⁶	Mol Fraction
t/°C		cm^3 atm mol ⁻¹ H ₂	² ²	<i>r</i> x 10 ⁴
			· · · · · · · · · · · · · · · · · · ·	$\frac{x_1 \times 10^4}{10^4}$
25	298.15	3.12×10^{5} 3.10×10^{5}	3.21 3.16	4.50 4.43
30	303.15	2.90×10^{5}	3.45	4.45
	313.15	2.50×10^{5} 2.65 x 10 ⁵		
40	273.72	2.65×10^{-10} 2.68 x 10 ⁵	3.77 3.73	5.36 5.31
50	323.15	2.53×10^{5}	3.95	5.68
		2.58 x 10 ⁵	3.88	5.58
60	333.15	2.44×10^{5}	4.10	5.95
compile			ure were calculated	-
		AUXILIARY	INFORMATION	
METHOD /APPARA	TUS /PROCED			ATERTALS :
	tus consi	URE: ists of a water-	INFORMATION SOURCE AND PURITY OF M (1) Hydrogen.	ATERIALS;
The apparat	tus consi flask wit	URE :	SOURCE AND PURITY OF M (1) Hydrogen.	ATERIALS;
The apparat jacketted i stirrer, a supply, and	tus consi flask wit vacuum s d a monom	URE: ists of a water- th a magnetic system, a gas neter system to	SOURCE AND PURITY OF M	ATERIALS;
The apparat jacketted is stirrer, a supply, and maintain co	tus consi flask wit vacuum s d a monom onstant p	URE: ists of a water- th a magnetic system, a gas neter system to pressure.	SOURCE AND PURITY OF M (1) Hydrogen. (2) Cumene. The compiler had a	copy of the gas
The apparat jacketted is stirrer, a supply, and maintain co Between 150 degassed in vacuum pump	tus consi flask wit vacuum s d a monom onstant p 0 and 200 n the fla ping for time for	URE: ists of a water- th a magnetic system, a gas neter system to pressure.) cm ³ of solvent is ask by stirring and three to four gas bubble	SOURCE AND PURITY OF M (1) Hydrogen. (2) Cumene. The compiler had a solubility part of	copy of the gas the thesis, 9. The materials
The apparat jacketted is stirrer, a supply, and maintain co Between 150 degassed in vacuum pump times the t evolution t Gas is admi	tus consi flask wit vacuum s d a monom onstant p 0 and 200 n the fla ping for time for to cease. itted to aintained	URE: ists of a water- th a magnetic system, a gas neter system to pressure.) cm ³ of solvent is ask by stirring and three to four gas bubble	SOURCE AND PURITY OF M (1) Hydrogen. (2) Cumene. The compiler had a solubility part of pp. 72 - 77, and 9	copy of the gas the thesis, 9. The materials
The apparat jacketted is stirrer, a supply, and maintain co Between 150 degassed in vacuum pump times the t evolution t Gas is admis sure and ma the gas dis The saturat times at 15 tight syrir samples of	tus consi flask wit vacuum s d a monom onstant p 0 and 200 n the fla ping for time for to cease. itted to aintained ssolves. ted liqui 5 m inter nge. Twe liquid a	URE: ists of a water- th a magnetic system, a gas meter system to pressure.) cm ³ of solvent is ask by stirring and three to four gas bubble 1 atm total pres-	SOURCE AND PURITY OF M (1) Hydrogen. (2) Cumene. The compiler had a solubility part of pp. 72 - 77, and 9 were not described	copy of the gas the thesis, 9. The materials on those pages. = 0.1

COMPONENTS:	ODICINAL MELOND	
(1) Hydrogen, H $(1333-74-0)$	ORIGINAL MEASUREMENTS: Ma, Y. H.	
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) (1-Methylethenyl)benzene or</pre>	Sc. D. thesis, 1967 Massachusetts Inst	tute of Technology
α-methylstyrene; C ₉ H ₁₀ ;	Satterfield, C. N.;	
[98-83-9]; 60 vol %.	Sherwood, T. K.	Ма, І. п.;
(3) (1-Methylethyl)-benzene or cumene C ₉ H ₁₂ ; [98-82-8]; 40 vol %.	I. Chem. E. Symp. S 22 - 29.	Ser. <u>1968</u> , No. 28,
VARIABLES:	PREPARED BY:	
T/K: 303.15 - 333.15 P/kPa: 101.325 (1 atm) Cumene/vol %: 40	H. L. Cle	ever
EXPERIMENTAL VALUES:		
Temperature Henry's Constant	C_{H_2} /mol cm ⁻³ x 10 ⁶	Mol Fraction
$t/^{\circ}C$ T/K cm^3 atm mol ⁻¹ H ₂	ⁿ 2	x 10 ⁴
30 303.15 3.04 x 10 ⁵ 3.07 x 10 ⁵	3.29 3.26	4.43 4.39
40 313.15 2.79×10^5 2.84 $\times 10^5$	3.58 3.52	4.87 4.79
50 323.15 2.63 x 10^5	3.80	5.23
60 333.15 2.59 x 10 ⁵	3.86	5.36
The solvent is 60 vol $%$ a-methy: Assuming no volume change on mix fraction a-methylstyrene.		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MA	TERIALS
The apparatus consists of a water-	(1) Hydrogen.	
jacketted flask with a magnetic stirrer, a vacuum system, a gas supply	(2) α-Methylstyrene	
and a monometer system to maintain		
Constant pressure. Between 150 and 200 cm ³ of solvent is degassed in the flask by stirring and	(3) Cumene. The compiler had a solubility part of pp. 72 - 77, and 99	
vacuum pumping for three to four times the time for gas bubble evolu-	were not described	the thesis, . The materials
vacuum pumping for three to four		the thesis, . The materials

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS: Cukor, P.M.; Prausnitz, J.M.
<pre>2. Benzene, l,l'-methylenebis-, (Diphenylmethane); C13H12; [101-81-5]</pre>	J. Phys. Chem. <u>1972</u> , 76,598-601.
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	L
T/K Henry's Consta /atm	nt ^a Mole fraction of ^b hydrogen in liquid ^x H ₂
300 3464	0.0002886
325 3020 350 2644	0.0003311 0.0003782
375 2322	0.0004306
400 2048	0.0004882
425 1813	0.0005515 0.0006211
450 1610 475 1436	0.0006963
a. Quoted in supplementa paper.	ry material for original
b. Calculated by compile	r for a partial pressure
of 1 atmosphere.	r tor a partiar pressure
	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric apparatus similar to	
that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2)	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 2\%.$
	REFERENCES: 1. Dymond, J.; Hildebrand, J.H. Ind. Eng.Chem.Fundam.1967,6,130.
	 2. Cukor, P.M.; Prausnitz, J.M. Ind. Eng. Chem. Fundam. <u>1971</u>,10,
	638.

COMPONENTS:	
	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Krauss, W.; Gestrich, W.
2. 1,2,3,4- Tetrahydronaphthalene, (Tetralin); C ₁₀ H ₁₂ ; [119-62-2]	Chem. Tech. (Heidelberg), <u>1977</u> , 6, 35-37.
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	
T/K Solubility */ mol dm ⁻³	bar-1 Mole fraction [§] of hydrogen in liquid, ^w H ₂
283.15 0.0014	0.00019
293.15 0.00165	0.000225
303.15 0.00185 313.15 0.00200	0.000254 0.000277
* read off graph, the equations appear to be in error.	given in the original paper
§ calculated by compiler for a p	partial pressure of 101.325 kPa.
	-
	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Stirred equilibrium cell. Volumetric apparatus in which a known volume of gas was added to a known volume of liquid and the equilibrium pressure measured. Details in source.	No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 10^{-5}$
	(estimated by compiler)
	REFERENCES:
	na and the state of the state o
	T I

COMPONENTS:

(1) Hydrogen; H₂; [1333-74-0]

(2) Alcohols

EVALUATOR:

H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA

1980, September

CRITICAL EVALUATION:

An Evaluation of the Mole Fraction Solubility of Hydrogen in Alcohols at a Hydrogen Partial Pressure of 101.325 kPa (1 atm).

The solubility of hydrogen in alcohols from papers that report the solubility at 200 kPa pressure or less is evaluated in this section. For the compilation and evaluation of the solubility of hydrogen in alcohols from paper that report the solubility at pressures greater than 200 kPa see a later section of the volume.

Most of the solubility measurements evaluated in this section were made at a total pressure near 101.325 kPa (1 atm). Mole fraction solubility values were calculated at a hydrogen partial pressure of 101.325 kPa assuming the gas to be ideal, Henry's law to be obeyed, and the Ostwald coefficient to be independent of pressure. The assumptions probably introduce errors that are less than the experimental error of the solubility measurement.

Hydrogen + Methanol [67-56-1]

Just (1) reported solubility measurements at 293.15 and 298.15 K and Katayama and Nitta (2) reported five measurements between the temperatures of 213.15 and 298.15 K. At 298.15 K Just's mole fraction solubility is 3 per cent greater than Katayama and Nitta's. Although both sets of data are classed as tentative the thermodynamic changes and smoothed solubility values below are based on a linear regression of the Katayama and Nitta data.

The equation for use over the 213.15 to 298.15 K range is

 $\ln x_1 = -7.3644 - 4.0838/(T/100K)$

with a standard error about the regression line of 8.45 x 10^{-7} .

The temperature independent thermodynamic changes for the transfer of one mole of hydrogen from the gas at a hydrogen partial pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \text{ mol}^{-1}$ 3.395 and $\Delta \overline{S}_1^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1}$ -61.2.

The smoothed solubility values and the Gibbs energy of solution are given in Table 1.

Table 1. Solubility of hydrogen in methanol at a hydrogen partial pressure of 101.325 kPa. Tentative values of mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G ₁ ∕kJ mol ⁻¹
213.15 223.15 233.15 243.15 253.15 263.15 273.15 283.15 288.15 298.15	0.932 1.016 1.10 1.18 1.26 1.34 1.42 1.50 1.5 1.57 1.61	16.447 17.059 17.671 18.283 18.896 19.508 20.120 20.733 21.039 21.345 21.651

The single datum of Makranczy *et al.* (7) is several per cent lower than the smoothed solubility values and is classified as doubtful. Hydrogen + Ethanol [64-17-5]

There are five papers on the solubility of hydrogen in ethanol. The early work of Carius (3) is mostly of historical interest. Only his solubility value at 274.15 K agrees with the results of modern day work. His values at the other temperatures up to 296.85 K are low and show an incorrect sign of the temperature coefficient of solubility. The data should be rejected. Just's (1) two values of 293.15 and 298.15 K are about five per cent greater than modern values and are classed as doubtful.

The measurements of Maxted and Moon (4), Katayama and Nitta (2), and Cargill (5) are in good agreement. The total of nineteen solubility values over the 213.15 to 333.15 K temperature interval from the three papers were combined in a linear regression to obtain the equation

 $\ln x_1 = -7.0155 - 4.3918/(T/100K)$

with a standard error about the regression line is 2.04×10^{-6} . A three constant equation shows no improvement in the standard error.

The temperature independent thermodynamic changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at a partial pressure of 101.325 to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$ 3.65, and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \text{ mol}^{-1}$ -58.3.

The smoothed values of mole fraction solubility and Gibbs energy of solution are in Table 2.

Table	2.	hydro The r and p	olubility of hy gen partial pre ecommended mole artial molar Gi function of tem	essure of 101.32 fraction solub bbs energy of s	25 kPa. Dility
		T/K	Mole Fraction*	$\Delta \overline{G}$?/kJ mol ⁻¹	-
			10 ⁴ <i>x</i> ₁	•	
	2	13.15	1.14	16.084	
	23	23.15	1.14 ₅ 1.25	16.668	
	2	33.15		17.251	
	24	43.15	1.475	17.834	
	2!	53.15	1,585	18.417	
	20	63.15	1.695	19.001	
	2	73.15	1.80	19.584	
	28	33.15	1.90 1.955 2.005 2.06	20.167	
	28	38.15	1.955	20.459	
		93.15	2.005	20.751	
		98.15	2.06	21.042	
	30	03.15	2.11	21.334	
	31	L3.15	2.21	21.917	
	32	23.15	2.30	22.501	
	3:	33.15	2.40	23.084	

* Mole fraction values rounded to $0.005 \times 10^{-*}$ The single datum of Makranczy *et al.* (7) is several per cent lower than the smoothed solubility values and is classified as doubtful. Hydrogen + 1-Propanol [71-23-8]

Katayama and Nitta (2) have reported solubility measurements on the hydrogen + 1-propanol system. A linear regression of their five measurements over the 213.15 to 298.15 K temperature interval gives the equation

 $\ln x_1 = -6.9745 - 4.1646/(T/100K)$

with a standard deviation about the regression line of 2.17 x 10^{-6} .

The single datum of Makranczy *et al.* (7) is in reasonable agreement with the data in table 3.

The temperature independent thermodynamic changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at a hydrogen partial pressure of 101.325 to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$ 3.46, and $\Delta \overline{S}_{1}^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1}$ -58.0.

The smoothed values of mole fraction solubility and Gibbs energy of solution are in Table 3.

Table 3. The solubility of hydrogen in 1-propanol at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molar Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $10^4 x_1$	$\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{-1}$
213.15 223.15 233.15 253.15 263.15 273.15 283.15 288.15 293.15	1.33 1.45 1.57 1.69 1.81 1.92 2.04 2.15 2.20 2.26	15.823 16.403 16.983 17.562 18.142 18.722 19.302 19.882 20.172 20.462
298.15	2.31	20.752

Hydrogen + 2-Propanol [67-63-0]

Puri and Ruether (6) measured the solubility of hydrogen in mixtures of acetone and 2-propanol at 298.15 K and a total pressure of approximately 10^{5} Pa. Their Ostwald coefficient measured for hydrogen and pure 2-propanol converts to a mole fraction solubility at 101.325 kPa of 2.66 x 10^{-4} . The value is classed as tentative.

Hydrogen + 1-Butanol [71-36-3]

Katayama and Nitta (2) report five solubility measurements over the 213.15 to 298.15 K temperature interval, and Makranczy, Rusz, and Balog-Megyery (7) report one measurement at 298.15 K. The two values at 298.15 K agree within 1.5 per cent. The data are classed as tentative.

The six measurements from the two papers were combined in a linear regression to obtain the equation for the 213.15 to 298.15 K temperature interval of

 $\ln x_1 = -6.9350 - 3.8994/(T/100K)$

with a standard error about the regression line of 2.65 x 10^{-6} .

The temperature independent thermodynamic changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas phase at a hydrogen partial pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$ 3.24, and $\Delta \overline{S}_{1}^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1}$ -57.7.

The smoothed values of the mole fraction solubility and the partial molar Gibbs energy of solution are in Table 4.

Table 4. Solubility of hydrogen in 1-butanol at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molar Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G ₁ /kJ mol ⁻¹
213.15	1.57	15.528
223.15	1.70	16.104
233.15	1.83	16.681
243.15	1.96	17.258
253.15	2.09	17.834
263.15	2.22	18.411
273.15	2.34	18.987
283.15	2.46	19.564
288.15	2.52	19.852
293.15	2.58	20.141
298.15	2.64	20.429

Hydrogen + 1-Pentanol [71-41-0]

Just (1) has reported solubility measurements on the hydrogen + 1-pentanol system. On comparison of Just's two values of 293.15 and 298.15 K with the solubility of hydrogen in alcohols of similar molecular weight, Just's values appear to be smaller than expected. The values are classed as doubtful.

The datum of Makranczy $et \ all$. (7) appears to be more in line with data on both lower and higher alcohols and is classified as tentative.

Hydrogen + 1-Hexanol [111-27-3]

The value of Makranczy $et \ all$. (7) for this system appears to be in line with data on both lower and higher alcohols and is classified as tentative.

Hydrogen + 1-Heptanol [111-70-6] Hydrogen + 1-Octanol [111-87-5]

The mole fraction solubility data at 298.15 K of Makranczy $et \ all$. (7) are considerably lower than those of Ijams (8). The former are classified as tentative and the latter as doubtful.

Hydrogen + 1-Nonanol [143-08-8] Hydrogen + 1-Decanol [112-30-1] Hydrogen + 1-Undecanol [112-42-5] Hydrogen + 1-Dodecanol [112-53-8]

Makranczy $et \ all$. (7) measured the solubility of hydrogen at 298.15 K in each of the above systems. The results are classified as tentative.

Hydrogen + Cyclohexanol [108-93-0]

Cauquil (9) and Kruyer and Nobel (10) each report one value of the solubility of hydrogen in this system. There is a twofold difference in the two values with the Cauquil value being the higher value. Both values are classed as doubtful. However, comparison of the trends in the solubility of helium and neon in cyclohexanol and aliphatic alcohols of similar molecular weight definitely indicate the lower value of Kruyer and Nobel should be preferred.

References: Just, G. Z. Phys. Chem. 1901, 37, 342. 1. Katayama, T.; Nitta, T. J. Chem. Engng. Data. 1976, 21, 194. 2. Carius, L. Justus Liebigs Ann. Chem. 1855, 94, 129. з. Maxted, E. B.; Moon, C. H. Trans. Faraday Soc. 1936, 32, 769. 4. Cargill, R. W. J. Chem. Soc., Faraday Trans. I 1978, 74, 1444. 5. Puri, P. S.; Ruether, J. A. Can. J. Chem. Eng. 1974, 52, 636. 6. Makranczy, J.; Rusz, L.; Balog-Megyery, K. Hung. J. Ind. Chem. 7. 1979, 7, 41. Ijams, C. C. Ph.D. Thesis, Vanderbilt University, Nashville, TN, 1941. 8. 9. Cauquil, G. J. Chim. Phys. 1927, 24, 53. 10. Kruyer, S.; Nobel, A. P. P. Rec. Trav. Chim. 1961, 80, 1145.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.
(2) Methanol; CH ₃ OH; [67-56-1]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.
VARIABLES:	PREPARED BY:
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^4$ Co	Defficient Coefficient
	$\frac{\alpha \times 10^2}{10^2} = \frac{10^2}{10^2}$
293.15 1.52 298.15 1.57	8.401 9.016 8.657 9.449
	0.03/ 9.449
The author measured the (
pressure of about 746 mm the Ostwald coefficient	
pressure, and calculated	the mole fraction and
Bunsen coefficient values partial pressure of the	
	5 -
	INFORMATION
ME THOD /AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is	(1) Hydrogen. Prepared by the reaction of water with aluminum
used. The apparatus consists of a	amalgam accelerated with mercury
gas buret, an absorption flask, and a mercury manometer. The system is	(II) chloride.
thermostated with a water jacket.	(2) Methanol. No information.
The gas is introduced into the de-	
gassed liquid. The gas volume	
absorbed is determined by the gas buret. The solvent volume is deter-	
mined at the end of the experiment	
by pouring the solvent into a graduated flask.	ESTIMATED ERROR:
a sudded Hask.	
	$\delta L/L = 0.03$ (compiler.
	DEPENDING
1	REFERENCES: 1. Timofejew, W.
	Z. Physik. Chem. <u>1890</u> , 6, 141.
	2. Steiner,
	Ann. Phys. (Leipzig) <u>1894</u> , 52, 275.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
	Katayama, T.; Nitta, T.	
2. Methanol; CH40; [67-56-1]	J. Chem.Engng.Data. <u>1976</u> , 21,194-6	
VARIABLES:	PREPARED BY:	
VARIABLES.	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:		
T/K Ostwald Henry's coefficient,L /at	Constant Mole fraction [*] of m hydrogen in liquid, ^x H ₂	
298.15 0.0975 61	60 0.000162	
	10 0.000141	
	60 0.000126	
	90 0.000110	
	710 0.0000934	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric apparatus with equilibrium	l. Takachiho Chemical Industry Co.	
cell of approximately 0.08 litres.	sample, purity 99.99 mole per cent.	
Magnetic stirrer. Solvent carefully degassed. Equilibrium established	2. Nakarai Chemicals sample, purity	
in 1-1.5 hours. Details in ref. (1).	99.9 mole per cent.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.12$ at 213.15K, ± 0.05	
	at other temperatures, $\delta x_{H_2} = \pm 1.5$ %	
	REFERENCES :	
	1. Nitta, T.; Tatsuishi. A.;	
	Katayama, T. J.Chem.Eng.Jpn.1973,	
	6,475.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Rusz, L.;
2. Methanol; CH40; [67-56-1]	Balog-Megyery, K.
	Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6
VARIABLES:	PREPARED BY:
	C.L. Young
EXPERIMENTAL VALUES:	
ALIMINI VALUE.	
T/K P ⁺ /kPa Ostwald coe	fficient Mole fraction of hydrogen*, $x_{\rm H_2}$
298.15 101.3 0.09	17 0.000153
 * calculated by compi 	ler
+ partial pressure of	hydrogen
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	No details given.
	ESTIMATED ERROR: $\delta x_{\rm H_2} = \pm 3\%$
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. <u>1957</u> , 1, 55. Chem. Abstr. <u>1961</u> , 55, 3175h

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COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Carius, L.		
(2) Ethanol; C ₂ H ₆ O; [64-17-5]	Justus Liebigs Ann. Chem. <u>1855</u> , 94, 129 - 166.		
	Also known as Ann. Chem. Pharm.		
VARIABLES: T/K: 274.15- 296.85	PREPARED BY:		
P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $\frac{x_1 \times 10^4}{2}$	BunsenOstwaldCoefficientCoefficient $\alpha \ge 10^2$ L $\ge 10^2$		
274.15 1.764	6.916 6.941		
278.15 1.754 284.55 1.752	6.847 6.972 6.765 7.05		
284.55 1.752 287.55 1.741	6.726 7.08		
293.05 1.736	6.668 7.15		
296.85 1.734	6.633 7.21		
The mole fraction and Ostwa calculated by the compiler.	ld coefficient values were		
	nt work of Katayama and Nitta values appear to be low and of icient.		
AUXILIARY	INFORMATION		
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS;		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used.	SOURCE AND PURITY OF MATERIALS;		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1	SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used. The apparatus consists of an absorp- tion tube sealed at the low end with	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute sulfuric acid. (2) Ethanol. Absolute alcohol. Specific gravity 0.792 at 20 °C. 		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used. The apparatus consists of an absorp- tion tube sealed at the low end with a rubber plate, and a water jacket. The gas is placed in the absorption tube, and its pressure, temperature, and volume determined. The solvent is	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute sulfuric acid. (2) Ethanol. Absolute alcohol. Specific gravity 0.792 at 20 °C. 		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used. The apparatus consists of an absorp- tion tube sealed at the low end with a rubber plate, and a water jacket. The gas is placed in the absorption tube, and its pressure, temperature, and volume determined. The solvent is added, and the system shaken until the volume no longer changes. Final temperature, pressure and volume	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute sulfuric acid. (2) Ethanol. Absolute alcohol. Specific gravity 0.792 at 20 °C. 		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used. The apparatus consists of an absorp- tion tube sealed at the low end with a rubber plate, and a water jacket. The gas is placed in the absorption tube, and its pressure, temperature, and volume determined. The solvent is added, and the system shaken until the volume no longer changes. Final temperature, pressure and volume	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute sulfuric acid. (2) Ethanol. Absolute alcohol. Specific gravity 0.792 at 20 °C. 		
METHOD/APPARATUS/PROCEDURE: The apparatus and method of Bunsen (1 were used. The apparatus consists of an absorp- tion tube sealed at the low end with a rubber plate, and a water jacket. The gas is placed in the absorption tube, and its pressure, temperature, and volume determined. The solvent is added, and the system shaken until the volume no longer changes. Final temperature, pressure and volume	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared from the reaction of zinc and dilute sulfuric acid. (2) Ethanol. Absolute alcohol. Specific gravity 0.792 at 20 °C. ESTIMATED ERROR: 		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.
(2) Ethanol; C ₂ H ₆ O; [64-17-5]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.
VARIABLES:	PREPARED BY:
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient α x 10 ² L x 10 ²
293.15 2.09 298.15 2.14	8.032 8.620 8.186 8.935
pressure of about 746 m the Ostwald coefficient pressure, and calculate	ed the mole fraction and les at 101.325 kPa (1 atm)
AUXILIA	RY INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket.	 (1) Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. (2) Ethanol. No information.
The gas is introduced into the degassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is deter- mined at the end of the evperiment h	AV
pouring the solvent into a graduated flask.	ESTIMATED ERROR:
	$\delta L/L = 0.03$ (compiler)
	REFERENCES: 1. Timofejew, W. Z. Physik. Chem. <u>1890</u> , 6, 141.
	2. Steiner, Ann. Phys. (Leipzig) <u>1894</u> , 52, 275.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H_2 ; [1333-74-0]	Maxted, E.B.; Moon, C.H.;	
2. Ethanol; C ₂ H ₆ O; [64-17-5]	Trans. Faraday Soc. <u>1936</u> , 32, 769-75.	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:		
T/K Bunsen	Mole fraction of	
coefficier a	ht, hydrogen, x _{H2}	
273.75 0.0718	0.000183	
283.15 0.0737	0.000190	
293.45 0.0769 298.15 0.0784	0.000200 0.000205	
303.15 0.0802	0.000211	
313.15 0.0840 313.95 0.0839	0.000223 0.000223	
323.15 0.0864	0.000233	
Partial pressure of hydroge	en = 1 atm = 101.325 kPa.	
AUXILIARY	INFORMATION	
METHOD: /APPARATUS PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric encyclus with reaking	1. Electrolytic grade.	
Volumetric apparatus with rocking absorption cell. Details in source.	1. Electiolycle grade.	
-	2. Degassed, high purity sample, no	
	other details given.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.2; \ \delta x_{H_2} = \pm 1$ %.	
	(estimated by compiler.)	
	REFERENCES :	
	MITERENCES ;	

OMPONENTS:	ORIGINAL MEASUREMENTS:	
. Hydrogen; H ₂ ; [1333-75-0]	Katayama, T.; Nitta, T.	
2. Ethanol; C ₂ H ₆ O; [64-17-5]	J. Chem. Engng.Data. <u>1976</u> ,21,194-6.	
/ARIABLES:	PREPARED BY:	
Temperature.	C.L. Young.	
EXPERIMENTAL VALUES:		
T/K Ostwald Henry's coefficient, L /	Constant Mole fraction [*] of atm hydrogen in liquid, ^x H ₂	
293.15 0.0852 49	00 0.000204	
273.15 0.0696 56	40 0.000177	
253.15 0.0580 64	00 0.000156	
233.15 0.0480 72	70 0.000138	
213.15 0.0372 87	50 0.000114	
* at a partial pressure	e of 1 atmosphere.	
* at a partial pressure	e of 1 atmosphere.	
AUXILIARY	of 1 atmosphere.	
AUXILIARY METHOD /APPARATUS/PROCEDURE: Volumetric apparatus with equilibrium Cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per c	en
	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co.	en
AUXILIARY METHOD /APPARATUS/PROCEDURE: Volumetric apparatus with equilibrium Cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully degassed. Equilibrium established in	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per c 2. Nakarai Chemicals sample, purit 99.9 mole per cent.	en
AUXILIARY METHOD /APPARATUS/PROCEDURE: Volumetric apparatus with equilibrium cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully degassed. Equilibrium established in	<pre>INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per c 2. Nakarai Chemicals sample, purit 99.9 mole per cent. ESTIMATED ERROR:</pre>	en Y
AUXILIARY METHOD /APPARATUS/PROCEDURE: Volumetric apparatus with equilibrium cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully degassed. Equilibrium established in	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per c 2. Nakarai Chemicals sample, purit 99.9 mole per cent. ESTIMATED ERROR:	eni y .5

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(l) Hydrogen; H ₂ ; [1333-74-0]		Cargill, R. W.		
(2) Ethanol; C ₂ H ₆ O; [64-17-5]		J. Chem. Soc., Faraday Trans. I <u>1978</u> , 74, 1444 - 1456.		
VARIABLES: T/K: 278.9 - 333.2 P/kPa: 101.325 (1 atm)		PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:				
T^{-1} S _O /cm ³ kg ⁻¹ M		Bunsen Coefficient $\alpha \times 10^2$	Ostwald Coefficient L x 10^2	
59 96.4 43 100 535 106 524 111 502 115 54 54 55 55 55 55 55 55 55 5	1.98 2.055 2.18 2.28 2.36 cient, and O	7.64 7.84 8.2 8.5 8.7 stwald coeffic		
AUXILIARY	INFORMATION ·	,	·····	
by a thin film of on and Billett (1) ad by replacing stant flow pump and ass of the solvent tion tube (instead a top-pan balance. assed using the le (1). Each deter- bout 20 cm ³ of gas	 (1) Hydrog Gas 99 over s (2) Ethano Sample alcoho water. water) 	en. British Os .9 per cent pu aturated brind 1. Absolute al was 0.98 mole 1, 0.02 mole f (ca. 0.8 wt pe	kygen Co. Dre, stored e. Lochol. e fraction Fraction	
	$\frac{(64-17-5)}{(1 \text{ atm})}$	$\begin{bmatrix} 1333-74-0 \end{bmatrix}$ Cargill, R J. Chem. S $\begin{bmatrix} 978, 74, \\ 3. Chem. S \\ 1978, 74, \\ 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978, 100, \\ 198, 100, \\ 1978,$	[1333-74-0]Cargill, R. W. $0; [64-17-5]$ $J. Chem. Soc., Faraday 29: [64-17-5]J. Chem. Soc., Faraday 225: (1 atm)PREPARED BY:2: 25: (1 atm)H. L. Clever2: 25: (1 atm)H. L. Clever2: 7^{-1} S_0/cm^3kg^{-1} Mol Fraction BunsenCoefficientx_1 \times 10^4a \times 10^23: 87: 91.61.88: 7.341.59: 96.41.98: 7.642.35: 1062.18: 8.22.24: 1112.28: 8.52.02: 1152.36: 8.72: 4: 1112.28: 8.52: 0: 2: 1152.36: 8.72: 4: 1112.28: 8.52: 0: 2: 1152.36: 8.72: 4: 1112.28: 8.53: 0: 2: 1152: 36: 8.72: 4: 1112.28: 8.53: 0: 2: 15: 2: 36: 8.73: 2: 4: 1112: 28: 9.53: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 2: 36: 8.73: 0: 0: 2: 15: 3: 35: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5: 10: 32: 5$	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>l. Hydrogen; H₂; [1333-74-0 2. Ethanol; C₂H₆O; [64-17-5]</pre>	Makranczy, J.; Rusz, L.; Balog-Megyery, K. Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6.
VARIABLES:	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:	
T/K P ⁺ /kPa Ostwald coefficient Mole fraction of hydrogen*, x _{H2}	
298.15 101.3 0.0768	0.000184
* calculated by compiler	
+ partial pressure of hydrogen.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	SOURCE AND PURITY OF MATERIALS: No details given.
	ESTIMATED ERROR: $\delta x_{\rm H_2} = \pm 3\%$
	<pre>REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. <u>1957</u>, 1, 55. Chem. Abstr. <u>1961</u>, 55,3175h.</pre>

COMPONENTS:	ODICINAL MEACUIDEMENTER		
	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Katayama, T.; Nitta, T.		
2. l-Propanol; C ₃ H ₈ 0; [71-23-8]	J. Chem.Engng. Data. <u>1976</u> ,21,194-6		
VARIABLES:	PREPARED BY:		
Temperature	C.L. Young		
EXPERIMENTAL VALUES:	I		
T/K Ostwald Henry's coefficient, L /	Constant Mole fraction* of atm hydrogen in liquid, ^x H ₂		
298.15 0.0763 42	.70 0.000234		
273.15 0.0615 49	0.000201		
253.15 0.0520 55	50 0.000180		
233.15 0.0426 63	60 0.000157		
213.15 0.0336 75	10 0.000133		
AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
	1. Takachiho Chemical Industry Co.		
Volumetric apparatus with equilibrium cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully degassed. Equilibrium established	sample, purity 99.99 mole per cent.		
in 1-1.5 hours. Details in ref. (1).	 Nakarai Chemicals sample, distilled, purity 99.9 mole per cent. 		
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.12$ at 213.15K; ± 0.05		
	at other temperatures; $\delta x H_2 = \pm 1.5$ %		
	REFERENCES :		
	1. Nitta, T.; Tatsuishi. A.;		
	Katayama, T. J.Chem.Eng.Jpn. <u>1973</u> ,		
	6,475.		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Rusz, L.;	
	Balog-Megyery, K.	
2. 1-Propanol; C ₃ H ₈ O; [71-23-8]	Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6.	
VARIABLES:	PREPARED BY:	
	C.L. Young	
EXPERIMENTAL VALUES:		
T/K P ⁺ /kPa Ostwald coe	fficient Mole fraction of hydrogen*, x _{H2}	
298.15 101.3 0.074	2 0.000228	
* calculated by compiler		
+ partial pressure o	r hydrogen	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) Was used.	No details given.	
	ESTIMATED ERROR:	
	$\delta x_{\rm H_2} = \pm 3\%$	
	REFERENCES :	
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Vesspremi Vegyip. Egy. Kozl. <u>1957</u>, 1, 55, Chem. Abstr. <u>1961</u>, 55, 3175h</pre>	
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COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen, H_2 ; [1333-74-0]]		
2. 1-Butanol; C ₄ H ₁₀ O; [71-36-3]	Katayama, T.; Nitta, T. J. Chem.Engng.Data. <u>1976</u> , 21,194-6	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:	L	
T/K Ostwald Henry coefficient,L	's Constant Mole fraction* of /atm hydrogen in liquid, ${}^{x}_{\mathrm{H}_{2}}$	
298.15 0.0709	3750 0.000267	
273.15 0.0577	4320 0.000231	
253.15 0.0493	4770 0.000210	
233.15 0.0398 213.15 0.0324	5530 0.000181 6340 0.000158	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE: Volumetric apparatus with equilibrium cell of approximately 0.08 litres. Magnetic stirrer. Solvent carefully degassed. Equilibrium established in 1-1.5 hours. Details in ref. (1).	<pre>SOURCE AND PURITY OF MATERIALS: 1. Takachiho Chemical Industry Co. sample, purity 99.99 mole per cent. 2. Nakarai Chemicals sample, distilled, purity 99.9 mole per cent. ESTIMATED ERROR:</pre>	
	REFERENCES: 1. Nitta, T.; Tatsuishi. A.; Katayama, T. J. Chem.Eng. Jpn. <u>1973</u> ,6, 475.	

COMPONENTS:	ORIGINAL MEASUDEMENTS
L. Hydrogen; H ₂ ; [1333-74-0] 2. 1-Butanol; C ₄ H ₁₀ O; [71-36-3]	ORIGINAL MEASUREMENTS: Makranczy, J.; Rusz, L.; Balog- Megyery, K. Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6.
VARIABLES:	PREPARED BY: C.L. Young.
EXPERIMENTAL VALUES:	
T/K P ⁺ /kPa Ostwald coe	fficient Mole fraction of hydrogen*, ¤ _{H2}
298.15 101.3 0.069	9 0.000263
* calculated by comp	iler
+ partial pressure o	
+ partial pressure o	r nyarogen
	INFORMATION
METHOD/AFPARATUS/PROCEDURE: Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	SOURCE AND PURITY OF MATERIALS: No details given.
	ESTIMATED ERROR:
	$\delta x_{H_2} = \pm 3\%$ REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Vesspremi Vegyip. Egy. Kosl. <u>1957</u> , 1, 55. Chem. Abstr. <u>1961</u> , 55, 3175h

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.	
(2) 1-Pentanol; C ₅ H ₁₂ O; [71-41-0	0] Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.	
VARIABLES: T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: M. E. Derrick H. L. Clever	
EXPERIMENTAL VALUES:		
T/K Mol Fracti x _l x 10 ⁴		
293.15 1.59 298.15 1.65	3.292 3.533 3.397 3.708	
The author measured the Ostwald coefficient at a pressure of about 746 mmHg. The compiler assumed the Ostwald coefficient to be independent of pressure, and calculated the mole fraction and Bunsen coefficient values at 101.325 kPa (1 atm) partial pressure of the gas.		
AU3	KILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: An Ostwald apparatus as modified Timofejew (1), and Steiner (2) i used. The apparatus consists of gas buret, an absorption flask, a mercury manometer. The system thermostated with a water jacket	s reaction of water with aluminum a amalgam accelerated with mercury and (II) chloride.	
The gas is introduced into the d gassed liquid. The gas volume absorbed is determined by the ga buret. The solvent volume is de mined at the end of the experime by pouring the solvent into a graduated flask.	is iter-	
	$\delta L/L = 0.03$ (compiler)	
	<pre>REFERENCES: 1. Timofejew, W. Z. Physik. Chem. <u>1890</u>, 6, 141. 2. Steiner, Ann. Phys. (Leipzig) <u>1894</u>, 52, 275.</pre>	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	
	Makranczy, J.; Rusz, L.; Balog-Megyery, K.
2. 1-Pentanol; C ₅ H ₁₂ O; [71-41-0 or	0] Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6.
1-Hexanol; C ₆ H ₁₄ O; [111-27-3	3]
VARIABLES:	PREPARED BY:
	C.L. Young
EXPERIMENTAL VALUES:	
T/K P ⁺ /kPa Ostwal	ld coefficient Mole fraction of hydrogen*, $x_{\rm H_2}$
	1-Pentanol
298.15 101.3	0.0604 0.000268
	l-Hexanol
298.15 101.3	0.0589 0.000301
* calculated by	compiler
+ partial pressu	ure of hydrogen
	CILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatu of Bodor, Bor, Mohai, and Sipos Was used.	us NO details given. (1)
	ESTIMATED ERROR:
	$\delta x_{\rm H_2} = \pm 3\%$

COMPONENTS:	
	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Ijams, C. C.
(2) Aliphatic alcohols; C ₇ H ₁₆ O and C ₈ H ₁₈ O	Ph.D. thesis, <u>1941</u> Vanderbilt University Nashville, TN
	Thesis Director: L. J. Bircher
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	H.L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald Coefficient Coefficient α L
l-Heptanol; C ₇ H ₁₆ C); [111-70-6]
298.15 3.85	0.0607 0.0663
l-Octanol; C ₈ H ₁₈ O;	[111-87-5]
298.15 3.92	0.0555 0.0606
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	
A Van Slyke-Neill Manometric	SOURCE AND PURITY OF MATERIALS:
Apparatus manufactured by the Eimer and Amend Co. was used.	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Air Reduction Co. Purity 99.5 per cent.
	(1) Hydrogen. Air Reduction Co.
and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified so that small solvent sample (2 cm ³) could be used with almost 100 per cent recovery of the solvent. An improved temperature control	 Hydrogen. Air Reduction Co. Purity 99.5 per cent. Aliphatic alcohols. Purified. Vapor pressure and boiling point also reported in the
and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified so that small solvent sample (2 cm ³) could be used with almost 100 per cent recovery of the solvent.	 Hydrogen. Air Reduction Co. Purity 99.5 per cent. Aliphatic alcohols. Purified. Vapor pressure and boiling point also reported in the

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Makranczy, J.; Rusz, L.;
	Balog-Megyery, K.
2. 1-Heptanol; C ₇ H ₁₆ O; [111-70-6]	
or	Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6
1-Octanol; C ₈ H ₁₈ O; [111-87-5]	<u>.</u>
VARIABLES:	
VARIABLES:	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:	
+	
T/K P ⁺ /kPa Ostwald coe	fficient Mole fraction of
	hydrogen*, x _{H2}
l-Hept	anol
298.15 101.3 0.054	6 0.000316
1-Octa:	nol
298.15 101.3 0.051	3 0.000332
* calculated by compi	ler
+ partial pressure of	hydrogen.
*	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;
Volumetric method. The apparatus of	No details given.
Bodor, Bor, Mohai, and Sipos (1) was used.	
	ESTIMATED ERROR:
	$\delta x_{\rm H_2} = \pm 3\%$
1	REFERENCES:
l	1. Bodor, E.; Bor, Gy.; Mohai, B.;
	Sipos, G. Kaarnemi Kaguin Fau Kagi
	Veszpremi Vegyip. Egy. Kozl. 1957, 1, 55.
	<i>Chem. Abstr.</i> <u>1961</u> , 55, 3175h.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Makranczy, J.; Rusz, L.; Balog-Megyery, K.
2. l-Nonanol; C ₉ H ₂₀ O; [143-08-8] or	Hung. J. Ind. Chem. <u>1979</u> , 7, 41-6
1-Decanol; C ₁₀ H ₂₂ O; [112-30-1]	
VARIABLES:	PREPARED BY:
	C.L. Young
EXPERIMENTAL VALUES:	
T/K P ⁺ /kPa Ostwald coe	fficient Mole fraction of hydrogen*, x _{H2}
1-No	nanol
298.15 101.3 0.04	80 0.000343
	canol
298.15 101.3 0.04	58 0.000358
* calculated by compi	ler
+ partial pressure of	hydrogen
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	No details given.
	ESTIMATED ERROR:
	$\delta x_{\rm H_2} = \pm 3\%$
	REFERENCES :
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. <u>1957</u>, 1, 55. Chem. Abstr. <u>1961</u>, 55, 3175h</pre>

COMPONE	ENTS:		'	ORIGINAL M	EASUREMENTS:
	Hydrogen; H ₂ 1-Undecanol;			Balog-M	zy, J.; Rusz, L.; Megyery, K. . Ind. Chem. <u>1979</u> , 7, 41-6.
	or 1-Dodecanol;	C ₁₂ H ₂₆ O;	[112-53-8]	пину. о	. 1na. onem. <u>1979</u> , 7, 41 ⁻⁰ .
VARIAB	LES:	<u> </u>		PREPARED B	Y:
					C.L. Young
EXPERI	MENTAL VALUES:	·····			<u></u>
	т/к	P ⁺ /kPa	Ostu coeffi	vald .cient	Mole fraction of hydrogen*, $x_{\rm H_2}$
			l-Ur	decanol	
	298.15	101.3	0.0	426	0.000362
		1-Dodecanol			
	298.15	101.3	0.0	404	0.000370
		* calcu	ulated by co	mpiler	
			ial pressure		agen
		-	•	-	-
	AUXILIARY INFORMATION		1		
METHOD	APPARATUS / PROC	EDURE:			PURITY OF MATERIALS:
Volu of B	metric metho odor, Bor, M used.	d The ar	oparatus Sipos (1)		details given.
	-564.				
				·	
				ESTIMATED	ERROR:
				δ <i>x</i> _H	2 ± 3%
				REFERENCES	:
				Sipc <i>Vesz</i> 1957	r, E.; Bor, Gy.; Mohai, B.; s, G. premi Vegyip. Egy. Kozl. , 1, 55. . Abstr. <u>1961</u> , 55, 3175h.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Cauquil, G.		
(2) Cyclohexanol; C ₆ H ₁₂ O; [108-93-0]	J. Chim. Phys. <u>1927</u> , 24, 53 - 55.		
VARIABLES:	PREPARED BY:		
T/K: 299.15 P/kPa: 101 - 102 (760-6	P. L. Long H. L. Clever		
(760 - 766 mmHg) EXPERIMENTAL VALUES:	·		
EXPERIMENTAL VALUES:			
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient		
$\frac{x_1 \times 10^4}{2}$			
299.15 3.5	0.075 0.082		
3.6	0.076 0.083		
The author reported what the compiler believes is an Ostwald coefficient. The compiler calculated the mole fraction and Bunsen coefficient values.			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus consisted of a flask	(1) Hydrogen. No information.		
and a mercury leveling bulb to control the pressure.	(2) Cyclohexanol. Source not given.		
The solvent volume was measured, the gas introduced over the solvent, The gas absorbed was found by differnce between the initial and final gas volume.	Distilled.		
	ESTIMATED ERROR:		
	$\delta L/L = 0.10$ (compiler)		
	REFERENCES:		

COMPONENTS:	ODTOTIVAL MELCUDENTE
Sour ONENIS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Kruyer, S.; Nobel, A.P.P.
2	
2. Cyclohexanol; C ₆ H ₁₂ O; [108-93-0]	<i>Rec. Trav. cntm.</i> 1501 , 80 , $1145-50$
VARIABLES:	PREPARED BY:
	C. L. Young
Time	
EXPERIMENTAL VALUES:	[a]
T/K Ostwald coeffic	ient T Mole fraction of
	hydrogen, x_{H_2}
	۲
298.15 0.039	0.000168
298.15 0.059	0.000100
	•
. t- x	
[a] Calculated by compiler for a part	rtial pressure of 101.325 kPa
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	
	SOURCE AND PURITY OF MATERIALS:
Technique consisted of saturating	1. Hydrogen and argon passed through
	molecular sieve 4A in liquid oxygen
out the budmanan with among The	and nitrogen trap respectively.
	2. Distilled.
analysed with a katharometer.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.2; \delta L = \pm 3\%$
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H_2 ; [1333-74-0] 2. 2-Propanone, (Acetone); C_3H_6O ;	Puri, P.S.; Ruether, J.A.	
[67-64-1]		
3. 2-Propanol; C ₃ H ₈ O; [67-63-0]	Can. J. Chem. Eng. <u>1974</u> , 52, 636-640	
VARIABLES:	PREPARED BY:	
Liquid phase composition	C.L. Young	
EXPERIMENTAL VALUES:		
	¢ • • • • *	
T/K Mole fraction acetone in li		
298.15 1.000	0.0943	
0.736 0.655	0.1016 0.1038	
0.486	0.1038	
0.351	0.1023	
0.122	0.0920	
0.000	0.0845	
* total pressure approx	imately 10 ⁵ Pa.	
······································		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Volumetric apparatus similar to that	1. Liquid Carbonic Canadian Corp.	
described in ref. (1). Degassed	sample purity 99.97 mole per cent.	
solution placed in calibrated	2 and 2 Dalam Decemptions 1	
dissolution vessel, gas saturated with solvent vapor introduced from	2. and 3. Baker Reagent grade.	
calibrated gas buret. Amount of		
gas dissolved determined from pressure		
and volume changes.		
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.01; \ \delta L = \pm 0.5$ %.	
	(estimated by compiler).	
	(estimated by compiler).	
	DEFEDENCUE.	
	REFERENCES :	
	l. Ben-Naim, A.; Baer, S.	
	Trans. Faraday. Soc. <u>1963</u> , 59,	
	2735.	

Organic Compounds Containing Oxygen			
COMPONENTS: (1) Hydrogen; H ₂ ; [1333-74-0] (2) Ethers	EVALUATOR: H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA		
	1980, September		
CRITICAL EVALUATION:			
Hydrogen in Ethers a	e Fraction Solubility of t a Hydrogen Partial 325 kPa (l atm).		
Most of the solubility measurements evaluated in this section were carried out at a total pressure near 101.325 kPa. The mole fraction solubility values at a hydrogen partial pressure of 101.325 kPa were calculated on the assumption that the following statements are true. The gas is ideal, Henry's law is obeyed, and the Ostwald coefficient is independent of pressure. The assumptions introduce errors that are probably smaller than the experimental errors of the solubility measurements.			
Hydrogen + 1,1'-Oxybisethane or dieth	yl ether [60-29-7]		
Christoff (1) made one measurement at 273.15 K, and Horiuti (2) made six measurements between the temperatures of 192.55 and 294.25 K of the solubility of hydrogen in diethyl ether. Horiuti's value of the mole fraction solubility at 273.15 K is 6.1 per cent greater than Christoff's value.			
Both authors work is classed as tentative. However, the work of Horiuti is preferred. Horiuti's mole fraction solubility values show a definite curvature on a log x_1 vs. 1/T plot.			
Although the observed curvature may be due to a systematic error in the measurement related to the relatively large vapor pressure of the solvent, the evaluator choses to believe the effect is real and has treated Horiuti's data by a linear regression to obtain the three constant tentative equation for use between 193.15 and 298.15 K.			
$\ln x_1 = -10.3539 + 1.2545/(T/100K) + 2.3384 \ln (T/100K)$			
	with a standard error about the regression line of 4.32 x 10^{-6} .		
The three constant equation gives temperature dependent values of the thermodynamic changes of enthalpy and entropy for the transfer of one mole of hydrogen from the gas phase at a partial pressure of 101.325 kPa to the infinitely dilute solution. Values of the thermodynamic changes at several temperatures are given in Table 1. Smoothed values of the mole fraction solubility and the partial molar Gibbs energy of solution as a function of temperature are given in Table 2.			
Table 1. Hydrogen + diethyl ether. Changes in enthalpy, entropy and heat capacity for the transfer of one mole of hydrogen from the gas at a partial pressure of 101.325 kPa to the infinitely dilute solution at several temperatures.			
$T/K \Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1} \Delta \overline{S}_{1}^{\circ}/J$	$\frac{1}{mol^{-1}} \Delta \overline{C}_{p_1}^{\circ} / J K^{-1} mol^{-1}}$		
248.15 3.78 - 273.15 4.27 -	19.4 19.0 19.4 19.4 19.4 19.4 19.4 19.4		

Table 2. The solubility of hydrogen in diethyl ether at a hydrogen partial pressure of 101.325. Tentative values of the mole fraction solubility and partial molar Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction	∆G ₁ /kJ mol ⁻¹
193.15	2.84	13.112
203.15	3.10	13.646
213.15	3.37	14.170
223.15	3.65	14.685
233.15	3.95	15.191
243.15	4.26	15.688
253.15	4.59	16.178
263.15	4.93	16.660
273.15	5.29	17.135
278.15	5.47	17.370
283.15	5.66	17.602
288.15	5.85	17.834
293.15	6.05	18.063
298.15	6.24	18.291

Hydrogen + 1,1'-Oxybispropane or dipropyl ether [111-43-3]

Guerry (3) measured the solubility at temperatures of 293.15 and 298.15 K. The results are classed as tentative.

Hydrogen + 1,4-Dioxane [123-91-1]

Guerry (3) measured the solubility at temperatures of 293.15 and 298.15 K. Krauss and Gestrich (4) measured the solubility at four temperatures between 283.15 and 313.15 K. The mole fraction value of Guerry is 6.5 per cent larger than the Krauss and Gestrich value at 293.15 K. Both sets of data are classed as tentative. However, the tentative equation and smoothed data below are based on a linear regression of only the data of Krauss and Gestrich. The equation for use from 283.15 to 313.15 K is

$$\ln x_1 = -5.7347 - 8.6743/(T/100K)$$

with a standard error about the regression line of 2.96 x 10^{-6} .

The temperature independent values for the thermodynamic changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at a partial pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \mod^{-1}$ 7.21 and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \mod^{-1}$ -47.7.

Smoothed values of the solubility and partial molar Gibbs energy of solution are in Table 3.

Table 3. Solubility of hydrogen in 1,4-dioxane at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molar Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G°⁄kJ mol ⁻¹
283.15	1.51	20.713
293.15	1.68	21.190
298.15	1.76	21.428
303.15	1.85	21.666
313.15	2.03	22.143

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Hydrogen + Tetrahydrofuran [109-99-9]
          + 2,3-Dihydropyran [22512-65-6]
          + Tetrahydro-2H-pyran [142-68-7]
Guerry (3) measured the solubility at temperatures of 293.15 and 298.15 K
in each of these systems. The results are classed as tentative.
References:
   Christoff, A. Z. Phys. Chem. 1912, 79, 456.
1.
   Horiuti, J. Sci. Pap. Inst. Phys. Chem. Res. (Jpn)
1931/32, 17, 125.
2.
    Guerry, D. Jr. Ph.D. thesis, Vanderbilt University, Nashville, TN 1944.
з.
    Krauss, W.; Gestrich, W. Chem.-Tech. (Heidelberg)
1977, 6, 35.
4.
                                                      • •
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COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Christoff, A.		
(2) 1,l'-Oxybisethane or diethyl ether; C ₄ H ₁₀ O; [60-29-7]	Z. Phys. Chem. <u>1912</u> , 79, 456 - 460.		
VARIABLES: T/K: 273.15 P/kPa: Atmospheric	PREPARED BY: M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mole Fracti $x_1 \times 10^{4}$	Coefficient Coefficient		
273.15 5.01	11.15 11.15		
The author measured the Ostwald coefficient. The total pressure was corrected for the vapor pressure of the solvent at the temperature of the measurement. The compiler calculated the mole fraction and Bunsen coefficient values. The value is 6.2 per cent lower that the value reported by Horiuti at 273.15 K. The Horiuti value is preferred.			
	ARY INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;		
The apparatus is a modified Ostwald apparatus described by Just (1), ar modified by Skirrow (2). The appara consists of a thermostated gas bure and absorption flask. The modification involves the use of vapor free gas in the gas buret. A correction is made for the vapor pressure of the liquid. A steel capillary tube with a stopcock, whi prevents the gas and the liquid vap	 (1) Hydrogen. Prepared by the reaction of zinc and dilute sulfuric acid. (2) Diethyl ether. Merck (Darmstadt). Stated to be pure and anhydrous. 		
mixing in the buret, is used to connect the absorption flask and th buret.	BOTTEMED BRACK		
	<pre>REFERENCES: 1. Just, G. Z. Phys. Chem. <u>1901</u>, 37, 342. 2. Skirrow, F. W. Z. Phys. Chem. <u>1902</u>, 41, 139.</pre>		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Horiuti, J.	
(2) l,l'-Oxybisethane or diethyl ether; C ₄ H ₁₀ O; [60-29-7]	Sci. pap. Inst. Phys. Chem. Res. (Jpn) <u>1931/32</u> , 17, 125 - 256.	
VARIABLES:	PREPARED BY:	
T/K: 192.55 - 294.25	M. E. Derrick	
P/kPa: 101.325 (1 atm)	H. L. Clever	
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald	
,	Coefficient Coefficient	
	$\underline{\alpha \times 10^2} \underline{L \times 10^2}$	
192.55 2.84 213.25 3.34	7.06 4.98 8.10 6.32	
233.15 3.98	9.37 8.00	
252.05 4.53 273.15 5.335	10.4 9.64 11.88 11.88	
294.25 6.060	13.08 14.09	
The mole fraction and Bunsen coeffici	ent values were calculated by the	
Compiler.	ent varies were carcutated by the	
Smoothed Data: $\ln x_1 = -10.3539 + 1$.	2545/(T/100K) + 2.3384 ln (T/100K)	
±	the regression line = 4.32×10^{-6}	
T/K Mol Fraction	T/K Mol Fraction	
$x_1 \times 10^4$	$x_1 \times 10^4$	
$\frac{1}{193.15}$ $\frac{2.84}{2.84}$	$\frac{-1}{253.15}$ $\frac{4.59}{4.59}$	
203.15 3.10	263.15 4.93 273.15 5.29 283.15 5.66 293.15 6.05	
213.15 3.37 223.15 3.65		
223.15 3.65		
243.15 4.26	298.15 6.24	
AUXILIARY	INFORMATION	
METHOD /AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
The apparatus consists of a gas buret	(1) Hydrogen. Prepared by	
a solvent reservoir, and an absorp- tion pipet. The volume of the pipet	electrolysis.	
18 determined at various meniscus	(2) 1 11 Ownhighthand Marchig "for	
heights by weighing a quantity of water. The meniscus height is read	(2) 1,1'-Oxybisethane. Merck's "for analysis". Stored over sodium	
with a cathetometer.	amalgam and distilled before	
The dry gas is introduced into the	use. Constant boiling within 0.01 degree.	
degassed solvent. The gas and solvent		
are mixed with a magnetic stirrer ^{Until} saturation. Care is taken to		
prevent solvent vapor from mixing		
With the solute gas in the gas buret. The volume of gas is determined from	ESTIMATED ERROR:	
I ^{che} gas buret readings, the volume of	$\delta T/K = 0.05$	
solvent is determined from the meniscus height in the absorption	$\delta x_1 / x_1 = 0.01$	
Pipet.	REFERENCES:	
	ALTERENCES:	

[3		
COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Guerry, D. Jr.		
<pre>(2) 1,1'-Oxybispropane or dipropyl ether; C₆H₁₄O; [111-43-3]</pre>	Ph.D. thesis, <u>1944</u> Vanderbilt University Nashville, TN		
	Thesis Director: L. J. Bircher		
VARIABLES:	PREPARED BY:		
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $x_1 \times 10^4$ Cc	Bunsen Ostwald Defficient Coefficient α L		
293.156.15298.156.43	0.101 0.108 0.105 0.115		
compiler.			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:			
A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and Amend Co. was used.			
The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost complete recovery of the sample.			
An improved temperature control system was used.			
SOURCE AND PURITY OF MATERIALS:	ESTIMATED ERROR:		
(1) Hydrogen. Air Reduction Co. Purity 99.5 per cent.	$\delta T/K = 0.05$		
(2) Dipropyl ether. Eastman Kodak Co. Refluxed four hours over Na, then distilled from Na in a N ₂ atm. B.p. (746.2 mmHg) t/°C 89.03 - 89.28 (corr.). Refrac- tive index, density, and vapor pressure data are in the thesis.	<pre>REFERENCES: 1. Van Slyke, D. D. J. Biol. Chem. 1939, 130, 545. 2. Ijams, C. C. Ph.D. thesis, 1941 Vanderbilt University</pre>		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]	Guerry, D. Jr.			
(2) Cyclic ethers: C_4H_8O , $C_4H_8O_2$; C_5H_8O , and $C_5H_{10}O$	Ph. D. thesis, <u>1944</u> Vanderbilt University Nashville, TN			
	Thesis Director: L. J. Bircher			
VARIABLES:	PREPARED BY:			
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever			
EXPERIMENTAL VALUES:				
$\frac{T/K Mol \ Fraction}{x_1 \times 10^4}$	Bunsen Ostwald oefficient Coefficient αL			
Tetrahydrofuran; C	4 ^H 80; [109-99-9]			
293.15 2.60 298.15 2.74	0.0719 0.0771 0.0752 0.0821			
1,4-Dioxane; C ₄ H ₈ O				
293.15 1.79	0.0471 0.0505			
298.15 1.93	0.0502 0.0548			
2,3-Dihydropyran; (293.15 2.68	C ₅ H ₈ O; [25512-65-6] 0.0662 0.0710			
293.15 2.64	0.0648 0.0707			
Tetrahydro-2H-pyra	$c_{5}H_{10}O; [142-68-7]$			
293.15 3.12 298.15 3.24	0.0718 0.0770 0.0742 0.0810 -			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:				
The apparatus was a modified Van Slyke-Neill Manometric Apparatus manufactured by the Eimer and Amend	Tetrahydrofuran. Eastman Kodak Co. B.p.(752.7 mmHg) t/°C 65.50 - 65.54. 1,4-Dioxane. Eastman Kodak Co. B.p.(743.7 mmHg) t/°C 100.81-100.82.			
Co. The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost 100 per cent recovery of the sample.	Dihydro-2H-pyran. Prepared from tetrahydrofurfuryl alcohol. B.p. (743.6 mmHg) t/°C 84.81 - 84.89. Tetrahydro-2H-pyran. Prepared by catalytic reduction of dihydro-2H-			
An improved temperature control system was used.	pyran. B.p.(750.6 mmHg) t/°C 87.51 - 87.52. All b. p. are corrected. ESTIMATED ERROR:			
SOURCE AND PURITY OF MATERIALS:	$\delta T/K = 0.05$			
(1) Hydrogen, Air Reduction Co.				
 Purity 99.5 per cent. (2) Cyclic ethers. The ethers were fractionally distilled from over Na in a nitrogen atmosphere. In addition to the solubility data the thesis contains measured values of refractive index, density, vapor pressure and b.p. 	<pre>REFERENCES: 1. Van Slyke, D. D. J. Biol. Chem. 1939, 130, 545. 2. Ijams, C. C. Ph. D. thesis, 1941 Vanderbilt University</pre>			

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Krauss, W.; Gestrich, W.	
2. 1,4-Dioxane; C ₄ H ₈ O ₂ ; [123-91-1]	Chem Tech. (Heidelberg), <u>1977</u> 6, 35-37.	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:	L	
	Mole fraction [§] of	
T/K Solubility*/ mol d		
	<i>x</i> H ₂	
283.15 0.00175	0.000150 0.000168	
293.15 0.00195 303.15 0.00215	0.000188	
313.15 0.0023	0.00020	
<pre>* read off graph, the equations</pre>	given in the original	
paper appear to be in error.		
§ calculated by compiler for a	partial pressure of 101.325 kPa.	
	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
me THOD/AFFARA TOS/FROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell.	No details given.	
Volumetric apparatus in which a	no detaits given.	
known volume of gas was added to a known volume of liquid and the		
equilibrium pressure measured. Details in source.		
betails in source.		
	PORTMARED EDDOD.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.05; \ \delta x_{H_2} = \pm 10^{-5}$ (estimated by compiler)	
	REFERENCES:	

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] 2-Propanone or acetone; C₃H₆O; [67-64-1] 	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1980, September

CRITICAL EVALUATION:

Three laboratories have reported measurements of the solubility of hydrogen in acetone at pressures near 101.325 kPa. Just (1) measured the solubility at 293.15 and 298.15 K, Horiuti (2) made seven measurements over the temperature interval of 191.25 to 313.15 K, and Puri and Ruether (3) measured the Ostwald coefficient of solubility at 298.15 K and a total pressure of approximately 10^5 Pa.

The Just mole fraction solubility values are about 25 per cent less than Horiuti's values, and the Puri and Ruether value is 5.3 per cent less than Horiuti's smoothed value at 298.15 K. The Just values are rejected, and the Horiuti, and Puri and Ruether values are classed as tentative. However, the values of Horiuti are preferred.

A linear regression was made of Horiuti's mole fraction solubility values. A three constant equation appears to be justified, although as with the hydrogen + diethyl ether system, this may be due to an error in the measurement connected with the relatively large solvent vapor pressure. The tentative equation for use over the 193.15 to 313.15 K temperature interval is

 $\ln x_1 = -9.5956 - 1.1902/(T/100K) + 1.7267 \ln (T/100K)$

with a standard error about the regression line of 2.40 x 10^{-6} .

Several values of the temperature dependent enthalpy and entropy changes for the transfer of one mole of hydrogen gas at a partial pressure of 101.325 kPa to the infinitely dilute solution are given in Table 1.

Smoothed values of the mole fraction solubility and partial molar Gibbs ^{energy} of solution are given in Table 2.

Table l.	Hydrogen + Acetone. Changes in enthalpy and entropy on transfer of mole of hydrogen from the gas at 101.325 kPa to the infinitely dilute solution.

Т/К	$\Delta \overline{H}^{\circ}_{1}/kJ \text{ mol}^{-1}$	∆5°/J K ⁻¹ mol ⁻¹	$\Delta \overline{C}_{p_1}^{\circ} / J K^{-1} mol^{-1}$
198.15	3.76	-55.6	14.4
223.15	4.19	-53.9	14.4
248.15	4.55	-52.4	14.4
273.15	4.91	-51.0	14.4
298.15	5.27	-49.7	14.4

The solubility of hydrogen in acetone at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction Table 2. solubility and partial molar Gibbs energy of solution as a function of temperature. Mol Fraction $\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{-1}$ T/K 10⁴ x₁ 193.15 1.14 14.574 1.29 203.15 15.130 213.15 1.44 15.679 1.60 223.15 16.221 16.757 17.287 233.15 1.76 243.15 1.93 253.15 17.811 2.11 263.15 2.30 18.329 273.15 2.49 18.841 283.15 2.70 19.349 288.15 2.80 19.600 293.15 2.90 19.851 20.100 298.15 3.01 303.15 3.12 20.348 313.15 3.34 20.841 References: 1. Just, G. Z. Phys. Chem. 1901, 37, 342. 2. Horiuti, J. Sci. Pap. Inst. Phys. Chem. Res. (Jpn.) 1931/32, 17, 125. 3. Puri, P. S.; Ruether, J. A. Can. J. Chem. Eng. 1974, 52, 636.

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OMPONENTS: ORIGINAL MEASUREMENTS:				
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.			
(2) 2-Propanone or acetone; C ₃ H ₆ O; [67-64-1]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.			
VARIABLES: T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: M. E. Derrick H. L. Clever			
EXPERIMENTAL VALUES:	I			
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient α x 10 ² L x 10 ²			
293.15 2.14 298.15 2.31	6.548 7.027 7.000 7.641			
The author measured the Ostwald coefficient at a pressure of about 746 mmHg. The compiler assumed the Ostwald coefficient to be independent of pressure, and calculated the mole fraction and Bunsen coefficient values at 101.325 kPa (1 atm) partial pressure of the gas.				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the degassed liquid The gas volume	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. 2-Propanone. No information. 			
buret. The solvent volume is determined at the end of the experi- ment by pouring the solvent into	ESTIMATED ERROR:			
graduated flask.	$\delta L/L = 0.03$ (compiler)			
	REFERENCES:			
	l. Timofejew, W. Z. Physik. Chem. <u>1890</u> , 6, 141.			
	2. Steiner, Ann. Phys. (Leipzig) <u>1894</u> , 52, 275.			

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
	Horiuti, J.		
(1) Hydrogen; H ₂ ; [1333-74-0]			
(2) 2-Propanone or acetone; C ₃ H ₆ O; [67-64-1]	Sci. pap. Inst. Phys. Chem. Res. (Jpn) <u>1931/32</u> , 17, 125 - 256.		
VARIABLES:	PREPARED BY:		
т/к: 191.25 - 313.15	M. E. Derrick		
P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald		
	Coefficient Coefficient		
	$\alpha \times 10^2$ L $\times 10^2$		
191.25 1.12	3.90 2.73		
212.45 1.42 232.55 1.77	4.83 3.76 5.85 4.98		
252.25 2.07	6.69 6.18		
273.15 2.50	7.83 7.83 8.99 9.68		
294.05 2.95 313.15 3.320	9.865 11.31		
The mole fraction and Bunsen coeffici compiler.	ent values were calculated by the		
-	902/(T/100K) + 1.7267 ln (T/100K)		
Standard error about	the regression line = 2.40×10^{-6}		
T/K Mol Fraction	T/K Mol Fraction		
$x_1 \times 10^4$	$x_1 \times 10^4$		
$\frac{1}{193.15}$ $\frac{1}{1.14}$	$\frac{1}{263.15}$ $\frac{1}{2.30}$		
203.15 1.29	273.15 2.49		
213.15 1.44	283.15 2.70		
223.15 1.60 233.15 1.76	293.15 2.90 298.15 3.01		
243.15 1.93	303.15 3.12		
253.15 2.11	313.15 3.34		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus consists of a gas	 Hydrogen. Prepared by electrolysis. 		
buret, a solvent reservoir, and an absorption pipet. The volume of the	erectorysis.		
pipet is determined at various	(2) 2-Propanone. Nippon Pure Chem.		
meniscus heights by weighing a quan- tity of water. The meniscus height	Co. or Merck. Extra pure grade, recrystallized with sodium		
is read with a cathetometer.	sulfite. Stored over calcium		
	chloride then fractionated.		
The dry gas is introduced into the degassed solvent. The gas and	Boiling point 56.09 ⁰ C		
solvent are mixed with a magnetic	(760 mmHg).		
stirrer until saturation. Care is			
taken to prevent solvent vapor from mixing with the solute gas in the	ESTIMATED ERROR:		
gas buret. The volume of gas is	$\delta T/K = 0.05$		
determined from the gas buret	$\delta x_1 / x_1 = 0.01$		
readings, the volume of solvent is determined from the meniscus height			
in the absorption pipet.	REFERENCES :		
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COMPONENTS :			
	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Guerry, D. Jr.		
(2) Cyclohexanone; C ₆ H ₁₀ O; [108-94-1]	Ph.D. thesis, <u>1944</u> Vanderbilt University Nashville, TN		
	Thesis Director: L. J. Bircher		
VARIABLES:	PREPARED BY:		
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:	L		
T/K Mol Fraction	Bunsen Ostwald		
•	Defficient Coefficient		
293.15 2.16 298.15 2.23	0.0467 0.0501 0.0480 0.0524		
The Ostwald coefficients w compiler.	vere calculated by the		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost complete recovery of the sample. An improved temperature control system was used.			
 SOURCE AND FURITY OF MATERIALS: (1) Hydrogen. Air Reduction Co. Purity 99.5 per cent. (2) Cyclohexanone. Eastman Kodak Co. Purified, distilled, b.p. (754.5 mmHg) t/°C 155.19. Refractive index, density, and vapor pres- sure data are in the thesis. 	ESTIMATED ERROR: δT/K = 0.05 REFERENCES: 1. Van Slyke, D. D. <i>J. Biol. Chem.</i> <u>1939</u> , <i>130</i> , 545. 2. Ijams, C. C.		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Kruyer, S.; Nobel, A.P.P.			
2. Phenol; C ₆ H ₆ O; [108-95-2]	Rec. Trav. Chim. <u>1961</u> , 80, 1145-56			
VARIABLES:	PREPARED BY:			
	C. L. Young			
EXPERIMENTAL VALUES:	1			
T/K Ostwald coeffic	[a] ient,L Mole fraction of hydrogen, x _{H2}			
298.15 0.033	0.000122			
[a] Calculated by compiler for a pa				
	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Technique consisted of saturating liquid with hydrogen in a spiral adsorption tube and then stripping out the hydrogen with argon. The resulting argon-hydrogen mixture was analysed with a katharometer.	SOURCE AND PURITY OF MATERIALS: 1. Hydrogen and argon passed through molecular sieve 4A in liquid oxygen and nitrogen trap respectively. 2. "Chemically pure".			
	ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta L = \pm 3$ %			
	REFERENCES :			

COMPONENTS:	EVALUATOR:			
(1) Hydrogen; H ₂ ; [1333-74-0]	H. L. Clever			
(2) Acetic acid; C ₂ H ₄ O ₂ ; [64-19-7]	Department of Chemistry Emory University Atlanta, GA 30322 USA			
	1980, September			
CRITICAL EVALUATION:				
The solubility of hydrogen in acetic 298.15 K by Just (1) and between 291. (2). The mole fraction solubility va some scatter, but in general agree wi	75 and 347.95 K by Maxted and Moon			
A linear regression was applied to the total of 14 solubility measurements to obtain the tentative equation for use between 289.75 (the melting Point of acetic acid) and 348.15 K.				
$\ln x_1 = -6.7248$ -	- 6.2238/(T/100K)			
with a standard error about the regre	ession line of 1.88×10^{-6} .			
The temperature independent thermodyn for the transfer of one mole of hydro 101.325 kPa to the infinitely dilute				
$\Delta \overline{H}_{1}^{*}/kJ \text{ mol}^{-1}$ 5.17 and	$\Delta \overline{s}_{1}^{\prime}/J K^{-1} mol^{-1}$ -55.9.			
The smoothed values of the mole fract Gibbs energy of solution are in Table	ion solubility and partial molal			
and partial molal function of temper	action $\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{-1}$			
289.75 (m.p.) 1.	40 21.375			
293.15 1. 298.15 1.	44 21.565 49 21.845			
303.15 1.	54 22.124			
313.15 1.0				
318.15 1. 323.15 1.				
328.15 1.8 333.15 1.8				
338.15 1.9	91 24.081			
343.15 1.1 348.15 2.0				
References:				
1. Just, G. Z. Phys. Chem. <u>1901</u> , 37	, 342.			
2. Maxted, E. B.; Moon, C. H. Trans.				
	<u> </u>			

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COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.		
-			
(2) Acetic Acid; C ₂ H ₄ O ₂ ; [64-19-7]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.		
VARIABLES:	PREPARED BY:		
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:	·····		
T/K Mol Fraction	Bunsen Ostwald		
x ₁ × 10 ⁺ C	Defficient Coefficient		
	$\frac{\alpha \times 10^2}{2} \qquad \frac{L \times 10^2}{2}$		
293.15 1.47 298.15 1.49	5.751 6.172 5.799 6.330		
The author measured the Os pressure of about 746 mmH the Ostwald coefficient to pressure, and calculated of Bunsen coefficient values partial pressure of the ga	g. The compiler assumed b be independent of the mole fraction and at 101.325 kPa (1 atm)		
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the de- gassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is deter-	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. Acetic acid. No information. 		
mined at the end of the experiment by pouring the solvent into a			
graduated flask.	ESTIMATED ERROR: δL/L = 0.03 (compiler)		

IPONENTS: ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Maxted, E.B.; Moon, C.H.;	
2. Acetic acid;C ₂ H ₄ O ₂ ; [64-19-7]	Trans. Faraday, Soc. <u>1936</u> , 32,769-75.	
VARIABLES:	PREPARED BY:	
Temperature	C.L. Young	
EXPERIMENTAL VALUES:	L	
T/K Bunsen	Mole fraction of	
coefficier		
α		
291.75 0.0558 300.55 0.0596	0.000142 0.000154	
310.65 0.0620	0.000161	
318.15 0.0649	0.000170	
328.05 0.0676 337.95 0.0714	0.000179 0.000191	
347.95 0.0742	0.000201	
293.15* 0.0566	0.000145	
303.15* 0.0594	0.000153	
323.15* 0.0669 293.15** 0.0547	0.000176 0.000140	
303.15** 0.0590	0.000152	
AUXILIARY		
METHOD:/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric apparatus with rocking absorption cell. Details in source.	1. Electrolytic grade.	
	 Degassed, high purity sample, no other details given. 	
	·	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.2; \delta x_{H_2} = \pm 1\%.$	
	(estimated by compiler.)	
	REFERENCES:	
4		

COMPONENTS:

(1) Hydrogen; H₂; [1333-74-0]

(2) Esters

EVALUATOR:

H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA

1980, September

CRITICAL EVALUATION:

An Evaluation of the Mole Fraction Solubility of Hydrogen in Esters at a Hydrogen Partial Pressure of 101.325 kPa (1 atm).

Most of the solubility measurements evaluated in this section were carried out at a total pressure near 101.325 kPa. The mole fraction solubility values at a hydrogen partial pressure of 101.325 kPa were calculated on the assumption that the following statements are true. The gas is ideal, Henry's law is obeyed, and the Ostwald coefficient is independent of pressure. The assumptions introduce errors that are probably smaller than the experimental errors of the solubility measurement.

Hydrogen + Acetic acid, methyl ester or methyl acetate [79-20-9]

Horiuti (2) measured seven values of the solubility over the 194.65 to 313.15 K temperature interval. There are no other measurements. The work of Horiuti generally has proved to be reliable. The tentative equation for the 193.15 to 313.15 K temperature range was obtained by a linear regression of his data.

$$\ln x_1 = -6.1832 - 5.7501/(T/100K)$$

with a standard error about the regression line of 3.00×10^{-6} .

The temperature independent values of changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas phase at a pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \mod^{-1} 4.78$ and $\Delta \overline{S}_1^{\circ}/J K^{-1} \mod^{-1} -51.4$.

Smoothed values of the mole fraction solubility at a hydrogen partial pressure of 101.325 kPa are given on the data sheet.

Hydrogen + Acetic acid, ethyl ester or ethyl acetate [141-78-6]

Just (1) reported solubility values at 293.15 and 298.15 K. Maxted and Moon (3) reported five values over the 273.65 to 312.95 K temperature interval.

Several of the solubility values appear to be inaccurate. The most likely inaccurate values are the 293.15 K value of Just, and either the 273.65 or the 312.95 K value of Maxted and Moon. Linear regressions were made of several combinations of the data. Thermodynamic values of changes in enthalpy and entropy were consistent with other hydrogen + solvent systems when the 293.15 K value of Just and the 273.65 K value of Maxted and Moon were omitted.

The tentative equation for use between 273.15 and 313.15 K is

 $\ln x_1 = -5.8144 - 6.4228/(T/100K)$

with a standard error about the regression line of 3.77 x 10^{-6} .

The temperature independent changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at a pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \mod^{-1} 5.34$ and $\Delta \overline{S}_1^{\circ}/J K^{-1} \mod^{-1} -48.3$.

The smoothed solubility data and partial molal Gibbs energy of solution are in Table 1 . The solubility of hydrogen in ethyl acetate Table 1. at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature. Mol Fraction $\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{-1}$ т/к $10^4 x_1$ 273.15 2.84 18.545 278.15 2.96 18.787 283.15 3.09 19.028 19.270 288.15 3.21 293.15 3.34 19.512 298.15 3.46 19.754 303.15 3.59 19.995 308.15 3.71 20.237 313.15 3.84 20.479 Hydrogen + Acetic acid, 2-methyl propyl ester or isobutyl acetate [110-19-0] Hydrogen + Acetic acid, pentyl ester or amyl acetate [628-63-7] Only Just (1) has reported solubility measurements on the above systems. His solubility values at 293.15 and 298.15 K are classed as tentative. References: 1. Just, G. Z. Phys. Chem. 1901, 37, 342. 2. Horiuti, J. Sci. Pap. Inst. Phys. Chem. Res. (Jpn.) 1931/32, 17, 125. з. Maxted, E. B.; Moon, C. H. Trans. Faraday Soc. 1936, 32, 769.

COMPONENTS:			
	ORIGINAL MEASUREMENTS: Horiuti, J.		
(1) Hydrogen; H ₂ ; [1333-74-0]	HOTIUTI, J.		
(2) Acetic acid methyl ester or methyl acetate; C ₃ H ₆ O ₂ ; [79-20-9]	Sci. pap. Inst. Phys. Chem. Res. (Jpn) <u>1931/32</u> , 17, 125 - 256.		
VARIABLES: T/K: 194.65 - 313.15	PREPARED BY: M. E. Derrick		
P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
$\frac{\text{T/K Mol Fraction}}{x_1 \times 10^4}$	Bunsen Ostwald Coefficient Coefficient		
	$\frac{\alpha \times 10^2}{10^2} \qquad \frac{L \times 10^2}{10^2}$		
194.65 1.09 212.85 1.39	3.49 2.49 4.34 3.38		
233.05 1.72	5.24 4.47		
253.05 2.09	6.24 5.78		
273.15 2.52 294.05 2.93	7.30 7.30 8.28 8.91		
313.15 3.333	9.168 10.51		
The mole fraction and Bunsen coeffici compiler.	ent values were calculated by the		
Smoothed Data: $\ln x_1 = -6.1832 - 5.7$	501/(T/100K)		
	the regression line = 3.00×10^{-6}		
T/K Mol Fraction	T/K Mol Fraction		
$x_1 \times 10^4$	$x_1 \times 10^4$		
193.15 1.05 203.15 1.22	263.15 2.32 273.15 2.51		
213.15 1.39	283.15 2.71		
223.15 1.57	293.15 2.90		
233.15 1.75	298.15 3.00		
243.15 1.94 253.15 2.13	303.15 3.10 313.15 3.29		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus consists of a gas buret a solvent reservoir, and an absorp- tion pipet. The volume of the pipet	<pre>(1) Hydrogen. Prepared by electrolysis.</pre>		
is determined at various meniscus	(2) Acetic acid, methyl ester.		
heights by weighing a quantity of	Merck. Extra pure grade treated		
water. The meniscus height is read	with phosphorous pentoxide		
with a cathetometer.	several times and distilled several times. Boiling point,		
The dry gas is introduced into the	$57.12^{\circ}C$ (760 mmHg).		
degassed solvent. The gas and solvent are mixed with a magnetic	5/*12 C (/00 mm/g/*		
stirrer until saturation. Care is			
taken to prevent solvent vapor from	ESTIMATED ERROR:		
mixing with the solute gas in the			
gas buret. The volume of gas is determined from the gas buret	$\delta T/K = 0.05$ $\delta x_1/x_1 = 0.015$		
readings, the volume of solvent is	······································		
determined from the meniscus height			
in the absorption pipet.	REFERENCES :		

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COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.		
<pre>(2) Acetic acid ethyl ester or ethyl acetate; C4H802; [141-78-6]</pre>	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.		
VARIABLES:	PREPARED BY:		
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $x_1 \times 10^4$ C	BunsenOstwaldpefficientCoefficient $\alpha \times 10^2$ L x 10^2		
293.15 3.20 298.15 3.43	7.340 7.877 7.802 8.516		
Bunsen coefficient values partial pressure of the g			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the degassed liquid. The gas volume	 (1) Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. (2) Acetic Acid ethyl ester. No information. 		
absorbed is determined by the gas buret. The solvent volume is deter- mined at the end of the experiment			
by pouring the solvent into a gradu- ated flask.	ESTIMATED ERROR:		
	$\delta L/L = 0.03$ (compiler)		
	<pre>REFERENCES: 1. Timofejew, W. Z. Physik. Chem. <u>1890</u>, 6, 141. 2. Steiner, Ann. Phys. (Leipzig) <u>1894</u>, 52, 275.</pre>		

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H_2 ; [1333-74-0]	Maxted, E.B.; Moon, C.H.;		
2. Acetic acid, ethyl ester (Ethyl Acetate); C ₄ H ₀ O ₂ ; [141-78-6]	Trans. Faraday Soc. <u>1936</u> , 32,769-75		
VARIABLES:	PREPARED BY:		
Temperature	C.L. Young		
EXPERIMENTAL VALUES:			
T/K Bunsen coefficier α	Mole fraction of ht, hydrogen, $x_{\rm H_2}$		
273.65 0.0708	0.000301		
283.15 0.0724	0.000312		
294.15 0.0761 303.15 0.0808	0.000333		
303.15 0.0808 312.95 0.0863	0.000358 0.000387		
AUXILIARY	INFORMATION		
METHOD:/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric apparatus with rocking	1. Electrolytic grade.		
absorption cell. Details in source.			
	 Degassed, high purity sample, no other details given. 		
	ESTIMATED ERROR: $\delta T/K = \pm 0.2; \ \delta x_{H_2} = \pm 1$ %. (estimated by compiler.)		

COMPONENTS :			OPTOTNAL 10	EASUREMENTS:	
				end okenen 19 :	
	-		Just, G.		
or isobu	cid 2-methylp tyl acetate;	ropyl ester C ₆ H ₁₁ O ₂ ;	Z. Phys.	Chem. <u>1901</u> , 37,	342 - 367.
[110-19-	0]				
VARIABLES:			PREPARED B	Y•	
	293.15 - 298	15	TREFACED D	M. E. Derrick	
	101.325 (1 a			H. L. Clever	
EXPERIMENTAL VA	LUES:				-
	T/K Mol	Fraction	Bunsen	Ostwald	
	x	1 × 10 ⁴ Co	pefficient	: Coefficient L x 10 ²	
	<u></u>		α x 10 ²	L X 10-	
	293.15 298.15	5.13 5.33	8.653 8.940	9.287 9.758	
	the Ostwald pressure, an Bunsen coeff	coefficient d calculated	to be inde the mole s at 101.3	ompiler assumed pendent of fraction and 25 kPa (l atm)	- -
		AUXILIARY	INFORMATION		
METHOD/APPARATU	-			PURITY OF MATERIAL	
Timofejew (1 used. The ap gas buret, an a mercury man	oparatus as m), and Steine oparatus cons absorption nometer. The with a water	r (2) is ists of a flask, and system is	amalg (II) (2) Aceti	ion of water wi am accelerated chloride. c acid 2-methyl	th aluminum with mercury
The gas is introduced into the de- gassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is deter- mined at the end of the experiment by pouring the solvent into a graduated flask.			NO IN ESTIMATED	formation. ERROR:	
				$\delta L/L = 0.03$ (co	ompiler)
			2. Stein	ejew, W. ysik. Chem. <u>189</u>	_
			Ann.		<u>1894</u> , 52

	ORIGINAL MEASUREMENTS:			
COMPONENTS: (1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.			
<pre>(2) Acetic acid pentyl ester or amyl acetate; C₇H₁₄O₂; [628-63-7]</pre>	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.			
VARIABLES:	PREPARED BY:			
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever			
EXPERIMENTAL VALUES:				
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald oefficient Coefficient $\alpha \times 10^2$ L x 10^2			
293.15 4.60 298.15 4.73	6.925 7.432 7.089 7.738			
pressure of about 746 mm the Ostwald coefficient t pressure, and calculated Bunsen coefficient values partial pressure of the g	o be independent of the mole fraction and at 101.325 kPa (1 atm)			
AUXILIARY	INFORMATION			
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is				
used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the degassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is determined at the ord of the experi-	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. Acetic acid pentyl ester. No information. 			
gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the degassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is determined at the end of the experi- ment by pouring the solvent into a	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. Acetic acid pentyl ester. No 			
gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket. The gas is introduced into the degassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is determined at the end of the experi-	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. Acetic acid pentyl ester. No information. 			

COMPONENTS:	EVALUATOR:
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Halocarbons</pre>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1980, September

CRITICAL EVALUATION:

An Evaluation of the Mole Fraction Solubility of Hydrogen in Halocarbons at a Hydrogen Partial Pressure of 101.325 kPa (1 atm).

Most of the solubility measurements evaluated in this section were made at a total pressure near 101.325 kPa. Mole fraction solubility values were calculated at a hydrogen partial pressure of 101.325 kPa with at least two of the following three assumptions. The gas is ideal, Henry's law is obeyed, and the Ostwald coefficient is independent of pressure. The assumptions introduce errors that are probably less than the experimental error of the solubility measurement.

Hydrogen + Hexadecafluoroheptane or Perfluoroheptane [335-57-9]

Gjaldbaek (1) reported four solubility measurements between the temperatures of 297.88 and 321.90 K. Cook, Hanson, and Alder (2) reported a total 14 measurements at six temperatures between 248.15 and 323.15 K.

Both sets of data are classed as tentative. The two data sets accord well except for Gjaldbaek's values near 321 K which are 8 per cent greater than the smoothed curve through the Cook $et \ al$. data.

The tentative equation for the 248.15 K to 323.15 K temperature interval was obtained by a linear regression of all of the data of Cook $et \ al$. and the two values near 298 K of Gjaldbaek.

$$\ln x_1 = -4.7741 - 5.3211/(T/100K)$$

with a standard error about the regression line of 1.98 x 10^{-5} .

The temperature independent values of the changes in enthalpy and entropy for the transfer of one mole of hydrogen in the gas at 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \mod^{-1}$ 4.42 and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \mod^{-1}$ -39.7.

The smoothed values of solubility and the partial molal Gibbs energy are given in Table 1. A three constant equation would reproduce the experimental data more closely, but it does not appear justified because of the two solubility measurements between 321 and 322 K that were not used in the linear regression. The evaluator has preferred the data of Cook *et al*. because it has generally proven to be reliable.

> Table 1. The solubility of hydrogen in perfluoroheptane at a hydrogen partial pressure of 101.325 kPa. The tentative mole fraction solubility and the partial molal Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $10^4 x_1$	∆G ₁ /kJ mol ⁻¹
248.15	9.89	14.274
258.15	10.75	14.671
268.15	11.61	15.068
278.15	12.47	15.465
288.15	13.32	15.862
293.15	13.75	16.060
298.15	14.18	16.259
303.15	14.60	16.457
313.15	15.44	16.854
323.15	16.27	17.251

Hydrogen + Tetrachloromethane [56-23-5]

The solubility of hydrogen in tetrachloromethane has been measured at two laboratories. Horiuti (3) made four measurements between 273.15 and 332.15 K. Cook, Hanson, and Alder (2) made three solubility measurements between the temperatures of 273.15 and 308.15 K. The work of both laboratories is generally reliable and both data sets are classed as tentative. The poorest agreement between the two data sets is at 273.15 K where the experimental values differ by 5.4 per cent with Horiuti's measurement the greater value.

When the two data sets are smoothed by a Gibbs energy equation linear in temperature the two laboratories have the same value of solubility at about 283 K. Above 283 K the Horiuti values are greater by about 2.7 per cent.

A linear regression of all of the data from both laboratories showed the 273.15 K solubility of Horiuti to deviate the most from the regression line. Although the deviation was less than 2 standard deviations an arbitrary decision was made to reject the value. A second linear regression of the remaining six values gave the tentative equation for use over the 273.15 to 333.15 K range.

$$\ln x_1 = -5.6661 - 7.0762/(T/100K)$$

with a standard error about the regression line of 3.95×10^{-6} .

The temperature independent values for the changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at a pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \mod^{-1} 5.88 \text{ and } \Delta \overline{S}_{1}^{\circ}/J \text{ K}^{-1} \mod^{-1} -47.1.$

Smoothed values of the solubility and partial molal Gibbs energy of solution are in Table 2.

Table 2. The solubility of hydrogen in tetrachloromethane at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction ¹ 10 ⁴ x ₁	∆G ₁ ∕kJ mol ⁻¹
273.15	2.595	18.751
283.15	2.845	19.223
293.15	3.095	19.694
298.15	.3.225	19.929
303.15	3.355	20.165
313.15	3.615	20.636
323.15	3.875	21.107
333.15	4.140	21.578

¹ Mole fractions rounded to nearest 0.005 x 10^{-4} .

Hydrogen + Trichloromethane [67-66-3]

Only Maxted and Moon (4) have measured the solubility of hydrogen in trichloromethane. Their values are classed as tentative. A linear regression of the four solubility values gives the tentative equation for use over the temperature range of 273.15 to 298.15 K of

 $\ln x_1 = -7.1710 - 3.7486/(T/100K)$

with a standard error about the regression line of 3.57×10^{-6} .

The temperature independent values of the changes in enthalpy and entropy on transfer of one mole of hydrogen from the gas phase at 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \mod^{-1}$ 3.12 and $\Delta \overline{S}_1^{\circ}/J \times^{-1} \mod^{-1}$ -59.6.

Smoothed values of the solubility and the partial molal Gibbs energy of solution are in Table 3.

Table 3. The solubility of hydrogen in trichloromethane at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G _l ⁄kJ mol ⁻¹
273.15 278.15 283.15 288.15 293.15 298.15	1.97 1.99 2.02 2.07 2.13 2.20	19.374 19.708 20.025 20.324 20.606 20.872

Hydrogen + 1,2-Dichloroethane [107-06-2]

Only Waters, Mortimer, and Clements (5) have measured the solubility of hydrogen in 1,2-dichloroethane. Their four solubility values, classed as tentative, were put through a linear regression to obtain the equation for use over the 263.15 to 298.15 K temperature range.

 $\ln x_1 = -5.5837 - 9.1168/(T/100K)$

with a standard error about the regression line of 1.89×10^{-6} .

The temperature independent values of the changes of enthalpy and entropy for the transfer of one mole hydrogen from the gas phase at a partial pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}^{\circ}_{1}/kJ \mod^{-1}$ 7.58 and $\Delta \overline{S}^{\circ}_{1}/J K^{-1} \mod^{-1}$ -46.4.

The smoothed values of solubility and the partial molal Gibbs energy of solution are in Table 4.

Table 4. The solubility of hydrogen in 1,2-dichloroethane at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G _l ⁄kJ mol ⁻¹
263.15	1.18	19.797
273.15	1.335	20.261
283.15	1.50	20.725
288.15	1.59	20.957
293.15	1.68	21.189
298.15	1.77	21.422

Hydrogen + 1,1,2,2-Tetrachloroethane [79-34-5]

Only deWet (6) has measured the solubility of hydrogen in 1,1,2,2tetrachloroethane. A linear regression applied to his three tentative solubility values gives the equation for the 288.15 to 308.15 K temperature interval of

 $\ln x_1 = -6.5798 - 3.6640/(T/100K)$

with a standard error about the regression line of 3.51×10^{-6} .

The values of the temperature independent changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas phase at a partial pressure of 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \mod^{-1} 3.05$ and $\Delta \overline{S}_1^{\circ}/J K^{-1} \mod^{-1} -54.7$.

The smoothed solubility values and partial molal Gibbs energy of solution are in Table 5.

Table 5. The solubility of hydrogen in 1,1,2,2-tetrachloroethane at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction	∆G ₁ ⁄kJ mol ⁻¹
288.15	3.89	18.810
293.15	3.98	19.084
298.15	4.06	19.357
303.15	4.14	19.631
308.15	4.23	19.904

Hydrogen + 1-Chlorohexane [544-10-5]

Guerry (7) has measured the solubility of hydrogen in 1-chlorohexane at the temperatures of 293.15 and 298.15 K. The values are classed as tentative.

Hydrogen + Chlorobenzene [108-90-7]

Horiuti (3) measured the solubility of hydrogen in chlorobenzene at seven temperatures between 232.25 and 353.95 K. His values of solubility are the only ones for the system and they are classed as tentative.

A graph of the data of Horiuti as $\ln x_1 vs. 1/T$ shows a systematic deviation from linearity. Linear regressions for a two constant and a three constant equation show a four fold improvement in the standard error. Thus, the tentative equation for use over the 233.15 to 353.15 K temperature range is the three constant equation

 $\ln x_1 = -10.0240 - 0.7256/(T/100K) + 1.8288 \ln (T/100K)$

with a standard error about the regression line of 1.44×10^{-6} .

The three constant equation gives temperature dependent values of the changes of enthalpy and entropy for the transfer of one mole of hydrogen from the gas phase at 101.325 kPa partial pressure to the infinitely dilute solution. Values of the thermodynamic changes at several temperatures are given in Table 6.

•

Table 6	of hyd	dynamic change rogen in chlos perature.				
Τ/Κ Δ	.₩°/kJ mol	-1 ∆5 <u>°</u> ∕J K ⁻¹	mol ⁻¹ ∆C° p ₁	/J K ⁻¹	mol ⁻¹	
233.15 273.15 298.15 323.15	4.15 4.76 5.14 5.52	-55.3 -52.9 -51.5 -50.3		15.2 15.2 15.2 15.2		
353.15	5.97	-49.0		15.2		
Smoothed values solution are in Table 7.	Table 7.	olubility and ubility of hyd				of
	at a pa: 101.325 fraction	rtial pressure kPa. Tentati n solubility a of solution as ture.	e of hydroge ve values o and partial n a function	n of f the r molal (of	nole	
	T/K	Mol Fraction $10^4 x_1$	$\Delta \overline{G}_1^{\circ}/kJ \text{ mol}^{\circ}$	-1		
·	233.15 243.15 253.15	1.53 1.67 1.82	17.034 17.583 18.126			
	263.15 273.15	1.97 2.13	18.663 19.195			
	283.15 288.15 293.15	2.30 2.39 2.47	19.721 19.982 20.241			
	298.15 303.15	2.56 2.65	20.499 20.756			
	313.15 323.15 333.15	2.84 3.02 3.22	21.267 21.772 22.273			
	343.15 353.15	3.42 3.63	22.275 22.769 23.261			
Hydrogen + 1,1, or Fre	2-Trichlor eon 113 [7	co-1,2,2-trifl 6-13-1]	uoroethane			
Linford and Hild temperatures bet tentative. A 1: over the tempera	ween 276. Lnear regr	85 and 301.75 ession of the	K. The dat data gives	a are the eq	classed a	S
	$\ln x_1 =$	-5.3371 - 5.93	346/(T/100K)			
with a standard	error abo	ut the regres	sion line of	2.88	x 10 ⁻⁶ .	
The temperature on transfer of c pressure of 101.	one mole o	f hydrogen fro	om the gas p	hase a	t a parti	entropy al
∆ <mark>H</mark> °∕kJ	mol ⁻¹ 4	.93 and $\Delta \overline{S}_{1}^{\circ}$	/J K ⁻¹ mol ⁻¹	-44.	4.	
There is a table sheet.	of smoot	hed mole fract	ion solubil	ity va	lues on th	ne data
The suthers -las			a. 6. Jan 1		•	

The authors also report the solubility of hydrogen in several mixtures of benzene + 1,1,2-trichloro-1,2,2-trifluoroethane.

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Hydrogen + 1-Bromoheptane [629-04-9]
Ijams (9) measured one value of the solubility at a temperature of
298.15 K. The value is classed as tentative.
References:
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1931/32, 17, 125.
з.
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6.
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7.
   Nashville, TN, 1944.
8. Linford, R. G.; Hildebrand, J. H. Trans. Faraday Soc. 1970, 66, 577.
    Ijams, C. C. Ph.D. thesis, Vanderbilt University,
9.
   Nashville, TN, 1941.
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COMPONENTS:	·····		ORTCI	INAL MEASUREMENTS	•
(1) Hydrogen; H ₂	: []333-74-0	1		k, M. W.; Hans	
(2) Hexadecafluo				Alder, B. J.	
fluoroheptan		1	J. (Chem. Phys. <u>19</u>	<u>57</u> , <i>26</i> , 748-751.
[335-57-9]					
VARIABLES:			PREP	ARED BY:	· ····································
	.15 - 323.15 .325 (l atm)			P. L.	Long Clever
P/KPa: 101	.325 (I atm)			п. ц.	Ciever
EXPERIMENTAL VALUES:					
	olubility	Mol Frac		Bunsen	Ostwald
mo	$1 g^{-1} \times 10^{6}$	<i>x</i> 1 × 1	o ⁴	$\frac{\alpha \times 10^2}{\alpha \times 10^2}$	Coefficient
248.15	2.589	10.0	37	10.45	9.49
273.15	3.077	11.9	27	12.15	12.15
285.25	3.333				
	<u>3.334</u> 3.333 ₅ av.	12.9	22	13.03	13.60
298.15	3.613 3.616				
	3.615				
	$\frac{3.614}{3.614}$ av.	14.0	07	13.96	15.24
308.15	3.853	14.0	07	10.00	10.14
5000125	3.849				
	3.849 3.850				
	3.850 ₃ av.	14.93	20	14.74	16.63
323.15	4.29				
	$\frac{4.30}{4.29}$ av.	16.64	4 ²	16.21	19.18
¹ Data from (1).					<u></u>
² Mole fraction v	alue calculat	ed by the		miler.	
The Bunsen and O					the compiler.
		AUXILIARY			•
Mummor Line		AUXILIARI		-	
METHOD/APPARATUS/PRO]	CE AND PURITY OF	
The apparatus, de for the determination	ation of the	solubil-	(1)		theson Co. Mass c analysis showed
ity of hydrogen of a gas bulb, a	in liquids, c	consists		gas 99.75 per	
bulb, and a manor	meter system.	All	(2)	Impurity most	bheptane. Source
are attached to the assembly is	a mounting pl	ate, and	1	not given. Di	istilled, center
The solvent is de				portion used,	b.p. 355.65K. properties given
ent bulb by heat	and evacuati	on. The		in reference (
gas is placed in temperature equi			ESTI	MATED ERROR:	
the gas is contac	cted with the	de-		$\delta x_1/x_1 = 0.00$)l (authors)
gassed solvent. until solubility	The system i	s shaken is	REFE	RENCES:	
	ry is used as		1. C	look, M. W.	California Radiatio
The solubility is	s calculated	from the	I	ab, Report UCI	RL-2459, <u>1954</u> .
initial and final	l quantities	of gas,	2. 0	look, M. W.; Ha	anson, D. N.
the pressure meas pressure of the s solvent volume.	solvent, and	the	ĥ	ev. 501. Instr	. <u>1957</u> , 28, 370.
	$\ln x_{1} = -12.1$	850 + 4.9	152/	(T/100K) + 3.6	328 ln (T/100)
	Standard erro	r about t	he r	egression line	$e = 9.85 \times 10^{-6}$
See the hydrogen	+ hexadecaf1	uorohepta	ine e	valuation for	the recommended

COMPONENTS:			ORIGINAL MEASURE	MENTS .	
(1) Hydrogen; H ₂ ; [1333-74-0]			Gjaldbaek, J. C.		
<pre>(2) Hexadecafluoroheptane or Perfluoroheptane; C₇F₁₆; [335-57-9]</pre>		Gjaldbaek, J. C. Acta. Chem. Scand. <u>1952</u> , 6, 623-633.			
VARIABLES:	<u> </u>	<u> </u>	PREPARED BY:		
T/K: 297.88 - 321.90 P/kPa: 101.325 (1 atm)			J. Chr. Gjaldbaek		
EXPERIMENTAL VALUES	S:				
	т/к	Mol Fraction	Bunsen Coefficient 10 ^{2 a}	Ostwald Coefficient 10 L	
	297.88 297.95		14.1 14.0	15.4 15.3	
	321.45 321.90		16.6 16.6	19.5 19.6	
The Ostwald and compiler at 101 obeyed.	mole frac .325 kPa	ction solubil: (l atm) hydro	ity values were ogen pressure a	e calculated by the assuming Henry's law is	
Smoothed Data:	$\ln x_1 =$	-3.8039 - 8.3	2063/(T/100K)		
		AUXILIARY	INFORMATION		
	IOCEDURE -	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PR A calibrated all ometer and bulb air thermostat a equilibrium. Me calibration and liquid. The sol in the apparatus reference 1.	l-glass co was enclo and shaken ercury was as the co lvents wer	ombined man- osed in an until used for onfining re degassed	SOURCE AND PURIT (1) Hydrogen. Freed fro 99.5 per N ₂ . (2) Hexadecaf	Y OF MATERIALS: Source not given. om oxygen and dried. cent H ₂ , 0.5 per cent Eluoroheptane. Sample d in earlier paper (2).	
A calibrated all ometer and bulb air thermostat a equilibrium. Me calibration and liquid. The sol in the apparatus reference 1. The absorped vol calculated from amounts, both sa	l-glass co was enclo and shaken ercury was as the co lvents wer s. Detail lume of ga the initi aturated w unt of sol	ombined man- osed in an a until s used for onfining re degassed .s are in as is al and final with solvent .vent is	SOURCE AND PURIT (1) Hydrogen. Freed fro 99.5 per N ₂ . (2) Hexadecaf described	Source not given. om oxygen and dried. cent H ₂ , 0.5 per cent fluoroheptane. Sample d in earlier paper (2).	

COMPONENTS :		ORIGINAL MEAS	UREMENTS:		
(1) Hydrogen; H ₂ ; [13	33-74-0]	Horiuti, J.			
(2) Tetrachloromethan tetrachloride; CC	e or carbon	Sci. pap. Inst. Phys. Chem. Res. (Jpn) <u>1931/32</u> ,17, 125-256.			
VARIABLES:	<u></u>	PREPARED BY:			
T/K: 273.15 - P/kPa: 101.325			M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:		I			
T/K	Mol Fraction $x_1 \times 10^4$ C	Bunsen coefficient α x 10 ²	Ostwald Coefficient L x 10 ²		
273.15 294.05 311.95 332.15	2.73 3.18 3.58 4.128	6.50 7.38 8.13 9.243	6.50 7.94 9.28 11.24		
The mole fraction and	Bunsen cooffici	onts wore a	alculated by the compiler.		
			arcaracca by the compress.		
+	= -5.9012 -6.31		-6		
Stand	ard error about	the regress	ion line = 4.10×10^{-6}		
See the hydrogen + te equation.	trachloromethane	evaluation	for the recommended		
		INFORMATION	······		
		INFORMATION			
METHOD/APPARATUS/PROCEDURE: The apparatus consist:			RITY OF MATERIALS:		
a solvent reservoir, a	and an absorp-		en. Preudreu Dy		
tion pipet. The volume is determined at variation	ne or rne piper	erectro	olysis.		
heights by weighing a	ous meniscus	(2) Tetracl	blysis. bloromethane. Kahlbaum.		
Water. The meniscus h	ous meniscus quantity of	(2) Tetracl Dried,	olysis. hloromethane. Kahlbaum. and distilled.		
water. The meniscus h with a cathetometer.	ous meniscus quantity of	(2) Tetracl Dried,	blysis. bloromethane. Kahlbaum.		
With a cathetometer. The dry gas is introdu degassed solvent. The solvent are mixed with	ous meniscus quantity of height is read nced into the e gas and n a magnetic	(2) Tetracl Dried,	olysis. hloromethane. Kahlbaum. and distilled.		
with a cathetometer. The dry gas is introdu degassed solvent. The solvent are mixed with stirrer until saturati taken to prevent solve	ous meniscus quantity of height is read acced into the e gas and a magnetic ion. Care is ent vapor from	(2) Tetracl Dried, Boiling	olysis. Moromethane. Kahlbaum. and distilled. g point 76.74 ⁰ C (760 mmHg).		
With a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted	ous meniscus quantity of height is read a ced into the e gas and a magnetic ion. Care is ent vapor from e gas in the	(2) Tetracl Dried,	olysis. nloromethane. Kahlbaum. and distilled. g point 76.74 ⁰ C (760 mmHg). ROR:		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas	ous meniscus quantity of height is read a ced into the e gas and a magnetic ton. Care is ent vapor from e gas in the e of gas is as buret	(2) Tetracl Dried, Boiling	olysis. Moromethane. Kahlbaum. and distilled. g point 76.74 ⁰ C (760 mmHg).		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas readings, the volume of determined from the magnetic determined fr	ous meniscus quantity of height is read a ced into the a gas and a magnetic ton. Care is ent vapor from a gas in the e of gas is as buret of solvent is eniscus height	(2) Tetracl Dried, Boiling ESTIMATED ER	blysis. hloromethane. Kahlbaum. and distilled. g point 76.74 ^o C (760 mmHg). ROR: $\delta T/K = 0.05$		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas readings, the volume of	ous meniscus quantity of height is read a ced into the a gas and a magnetic ton. Care is ent vapor from a gas in the e of gas is as buret of solvent is eniscus height	(2) Tetracl Dried, Boiling	blysis. hloromethane. Kahlbaum. and distilled. g point 76.74 ^o C (760 mmHg). ROR: $\delta T/K = 0.05$		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas readings, the volume of determined from the magnetic determined fr	ous meniscus quantity of height is read a ced into the a gas and a magnetic ton. Care is ent vapor from a gas in the e of gas is as buret of solvent is eniscus height	(2) Tetracl Dried, Boiling ESTIMATED ER	blysis. hloromethane. Kahlbaum. and distilled. g point 76.74 ^o C (760 mmHg). ROR: $\delta T/K = 0.05$		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas readings, the volume of determined from the magnetic determined fr	ous meniscus quantity of height is read a ced into the a gas and a magnetic ton. Care is ent vapor from a gas in the e of gas is as buret of solvent is eniscus height	(2) Tetracl Dried, Boiling ESTIMATED ER	blysis. hloromethane. Kahlbaum. and distilled. g point 76.74 ^o C (760 mmHg). ROR: $\delta T/K = 0.05$		
with a cathetometer. The dry gas is introduced degassed solvent. The solvent are mixed with stirrer until saturation taken to prevent solved mixing with the soluted gas buret. The volume determined from the gas readings, the volume of determined from the meters.	ous meniscus quantity of height is read a ced into the a gas and a magnetic ton. Care is ent vapor from a gas in the e of gas is as buret of solvent is eniscus height	(2) Tetracl Dried, Boiling ESTIMATED ER	blysis. hloromethane. Kahlbaum. and distilled. g point 76.74 ^o C (760 mmHg). ROR: $\delta T/K = 0.05$		

COMPONENTS :			ORICI	NAL MEASUREMENTS	•	
	H ₂ ; [1333-74-0]	1	Cook, M. W.; Hanson, D. N.;			
	2		Alder, B. J.			
<pre>(2) Tetrachloromethane or carbon tetrachloride; CCl₄; [56-23-5]</pre>		J. Chem. Phys. <u>1957</u> , 26, 748 - 751.				
			ļ			
VARIABLES:			PREPA	ARED BY:		
	273.15 - 308.15 101.325 (1 atm)			P. L. H. L.		
EXPERIMENTAL VAL	JES:	······		<u> </u>		
т/к	Solubility ¹ mol g ⁻¹ x 10^6	Mol Frac x ₁ × 1		Bunsen Coefficient a x 10 ²	Ostwald Coefficient _L x 10 ²	-
273.15	1.688	2.58	9	6.16	6.16	
298.15		3.19	3	7.37	8.05	
308.15	2.245	3.44		7.86	8.87	
¹ Data from (1).					-
•	d Ostwald coeff:	icients w	ere c	alculated by	the compiler.	
Smoothed Data	$: \ln x_1 = -5.7$	435 - 6.8	721/((T/100K)		
	+			egression line	-416×10^{-10}	•7
equation.						
					······	
		AUXILIARY	INFOR	MATION		
METHOD/APPARATUS	/PROCEDURE:		1	CE AND PURITY OF		
for the deter ity of hydrog of a gas bulb bulb, and a m are attached the assembly	, designed espec mination of the en in liquids, o , a gas buret, a anometer system to a mounting pl is shaken in an s degassed in th	solubil- consists a solvent All late, and air bath.	(2)	Adamson Reagen center portion	c analysis sho cent pure. ly N ₂ . thane. Baker nt Grade. Dis n used, b.p. 3	and tilled, 49.95K.
ent bulb by h The gas is pl after tempera reached, the the degassed	eat and evacuati aced in the gas ture equilibrium gas is contacted solvent. The sy	ion. bulb, n is 1 with ystem is	ESTI	Other solvent in reference MATED ERROR:		.ven
is attained. displacement		l as the		$\delta x_1 / x_1 = 0$	0.001 (authors)
initial and f the pressure :	y is calculated inal quantities measurements, th he solvent, and e.	of gas, ne vapor	REFE 1. C U L	RENCES: cook, M. W. niversity of (ab, Report UC)	RL-2459, <u>1954</u> .	
			2. C <i>R</i>	cook, M. W.; Ha ev. Sci. Insti	anson, D. N. 2. <u>1957</u> , 28, 3	70.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	Maxted, E.B., Moon, C.H.	
2. Trichloromethane (Chloroform); CHCl ₃ ; [67-66-3]	Trans. Faraday Soc. <u>1936</u> ,32,769-75.	
VARIABLES: Temperature	PREPARED BY: C.L. Young	
	l	
EXPERIMENTAL VALUES:		
T/K Bunsen	Mole fraction of	
coefficier	nt, hydrogen, x _{H2}	
α		
274.15 0.0563 283.15 0.0576	0.000197 0.000204	
291.85 0.0584	0.000209	
298.45 0.0614	0.000222	
Partial pressure of hydroge	en = 1 atm = 101.325 kPa.	
AUXILIARY INFORMATION		
METHOD:/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric apparatus with rocking	1. Electrolytic grade.	
absorption cell. Details in source.	2. Degassed, high purity sample, no	
	other details given.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.2; \delta x_{H_2} = \pm 1 \text{ s.}$	
	(estimated by compiler).	
	REFERENCES :	
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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) 1,2-Dichloroethane; C₂H₄Cl₂; [107-06-2]</pre>	Waters, J. A.; Mortimer, G. A.; Clements, H. E. J. Chem. Eng. Data <u>1970</u> , 15, 174 - 176 and 462 (correction).	
VARIABLES:	PREPARED BY:	
T/K; 263.15 - 298.15 H ₂ P/KPa: 101.325 (1 atm)	P. L. Long H. L. Clever	
EXPERIMENTAL VALUES:		
$\begin{array}{c c} \hline \text{Temperature} & c_{\text{H}_2}/\text{mol dm}^{-3} \text{ atm}^{-1} & \text{M} \\ \hline t/^{\circ}\text{C} & T/\text{K} & x \text{ 10}^{3} \\ \hline \end{array}$	ol Fraction Bunsen Ostwald $x_1 \times 10^4$ Coefficient Coefficient α L	
-10 263.15 1.557 0 273.15 1.739 10 283.15 1.890 25 298.15 2.239	1.18 0.0349 0.0336 1.34 0.0390 0.0390 1.48 0.0425 0.0441 1.78 0.0502 0.0548	
The mole fraction and Ostwald coefficient values were calculated from the authors data by the compiler.		
The authors also reported the vapor p	ressure of the solvent.	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The authors reported two methods of solubility measurement. The hydrogen solubilities were measured by their method A. The apparatus consisted of two glass bulbs connected by ½" stainless steel tubing fitted with Hoke valves and a strain gage. The strain gage signal was measured by a potentiometer. The bulbs were immersed in an oil bath. The temperature was measured with a	 Hydrogen. Air Reduction Co. Minimum purity 99.50 per cent. 1,2-Dichloroethane. Monsanto Co. Purity 99.95 per cent. 	
Pt resistance thermometer and Mueller bridge. The solvent was degassed three times at liquid N_2 temperature. The solvent	$\frac{\delta P/mmHg}{\delta T/K} = 0.1$	
vapor pressure was measured in the apparatus. Gas in the second bulb at a known P and T was allowed into the bulb containing the solvent. The change in P was followed until equilibrium was reached. The gas up- take was calculated using Charles law A correction was made for H ₂ adsorp- tion on the walls.	REFERENCES:	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	de Wet, W. J.
<pre>(2) 1,1,2,2-Tetrachloroethane; C₂Cl₄H₂; [79-34-5]</pre>	J. S. Afr. Chem. Inst. <u>1964</u> , 17, 9 - 13.
VARIABLES:	PREPARED BY:
T/K: 291.45 - 304.85	P. L. Long
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald oefficient Coefficient $\alpha \times 10^2$ L x 10^2
291.45 3.96	8.42 8.98
299.15 4.05 304.85 4.19	8.58 9.40
	8.84 9.87
The mole fraction and Ostwald coeffic: compiler.	ient values were calculated by the
Smoothed Data: $\ln x_1 = -6.5798 - 3.66$	640/(T/100K)
Standard error about	the regression line = 3.51×10^{-6}
T/K I	Mol Fraction
	$x_{1} \times 10^{4}$
288.15	3.89
293.15	3.98
298.15 303.15	4.06 4.15
308.15	4.23
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus is a modification of	(1) Hydrogen. Source not given.
that used by Morrison and Billett (1) and others (2). The degassed solvent	Gas from commercial cylinders purified over activated char-
is saturated with gas as it flows	coal at liquid air temperature.
down a glass helix containing the gas. The amount of solvent passed	Impurities estimated to be less
gas. The amount of solvent passed down the helix was such that 10 to	than 0.3 per cent.
25 cm ³ of gas was absorbed.	(2) 1,1,2,2-Tetrachloroethane.
Degassing. The solvent is placed in	Source not given. Distilled immediately before use.
a large continuously evacuated bulb	- -
until the solvent boils freely with- Out further release of dissolved	ESTIMATED EDDOD.
gases.	ESTIMATED ERROR:
Saturation. The solvent is flowed in a thin film down the glass helix Containing the gas. The volume of	$\delta T/K = 0.05$
gas absorbed is measured on an attached buret system.	REFERENCES:
	 Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; Ibid. 1952, 3819.
	 Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. <u>1957</u>, 61, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Guerry, D. Jr.
<pre>(2) 1-Chlorohexane; C₆H₁₃Cl; [544-10-5]</pre>	Ph.D. thesis, <u>1944</u> Vanderbilt University Nashville, TN
	Thesis Director: L. J. Bircher
VARIABLES:	PREPARED BY:
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $\frac{x_1 \times 10^4}{2}$	Bunsen Ostwald Coefficient Coefficient
293.154.38298.154.46	0.0715 0.0767 0.0724 0.0791
The Ostwald coefficients compiler.	were calculated by the
AUXILIAF	Y INFORMATION
AUXILIA METHOD /APPARATUS / PROCEDURE :	Y INFORMATION
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost complete	
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost complete recovery of the sample. An improved temperature control	
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost complete recovery of the sample. An improved temperature control system was used.	
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Appara- tus manufactured by the Eimer and	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ : [1333-40-7]	Horiuti, J.
(2) Chlorobenzene; C ₆ H ₅ Cl; [108-90-7]	Sai non Inst Phus Cham Ros
(2) childrobenzene; $C_6^{n} 5^{c1}$; [108-90-7]	(Jpn) <u>1931/32</u> , 17, 125 - 256.
	(, , , , , , , , , , , , , , , , , , ,
VARIABLES:	
T/K: 232.25 - 353.95	PREPARED BY: M. E. Derrick
P/kPa: 101.325 (1 atm)	H. L. Clever
EVDEDTMENTAL MATHER.	
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald
	coefficient Coefficient
$x_1 \times 10^4$ C	$\alpha \times 10^2$ L × 10 ²
232.25 1.52	3.56 3.03
252.65 1.80	4.13 3.82
273.15 2.13	4.79 4.79
	5.52 5.95
313.15 2.83 333.45 3.24	6.12 7.02 6.86 8.37
353.95 3.63	7.53 9.76
The mole fraction and Bunsen coeffici	
compiler.	ent varues were carcurated by the
—	7256/(m/1007) + 1.0200 lm (m/1007)
	7256/(T/100K) + 1.8288 ln (T/100K)
Standard error about	the regression line = 1.44×10^{-6}
T/K Mol Fraction	T/K Mol Fraction
$x_1 \times 10^4$	$x_1 \times 10^4$
$\frac{1}{233.15}$ $\frac{1}{1.53}$	298.15 2.56
243.15 1.67	303.15 2.65
253.15 1.82	313.15 2.84
263.15 1.97	323.15 3.02
273.15 2.13	333.15 3.22
283.15 2.30 293.15 2.47	343.15 3.42 353.15 3.63
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
The apparatus consists of a gas buret	SOURCE AND PURITY OF MATERIALS:
a solvent reservoir, and an absorp-	electrolysis.
tion pipet. The volume of the pipet	-
is determined at various meniscus	(2) Chlorobenzene. Kahlbaum.
heights by weighing a quantity of water. The meniscus height is read	Dried, and distilled. Boiling
with a cathetometer.	point 131.96 ⁰ C(760 mmHg).
The dry gas is introduced into the	
degassed solvent. The gas and	1
solvent are mixed with a magnetic	
stirrer until saturation. Care is taken to prevent solvent vapor from	
mixing with the solute gas in the	ESTIMATED ERROR:
gas buret. The volume of gas is	
determined from the gas buret	$\delta T/K = 0.05$ $\delta r/r = 0.01$
readings, the volume of solvent is	$\delta x_1 / x_1 = 0.01$
determined from the meniscus height in the absorption pipet.	DEFEDENCING
~ one apportation brhat.	REFERENCES:
	1

COMPONENTS:	ORIGINAL MEASUREMENTS:
	STOLEN INTO OTHER TO .
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) 1,1,2-Trichloro-1,2,2-trifluoro- ethane or Freon 113; C₂Cl₃F₃; [76-13-1]</pre>	Linford, R. G.; Hildebrand, J. H. <i>Trans. Faraday Soc</i> . <u>1970</u> , 66, 577 - 581.
VARIABLES :	PREPARED BY:
T/K: 276.85 - 301.75 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald Defficient Coefficient $\alpha \times 10^2$ L x 10^2
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	10.9 11.0 11.3 11.7 11.5 12.1 11.6 12.3 12.3 13.4 12.5 13.8 12.6 13.9
The Bunsen and Ostwald coefficients we	and colouisted by the compiler
Smoothed Data: ln x ₁ = -5.3371 - 5.9 Standard error about 4 T/K 1 273.15 278.15 283.15 288.15 293.15 298.15 303.15	$\frac{346}{(T/100K)}$ the regression line = 2.88 x 10 ⁻⁶ Mol Fraction $\frac{x_1 \times 10^4}{5.48}$ 5.48 5.70 5.91 6.13 6.35 6.57 6.79
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The liquid is saturated with the gas at a gas partial pressure of l atm. The apparatus is that described by Dymond and Hildebrand (1). The apparatus uses an all-glass pumping system to spray sligs of degassed solvent into the gas. The amount of gas dissolved is calculated from the initial and final gas pressures.	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Stuart Oxygen Co. Dried. (2) 1,1,2-Trichloro-1,2,2-trifluoro- ethane. Matheson, Coleman and Bell. Spectroquality.
	REFERENCES: 1. Dymond, J.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. <u>1967</u> , 6, 130.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Linford, R. G.; Hildebrand, J. H.
<pre>(2) Benzene; C₆H₆; [71-43-2] (3) 1,1,2-Trichloro-1,2,2-trifluoro- ethane or Freon 113; C₂Cl₃F₃; [76-13-1]</pre>	J. Phys. Chem. <u>1969</u> , 73, 4410-4411.
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm) C_6H_6/x_2 : 0.341, 0.695	PREPARED BY: D. G. T. Thornhill
EXPERIMENTAL VALUES:	
$ \frac{x_2}{298.15} \\ \frac{298.15}{0.000} \\ 0.341 \\ 0.695 \\ 1.000 $ a. Linford, R. G.; <i>Trans. Faraday S</i> b. Cook, H. W.; Har Alder, B. J. J. <u>1957</u> , 26, 748. The hydrogen solubility is almost a li	tion Mol Fraction $ \begin{array}{r} 10^{4} \times x_{1} \\ \hline 6.55^{a} \\ 3.35 \\ 3.96 \\ 2.58^{b} \\ \end{array} $ Hildebrand, J. H. Soc. 1970, 66, 577. hsen, D. N.; Chem. Phys. near function of the benzene mole $0^{-4} - 3.96 \times 10^{-4} x_{2}$ reproduces the
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Saturation of the liquid mixtures with dry gas. The gas solubilities were calculated from the initial and final volumes and pressures of gas. The mole fraction solubilities of gas were corrected to 101.325 kPa (1 atm) Partial pressure by Henry's law. The Dymond-Hildebrand (1) apparatus was used. Each liquid mixture (total volume 250 cm ³) was degassed by a freeze-thaw technique and loaded into the absorption vessel. Dry gas was then added to this vessel from a buret, and the liquid and gas were mixed together by means of a magnetically-operated all-glass pump. The pump allowed a thin film of liquid mixture to be repeatedly exposed to the gas, and thus speeded the attainment of equilibrium (c.a. 30 minutes).	SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Stated to be highest purity commercially obtainable. Dried before use. (2) Benzene. Matheson, Coleman and Bell "Spectroquality". Used as received. (3) 1,1,2-Trichloro-1,2,2-trifluoro- ethane. Matheson, Coleman and Bell "Spectroquality". Used as received. ESTIMATED ERROR: Temperature control was \pm 0.05K (reference 1). $\delta x_1/x_1 = \pm$ 0.01 (evaluator). REFERENCES: 1. Dymond, J. H.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. <u>1967</u> , 6, 130.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Ijams, C. C.
(2) 1-Bromoheptane; C ₇ H ₁₅ Br; [629-04-9]	Ph.D. thesis, <u>1941</u> Vanderbilt University Nashville, TN
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient α L
298.15 3.99	0.0570 0.0622
were calculated by the co	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: A Van Slyke-Neill Manometric Apparatus manufactured by the Eimer and Amend Co. was used. The procedure of Van Slyke (1) for pure liquids was modified so that small solvent sample (2 cm ³) could be used with almost 100 per cent recovery of the solvent. An improved temperature control system was used.	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Air Reduction Co. Purity 99.5 per cent. (2) 1-Bromoheptane. Purified. Vapor pressure and boiling point also reported in the thesis.
	$\delta T/K = 0.05$
	01/K = 0.05
	DEDEDRIVOUS
	REFERENCES: 1. Van Slyke, D. D. <i>J. Biol. Chem.</i> <u>1939</u> , <i>130</i> , 545.

COMPONENTS:	EVALUATOR:
 (1) Hydrogen; H₂; [1333-74-0] (2) Carbon disulfide; CS₂; [75-15-0] 	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA
	1980, September

CRITICAL EVALUATION:

Three laboratories have reported values of the solubility of hydrogen in carbon disulfide. Just (1) reported solubility measurements at 293.15 and 298.15 K which are 40 to 45 per cent smaller than more recent values. The Just data are rejected. Gjaldbaek (2) reported two solubility values near 298 K and Cook, Hanson and Alder (3) reported values at temperatures of 248.15, 273.15, and 298.15 K. The Gjaldbaek and the Cook *et al.* value agree within 2.5 per cent. Both sets of values are classed as tentative, however, the difference is greater than the accuracy claimed for the results of Cook *et al.* The tentative smoothed values are based entirely on a linear regression of the Cook *et al.* data.

The tentative equation for the mole fraction solubility over the 248.15 to 298.15 K temperature range is

$$\ln x_1 = -6.2421 - 7.4625/(T/100K)$$

with a standard error about the regression line of 1.19 x 10^{-6} .

The values of the temperature independent changes in enthalpy and entropy for the transfer of one mole of hydrogen from the gas at 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$ 6.20 and $\Delta \overline{S}_{1}^{\circ}/J K^{-1} \text{ mol}^{-1}$ -51.9.

The smoothed values of the mole fraction solubility and partial molal Gibbs energy of solution are in Table 1.

Table 1. The solubility of hydrogen in carbon disulfide at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $10^4 x_1$	∆G ₁ °/kJ mol ⁻¹
248.15	0.962	19.083
258.15	1.081	19.602
268.15	1.204	20.121
278.15	1.330	20.640
288.15	1.460	21.159
298.15	1.593	21.678

References:

1. Just, G. Z. Phys. Chem. 1901, 37, 342.

2. Gjaldbaek, J. C. Acta Chem. Scand. 1952, 6, 623.

3. Cook, M. W.; Hanson, D. N.; Alder, B. J. J. Chem. Phys. 1957, 26, 748.

COMPONENTS:	ORIGINAL MEASUREMENTS:
	Just, G.
 (1) Hydrogen; H₂; [1333-74-0] (2) Carbon disulfide; CS₂; [75-15-0] 	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.
VARIABLES:	PREPARED BY:
T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction x ₁ x 10 ⁴	BunsenOstwaldDefficientCoefficient $\alpha \ge 10^2$ L $\ge 10^2$
293.15 0.842 298.15 0.931	3.128 3.358 3.438 3.753
The author measured the Ostwald coefficient at a pressure of about 746 mmHg. The compiler assumed the Ostwald coefficient to be independent of pressure, and calculated the mole fraction and Bunsen coefficient values at 101.325 kPa (1 atm) partial pressure of the gas.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket.	 Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. (2) Carbon disulfide. No information.
The gas is introduced into the de- gassed liquid. The gas volume absorb- ed is determined by the gas buret. The solvent volume is determined at the end of the experiment by pouring the solvent into a graduated flask.	ESTIMATED ERROR:
	$\delta L/L = 0.03$ (compiler)

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Gjaldbaek, J. C.
(2) Carbon disulfide; CS ₂ ; [75-15-0]	Acta Chem. Scand. <u>1952</u> , 6, 623-633.
VARIABLES:	PREPARED BY:
T/K: 297.97, 298.01 P/kPa: 101.325 (1 atm)	J. Chr. Gjaldbaek
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald Defficient Coefficient $\alpha \times 10^2$ L x 10^2
297.97 1.64 298.01 1.64	6.06 6.61 6.07 6.62
Compiler. The solubilities are repor of 101.325 kPa (1 atm) assuming Henry	's law is obeyed.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND FURITY OF MATERIALS:
A calibrated all-glass combined manometer and bulb was enclosed in an air thermostat and shaken until equilibrium. Mercury was used for calibration and as the confining liquid. The solvents were degassed in the apparatus. Details are in reference 1. The absorped volume of gas is calculated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent	 (1) Hydrogen. Source not given. Freed from oxygen and dried. 99.5 per cent H₂, 0.5 per cent N₂. (2) Carbon disulfide. Merck. Analytical reagent grade. Distilled, boiling point 46.21 - 46.26°C.
is determined by the weight of dis- placed mercury.	ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta x_1/x_1 = 0.015$
	REFERENCES:

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COMPONENTS:			ORIGIN	AL MEASUREMENTS	:	<u> </u>
(1) Hydrogen; H ₂ ; [1333-74-0]			Cook, M. W.; Hanson, D. N.;			
2				Alder, B. J.		
(2) Carbon disulfide; CS ₂ ; [75-15-0]		J. C	hem. Phys. <u>19</u>	<u>57</u> , 26, 748 -	751.	
VARIABLES: T/K: 248.15 - 298.15		PREPA	RED BY:	L. Long		
	101.325 (1 atm)				L. Clever	
EXPERIMENTAL VALU						
T/K	Solubility ¹ mol g ⁻¹ x 10 ⁶	Mol Frac $x_1 \times 1$		Bunsen Coefficient α	Ostwald Coefficient L	
248.15	1.270	0.96	5	0.0378	0.0343	
273.15	1.656	1.25		0.0478	0.0478	1
298.15	2.101	1.59	9 ²	0.0591	0.0645	
¹ Data from (1	\ \					
		_ ·		 -		
'Recalculated	by compiler fro	om data in	n (1)	. Original p	aper gave 1.58	9.
The Bunsen and	d Ostwald coeffi	icients we	ere c	alculated by	the compiler.	
Smoothed Data	$: \ln x_1 = -6.24$	421 - 7.4	625/(T/100K)		
	- Standard erro	or about f	the r	egression lin	$e = 1.19 \times 10^{-1}$	6
See the evalu	ation of the hyd	drogen + d	carbo	n disulfide s	ystem for the	
recommended e						
		AUXILIARY	INFORM	ATION		
METHOD/APPARATUS				E AND PURITY OF		
	, designed espec mination of the				theson Co. Ma c analysis sho	
ity of hydrog	en in liquids, c	consists		jās 99.75 per	cent pure.	
	, a gas buret, a anometer system.		·	Impurity most	¹ ^y ^N 2 [•]	
	to a mounting pl is shaken in an			Carbon disulf Adamson Reage:		d tilled,
-				center portion	n used, b.p. 3	19.65K.
	s degassed in th eat and evacuati			Other solvent in reference	properties gi	ven
gas is placed	in the gas bulk	, after		10101010000	(1),	
temperature equilibrium is reached, the gas is contacted with the						
degassed solve	ent. The system	n is	LSTIM	ATED ERROR:		
	solubility equil Mercury is used			$\delta x_1/x_1$	= 0.001 (autho	rs)
displacement						
	y is calculated			ENCES:		
initial and f	inal quantities	of gas,		ook, M. W. Diversity of (California Rad	iation
vapor pressure	the pressure measurements, the vapor pressure of the solvent, and					
the solvent volume.			ab, Report UC	$(1)^{2455}, 1)^{54}$		
	olume.			ook, M. W.; H	anson, D. N.	70
	olume.			ook, M. W.; H		70.

COMPONENTS :	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] Sulfinylbismethane or dimethyl- sulfoxide; C₂H₆OS; [67-68-5] 	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1980, September
CRITICAL EVALUATION:	
Two workers have reported solubility dimethylsulfoxide system. Dymond (1)	

dimethylsulfoxide system. Dymond (1) reports one solubility measurement at 298.15 K and Symons (2) reports six measurements over the 298.15 to 353.15 K temperature interval.

Both sets of data are classed as tentative. Dymond's experimental method is capable of better precision than Symons' method. The two agree well at the common temperature of measurement of 298.15 K. The temperature coefficient of solubility is determined by Symons data. The enthalpy of solution appears to be greater than expected when compared with the enthalpy of solution of similar solvents. Thus, there is reason to use the data with some caution.

A linear regression was applied to the seven mole fraction solubility values from the two papers to obtain the tentative equation for use between 298.15 and 353.15 K.

 $\ln x_1 = -6.0383 - 10.2726/(T/100K)$

with a standard error of about the regression line of 7.25 x 10^{-6} .

The values of the temperature independent changes in enthalpy and entropy on transfer of one mole of hydrogen from the gas at 101.325 kPa to the infinitely dilute solution are

 $\Delta \overline{H}_1^{\circ}/kJ \mod^{-1}$ 8.54 and $\Delta \overline{S}_1^{\circ}/J K^{-1} \mod^{-1}$ -50.2.

The smoothed values of mole fraction solubility and the partial molal Gibbs energy are in Table 1.

Table 1. The solubility of hydrogen in dimethylsulfoxide at a hydrogen partial pressure of 101.325 kPa. Tentative values of the mole fraction solubility and partial molal Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction	∆G ₁ ⁄kJ_mol ⁻¹
298.15	0.76	23.51
308.15	0.85	24.01
318.15	0.945	24.51
328.15	1.04	25.02
338.15	1.14	25.52
348.15	1.25	26.02

References:

1. Dymond, J. H. J. Phys. Chem. 1967, 71, 1829.

2. Symons, E. A. Can. J. Chem. <u>1971</u>, 49, 3940.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H ₂ ; [1333-74-0]	Dymond, J. H.
<pre>(2) Sulfinylbismethane or Dimethyl Sulfoxide; C₂H₆OS (CH₃SOCH₃); [67-68-5]</pre>	J. Phys. Chem. <u>1967</u> , 71, 1829-1831.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (l atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·
T/K Mol Fraction $x_1 \times 10^4$	Bunsen Ostwald Coefficient Coefficient $\alpha \times 10^2$ L x 10^2
298.15 0.761	2.39 2.61
	х
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The liquid is saturated with the gas at a gas partial pressure of 1 atm. The apparatus is that described by	 Hydrogen. Stuart Oxygen Co. Dried. Dimethyl Sulfoxide. Matheson, Coleman, and Bell Co. Spectro-
The apparatus is that described by Dymond and Hildebrand (1). The apparatus uses an all-glass pumping system to spray slugs of degassed solvent into the gas. The amount of gas dissolved is calculated from the initial and final gas pressure.	quality reagent, dried, and a fraction frozen out. Melting pt.: 18.37 ⁰ C.
Dymond and Hildebrand (1). The apparatus uses an all-glass pumping system to spray slugs of degassed solvent into the gas. The amount of gas dissolved is calculated from the	quality reagent, dried, and a fraction frozen out. Melting

COMPONENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS: Symons, E. A.
<pre>(2) Sulfinylbismethane or dimethyl- sulfoxide; C₂H₆OS; [67-68-5]</pre>	Can. J. Chem. <u>1971</u> , 49, 3940 - 3947.
VARIABLES: T/K: 298.15 - 353.15 H ₂ P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever
EXPERIMENTAL VALUES:	
і - н ^т	raction Bunsen Ostwald $\times 10^4$ Coefficient Coefficient $\alpha \times 10^2$ L $\times 10^2$
· - •	75 2.35 2.57 77 2.42 2.64
35.0 308.15 1.18 0.	85 2.64 2.99
	.00 3.07 3.64
	14 3.45 4.28
80.0 353.15 1.74 1.	30 3.90 5.03
$\begin{array}{c ccc} T/K & Mol & Fr \\ & & & & & \\ \hline 298.15 & & & \\ 308.15 & & & \\ 318.15 & & & \\ 328.15 & & 1 \\ 338.15 & & 1 \\ \end{array}$	egression line = 8.10 x 10 ⁻⁷ raction x 10 ⁴ 76 85 945 04 145 25
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Gas chromatographic method (1). The gas-liquid equilibrium cell was a modified 100 cm ³ round bottom flask equipped with magnetic stirrer, syringe sampling portal, and vacuum/ gas line. The solvent was added, the flask evacuated several minutes to remove dissolved gases. The the gas was introduced to a partial pressure of one atm. The solution was stirred for five minutes, then sampled. Three to four successive samples were taken. The 5.0 cm ³ samples were taken by gas tight syringe. The sample was intro- duced to a stripping cell, stripped Out over a period of 1-2 minutes by the nitrogen carrier gas and then passed into a Varian Aerograph (No. 1420) equipped with an injection portal, column (10' ¼" stainless steel, packed with 40-60 mesh 13X molecular sieve) at ambient tempera- ture, and a thermal conductivity cell at 65°C.	<pre>SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Matheson Prepurified grade (99.5% min purity). (2) Sulfinybismethane. Fisher. Certified Reagent Grade. Dried 48 h over 4A molecular sieves, vacuum distilled at ca. 1 mmHg. Fraction boiling 38-40°C was stored under nitrogen at ambient temperature for later use. ESTIMATED ERROR:</pre>

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Hydrogen; H₂; [1333-74-0] Symons, E. A. (2) Cyclopentanamine or cyclopentylamine; C₅H₁₁N or C₅H₉NH₂; [1003-03-8] private communication VARIABLES: PREPARED BY: т/к: 203.15 - 298.15 H. L. Clever P/MPa: 0.10 (1 atm) EXPERIMENTAL VALUES: Mol Fraction¹ Temperature Bunsen Ostwald Coefficient Coefficient $x_1 \times 10^4$ t∕°C $\alpha \times 10^2$ т/к L_x 10² 1.04 ± 0.02 (2) 1.21 ± 0.03 (4) 2.58 1.92 -70.0 203.15 -50.0 223.15 2.95 2.41 -35.0 238.15 3.56 1.48 ± 0.01 (3) 3.10 3.69 -20.1 253.05 $1.68 \pm 0.02 (5)$ 3.98 $\begin{array}{c} 1.73 \pm 0.09 & (4) \\ 1.76 \pm 0.01 & (4) \\ 1.77 \pm 0.03 & (5) \end{array}$ -20.0 253.15 3.80 4.10 -16.7 256.45 3.90 4.15 3.94 -15.3 257.85 4.17 1.86 ± 0.05 (4) 4.21 -10.0 263.15 4.37 1.97 ± 0.02 (3) - 5.0 268.15 4.59 4.51 +10.0 283.15 2.22 ± 0.03 (4) 5.10 5.29 293.35 2.50 ± 0.03 (7) 20.2 5.68 6.10 25.0 298.15 2.44 ± 0.04 (5) 5.52 6.03 ¹ Mole fraction values are solubility ± range (number of samples). The data were provided by the author. The Bunsen and Ostwald coefficients were calculated by the compiler. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The gas-liquid equilibrium cell is a No information. modified 100 cm³ r.b. flask equiped with a magnetic stirrer, and a sampling portal, and a vacuum/gas line. The solvent is added, and degassed by several evacuations. The gas is introduced to a one atm partial pressure. The solution is stirred for five minutes, then sampled. The stirring is continued while three to four successive samples are taken The samples are taken in gas-tight ESTIMATED ERROR: syringes and weighed. The sample is introduced into a stripping cell, and See ranges given with the data. stripped out over a 1-2 minute period. The sample then passes into a Varian Aerograph GLC by N₂ carrier gas. The column is $10' \frac{1}{2}"$ stainless steel, **REFERENCES**: 1. Symons, E. A. packed with 40-60 mesh 13X molecular Can. J. Chem. <u>1971</u>, 49, 3940. sieve.aThe column is at ambient temperature, and the thermal conductivity cell is at 65 °C. 2. Symons, E. A.; Powell, M. E.; Schnittker, J. B.; Clermont, M. J. J. Am. Chem. Soc. <u>1979</u>, 101, 6704.

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]	Symons, E. A.; Powell, M. E.; Schnittker, J. B.; Clermont, M. J.			
<pre>(2) Cyclohexanamine or cyclohexyl- amine; C₆H₁₃N or C₆H₁₁NH₂; [108-91-8]</pre>	J. Am. Chem. Soc. <u>1979</u> , 101, 6704 - 6709.			
VARIABLES:	PREPARED BY:			
T/K: 258.15 - 288.15 H ₂ P/kPa: 101.325 (1 atm)	H. L. Clever			
EXPERIMENTAL VALUES:				
Temperature Mol Fraction ¹	Bunsen Ostwald			
$t/^{\circ}C$ T/K $x_1 \times 10^4$	Coefficient Coefficient $\alpha \times 10^2$ L x 10^2			
-15.0 258.15 2.00 ± 0.09 (4)	4.06 3.84			
-13.6 259.55 1.90 ± 0.09 (8)	3.85 3.66			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	4.54 4.46			
+ 5.1 278.25 2.47 + 0.04 (4)	4.91 5.00			
$\begin{array}{c} -0.09 \\ 15.0 & 288.15 & 2.70 \pm 0.10 \ (5) \end{array}$	5.32 5.61			
15.2 288.35 2.57 ± 0.09 (10)) 5.06 5.34			
25.0 298.15 2.91 ± 0.04 (4)	5.67 6.19			
cesium salt; $C_{6}H_{13}N.Cs$; 4820-05-7 , c/mol dm ⁻³ 0.0024. The Bunsen and Ostwald coefficients were calculated by the compiler.				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The gas-liquid equilibrium cell is a modified 100 cm ³ round bottom flask	(1) Hydrogen. Matheson of Canada, Ltd. Extra dry, 99.9 per cent.			
equipped with a magnetic stirrer, syringe sampling portal, and vacuum/ gas line. The solvent is added, the flask is evavuated several minutes to remove dissolved gases. The gas is introduced to a partial pressure of one atm. The solution is stirred for five minutes, then sampled. The stirring is continued while three to four successive samples are taken.	(2) Cyclohexanamine. Eastman Chemical Co. Original 97 per cent. Frac- tional distillation onto 4 A molecular sieves, dry over molten potassium. Impurity less than 0.02 weight % (gas chromatography), melting point/°C = -17.8 \pm 0.1, ρ/g cm ⁻³ = 0.868 ² ₄ °.			
The samples are taken in a gas tight	ESTIMATED ERROR:			
syringe and weighed. The sample is introduced into a stripping cell,	$\begin{array}{rcl} \delta \mathrm{T/K} &= 0.05\\ \delta x_{1}/x_{1} &= 0.02 \end{array}$			
stripped out over a period of 1-2 minutes, and then passed into a				
Varian Aerograph (No. 1420) by N ₂ carrier gas. The chromatograph is equiped with an injection portal, column (10' 4" stainless steel, packed with 40-60 mesh 13X molecular sieve) at ambient temperature, and a thermal	REFERENCES: 1. Symons, E. A. Can. J. Chem. <u>1971</u> , 49, 3940.			
conductivity cell at 65 °C.				

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Just, G.		
(2) Benzenamine or aniline; C ₆ H ₇ N; [62-53-3]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.		
VARIABLES:	PREPARED BY: M. E. Derrick		
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction	Bunsen Ostwald		
	Defficient Coefficient		
	$\alpha \times 10^2$ L x 10^2		
293.15 1.15	2.826 3.033		
298.15 1.07	2.610 2.849		
pressure of about 746 mmH the Ostwald coefficient to pressure, and calculated Bunsen coefficient values partial pressure of the g	b be independent of the mole fraction and at 101.325 kPa (1 atm)		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE: An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket.	 SOURCE AND PURITY OF MATERIALS; (1) Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. (2) Benzenamine. No information. 		
The gas is introduced into the de- gassed liquid. The gas volume absorb- ed is determined by the gas buret. The solvent volume is determined at the end of the experiment by pouring the solvent into a graduated flask.			
-	ESTIMATED ERROR:		
	$\delta L/L = 0.03$ (compiler)		
	REFERENCES :		
	1. Timofejew, W. Z. Physik. Chem. <u>1890</u> , 6, 141.		
	2. Steiner, Ann. Phys. (Leipzig) <u>1894</u> , 52, 275		

COMPONENTS :	OPTOTNAL WEACHDEVOURG	
	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Guerry, D. Jr.	
<pre>(2) Cyclic amines; C4H9N, C5H5N, and C5H10N</pre>	Ph. D. thesis, <u>1944</u> Vanderbilt University Nashville, TN	
	Thesis Director: L. J. Bircher	
VARIABLES: T/K: 293.15, 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:		
	Bunsen Ostwald efficient Coefficient αL	
Pyrrolidine; C ₄ H ₉ N;	[123-75-1]	
293.15 2.17 298.15 2.39	0.0586 0.0629 0.0642 0.0701	
Pyridine; C ₅ H ₅ N; [1 293.15 1.48	0.0412 0.0442	
293.15 1.48 298.15 1.62	0.0449 0.0490	
Piperidine; C ₅ H ₁₁ N;	[110-89-1]	
293.15 2.49 298.15 2.58	0.0566 0.0607 0.0582 0.0635	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;	
The apparatus was a modified Van Slyke-Neill Manometric Apparatus manufactured by the Eimer and Amend Co.	Pyrrolidine. Pyrrole was prepared and catalytically reduced to pyrrolidine. B.p. (750 mmHg) t/°C 88.12 - 88.26 (corr.).	
The procedure of Van Slyke (1) for pure liquids was modified (2) so that small solvent samples (2 cm ³) could be used with almost 100 per cent recovery of the sample. An improved temperature control system was used.	Pyridine. Mallincrodt Chemical Co. Purified and distilled. B.p. (743.9 mmHg) t/°C 114.96 - 115.06 (corr.). Piperidine. Part was a commercial sample (Eastman Kodak Co.), part pre- pared by reduction of pyridine. B.p. (752.4 mmHg) t/°C 106.00-106.17. ESTIMATED ERROR:	
SOURCE AND PURITY OF MATERIALS:	δT/K = 0.05	
 Hydrogen. Air Reduction Co. Purity 99.5 per cent. 	REFERENCES:	
(2) Cyclic amines. The pyridine and pyrrolidine were distilled from BaO under a N ₂ atmosphere. The piperidine was distilled from KOH under a N ₂ atmosphere. Experimental data on refractive index, density and vapor pres-	<pre>I. Van Slyke, D. D. J. Biol. Chem. 1939, 130, 545.</pre> 2. Ijams, C. C. Ph. D. thesis, 1941 Vanderbilt University	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(l) Hydrogen; H ₂ ; [1333-74-0]	Just, G.
(2) Nitrobenzene; C ₆ H ₅ NO ₂ ; [98-95-3]	Z. Phys. Chem. <u>1901</u> , 37, 342 - 367.
VARIABLES:	PREPARED BY:
T/K: 293.15 - 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ Co	BunsenOstwaldDefficientCoefficient $\alpha \times 10^2$ L $\times 10^2$
293.15 1.51 298.15 1.56	3.292 3.533 3.397 3.708
The author measured the O pressure of about 746 mm the Ostwald coefficient to pressure, and calculated Bunsen coefficient values partial pressure of the o	Ig. The compiler assumed to be independent of the mole fraction and at 101.325 kPa (1 atm)
	TNEODUATION
	INFORMATION
METHOD/APPARATUS/PROCEDURE: An Ostwald apparatus as modified by Timofejew (1), and Steiner (2) is used. The apparatus consists of a gas buret, an absorption flask, and a mercury manometer. The system is thermostated with a water jacket.	 SOURCE AND PURITY OF MATERIALS: (1) Hydrogen. Prepared by the reaction of water with aluminum amalgam accelerated with mercury (II) chloride. (2) Nitrobenzene. No information.
The gas is introduced into the de- gassed liquid. The gas volume absorbed is determined by the gas buret. The solvent volume is deter- mined at the end of the experiment by pouring the solvent into a	
graduated flask.	ESTIMATED ERROR:
	$\delta L/L = 0.03$ (compiler)
	REFERENCES :
	1. Timofejew, W. Z. Physik. Chem. <u>1890</u> , 6, 141.
	2. Steiner, Ann. Phys. (Leipzig) <u>1894</u> , 52, 275.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Powell, R. J.		
	J. Chem. Eng. Data <u>1972</u> , 17, 302-304.		
<pre>(2) 1,1,2,2,3,3,4,4,4-Nonafluoro-N, N-bis(nonafluorobutyl)-1- butanamine or Perfluorotributyla- mine; C₁₂F₂₇N; [311-89-7]</pre>	o. onom. 2ng. 2404 <u>1972</u> , 17, 302-304.		
VARIABLES:	PREPARED BY:		
T/K: 288.15 - 318.15 H ₂ P/kPa: 101.325 (1 atm)	P. L. Long		
EXPERIMENTAL VALUES:			
T/K Mol Fraction Buns			
	cient Coefficient $R_{\Delta \log T} = N$ 10 ² L x 10 ²		
298.15 15.52 9.7	6 10.7 3.28		
The author states that solubility measurements were made between 288.15 and 313.15 K, but only the solubility at 298.15 was given in the paper. The slope $R(\Delta \log X_1/\Delta \log T)$ was given. The smoothed data below were calculated by the compiler from the slope in the form: $\log X_1 = \log(15.52 \times 10^{-4}) + (3.28/R)\log(T/298.15)$ with R = 1.9872 cal K ⁻¹ mol ⁻¹ .			
T/K Mo	ol Fraction		
200 15	$\frac{x_1 \times 10^4}{14.67}$		
288.15 293.15	14.67 15.10		
298.15 303.15	15.52 15.95		
308.15	16.39		
313.15 318.15	16.83 17.28		
The Bunsen and Ostwald coefficients were calculated by the compiler.			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Dymond and Hildebrand (1) apparatus which uses an all glass pumping system to spray slugs of degassed	(1) Hydrogen. Source not given. Manufacturers research grade, dried over CaCl ₂ before use.		
solvent into the gas. The amount of gas dissolved is calculated from the initial and final gas pressures. The solvent is degassed by freezing and pumping followed by boiling under	<pre>(2) Perfluorotributylamine. Minnesota Mining & Mfg. Co Column distilled, used portion with b.p. = 447.85 - 448.64 K,</pre>		
reduced pressure.	& single peak GC.		
	ESTIMATED ERROR:		
	$\delta N/cal K^{-1} mol^{-1} = 0.1$ $\delta X_1/X_1 = 0.002$		
	REFERENCES:		
	 Dymond, J. H.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. <u>1967</u>, 6, 130. 		

COMPONENTS :		ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]		Chappelow, C.C.; Prausnitz, J.M.	
<pre>2. Cyclotetrasiloxane,octamethyl-; C_bH₂4O₄Si₄; [556-67-2]</pre>		Am.Inst.Chem.Engnrs.J. <u>1974</u> ,20, 1098-1104	
VARIABLES: Temperature		PREPARED BY: C.L. Young	
EXPERIMENTAL VALU	JES:	L	
т/к	Henry's Con /atm	stant ^a Mole fraction ^b of hydrogen at 1 atm partial pressure, ^x H ₂	
300	706	0.00142	
325		0.00161	
350	555	0.00180	
375	490	0.00204	
400	420	0.00238	
425	338	0.00296	
a. b.	pressures and values of within the Henry's-Law	assuming linear relationship	
	AUXILIARY	INFORMATION	
METHOD/APPARATU		SOURCE AND PURITY OF MATERIALS:	
described by D (1). Pressure	earatus similar to that ymond and Hildebrand measured with a null precision gauge. Details	Solvent degassed, no other details given.	
		ESTIMATED ERROR: $\delta T/K = \pm 0.1: \delta T = \pm 18$ (estimated)	
		$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 1$ %. (estimated by compiler).	
		REFERENCES: 1. Dymond, J.; Hildebrand, J.H. Ind. Eng.Chem. Fundam. <u>1967.6</u> ,130. 2. Cukor, P.M.; Prausnitz, J.M. Ind.Eng.Chem. Fundam. <u>1971</u> ,10,638.	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H ₂ ; [1333-74-0]	Gniewosz, S.; Walfisz, A.		
(2) Petroleum	Z. Physik. Chem. <u>1887</u> , 1, 70 - 72.		
VARIABLES:	PREPARED BY:		
T/K: 283.15, 293.15 Pressure: "atmospheric"	M. E. Derrick H. L. Clever		
EXPERIMENTAL VALUES:			
A DATENTAL VALUES:			
	Bunsen Ostwald efficient Coefficient		
	0.0652 0.0676 0.0582 0.0625		
	0.0582 0.0625		
The Ostwald co compiler.	efficient was calculated by the		
compiler.			
	-		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus consisted of an absorption flask connected to a gas buret	- (1) Hydrogen. No information.		
by a flexible lead capillary. The System was thermostated in a large Water bath.	(2) Petroleum. Russian petroleum. Cleaned by boiling in a large copper flask.		
The volume of gas absorbed in a volume of the degassed liquid was measured using the gas buret.			
	ESTIMATED ERROR:		
	$\delta \alpha / \alpha = 0.10$ (compiler)		
	REFERENCES:		

COMPONENTS :		ORIGINAL MEASUREMENTS:			
(1) Hydrogen; H ₂ ; [1333-74-0]		Baldwin, R. R.; Daniel, S. G.			
(1) hydrogen; h ₂ , [1333-74-0] (2) Oils		J. Appl. Chem. 1952, 2, 161 - 165.			
		J. Inst. Petrol., London, 1953, 39,			
		105 - 124.			
VARIABLES:		PREPARED BY:			
T/K: 273.15 - 373.15 H ₂ P/kPa: 101.325 (1 atm)		P. L. Long H. L. Clever			
EXPERIMENTAL VALUES:					
	Bunsen efficient a	Ostwald Coefficient L			
Oil A.2, v. 100 ⁰ F, me		68 centistokes at 510.			
273.15 293.15	0.0421 0.0465	0.0421 0.0499			
333.15 373.15	0.0526	0.0642 0.0806			
Oil A.5, viscosity 34.9 centistokes at 100 °F, mean mol wt 400.					
273.15	0.0452	0.0452			
293.15 333.15	0.0483	0.0518 0.0669			
373.15	0.0658	0.0899			
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:	donon	SOURCE AND PURITY OF MATERIALS:			
 Degassing. The liquid was deaer- ated by passage through a continu- ously evacuated vessel. The liquid was saturated with the gas, then degassed 		(1) Hydrogen. Commercial cylinders, source not given. Gas analysis on a Bone and Wheeler apparatus shows gas to be at least 99.5 %.			
again. 2. Saturation of liquid with gas. The gas was passed through a liquid air trap to remove water and carbon di- oxide, then through a long coil thermostated at the temperature of the solubility measurement, and then bubbled through the liquid up to five hours.		(2) Oils. The oils conform to DTD-472B specifications. Composition and physical properties of the oils are given in the appendix of the 1953 paper. The molecular weights were determined by freezing point depression in naphthalene (±5 %).			
3. Determination of the amount of gas		ESTIMATED ERROR: $\delta \alpha / \alpha = 0.01$			
liberated under vacuum from a known volume of the saturated liquid. The saturated liquid is placed in a ves- sel attached to a calibrated buret. The whole apparatus is intially evacuated. The gas released from the liquid was transferred to the cali- brated buret by a Topler pump. Five operations and transfers recover all but a trace of the gas. The last trace (2 - 5 %) was removed by boiling.		$\delta P/P = 0.01$			
		REFERENCES :			

COMPONENTS:	·		ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]		0]	Nasini, A. G.; Corinaldi, G.	
(2) Paraffin oil			Soc. Ital. Prog. Sci. Atti. Riun. <u>1932</u> , 20, 264 - 266.	
WADTADI EC.				
VARIABLES: T/K: 305.15 P/kPa: 101.325 (1 atm)		atm)	PREPARED BY: A. L. Cramer H. L. Clever	
EXPERIMENTAL VALUES:			I	
	т/к	Bunsen* Coefficien a	Ostwald t Coefficient L	
	305.15	0.0464	0.0518	
	*Original datum.			
		AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCE	EDURE :		SOURCE AND PURITY OF MATERIALS:	
The apparatus and based on those of	procedure Lannung (were 1).	 (1) Hydrogen. Tank gas freed of oxygen by passage over red-hot metal. 	
			(2) Paraffin oil. Density, $\rho_{15}^{15} = 0.87$	
			ESTIMATED ERROR:	
			δ T /K = 0.1	
			REFERENCES:	
			l. Lannung, A. J. Am. Chem. Soc. <u>1930</u> , 52, 68.	

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COMPONENTS:				ORIGINAL M	EASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]			Vibrans, F. C.			
(2) Vegetable oils		Oil and	Soap <u>1935</u> ,	12, 14 - 15.		
HADTADIEC.						. <u></u>
	VARIABLES: T/K: 296.15 - 318.15			PREPARED BY: P. L. Long		
					H. L. (Clever
EXPERIMENTAL		3 (070				3
	т/к	cm ³ (273		K,I atm)	H ₂ 100 cm ⁻³	av
	Corn oil					
	296.15-299.15 318.15	4.10 4 4.46 4	1.04 1.46	4.08 4.42	4.10 4.45	4.08 4.44
	Cottonseed	oil				
	296.15-299.15 318.15			4.28	4.38	4.22 4.29
	Hydrogenat	ed cotton	iseed	l oil		
	318.15	4.24 4	1.36			4.30
	<u></u>	AUXILI	IARY	INFORMATIO	N	
METHOD/APPAR	ATUS/PROCEDURE:			SOURCE AND	PURITY OF MA	TERIALS:
Van Slyke	manometric meth	od used ((1).	(l) Hydro ders	ogen. From a , source or	commercial cylin- purity not stated.
				boug		rcial sample arket. Represent - ss.
				boug		Commercial sample arket, representa- ss.
				ESTIMATED	ERROR:	<u> </u>
				;		3 at room T 2 at 318 K 0.04
				REFERENCES	5: 	<u> </u>
				1. Van <i>J. B[.]</i> 575.	Slyke, D. D. iol. Chem. <u>1</u>	; et al. 1924, 61, 523 and

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Hydrogen; H-+	[1333-74-0]	Vibrans, F. C.		
(1) Hydrogen; H ₂ ; [1333-74-0] (2) Lard				
(2) Datu		0il and Soap <u>1935</u> , 12, 14 - 15.		
VARIABLES:		PREPARED BY:		
T/K: P/kPa:	318.15 101.325	P. L. Long H. L. Clever		
EXPERIMENTAL VALUES:				
	T/K cm ³ (27	3.15 K, 1 atm) $H_2 \ 100 \ cm^{-3}$		
	318.15	4.16		
1		4.24 4.26		
		$\frac{4.43}{4.27}$ av.		
-				
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCE	DURE :	SOURCE AND PURITY OF MATERIALS:		
The manometric met (1) was used.	hod of Van Slyke:	(1) Hydrogen. From commercial cylinders, source and purity not given.		
		(2) Lard. Made from a mixture of killing and cutting fats, steam rendered.		
1				
		ESTIMATED ERROR:		
		$\begin{array}{rcl} \delta T/K &= 2\\ \delta c/c &= 0.04 \end{array}$		
		00/0 - 0.04		
		REFERENCES:		
		<pre>1. Van Slyke, D. D.; et al. J. Biol. Chem. 1924, 61, 523 and 575.</pre>		

متعافلات والمالية والمستعادين والمستعادية والمستعارية والمراجع والمراجع والمستعانية والمستعاد والمستعاد

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Schaffer, P. S.; Haller, H. S.	
(2) Animal and vegetable oils	0il and Soap 1943, 20, 161 - 162.	
	/	
VARIABLES:	PREPARED BY:	
T/K; 313.15, 333.15 P/kPa: 101.325 (1 atm)	P. L. Long H. L. Clever	
	H. L. Clever	
EXPERIMENTAL VALUES:		
$T/K \ cm^3 \ (273.1)$	5, 1 atm) H ₂ 100 cm ⁻³	
Cottonseed oil		
313.15	4.7	
Butter oil		
313.15 333.15	5.4 6.8	
Lard	0.0	
313.15	5.0	
The authors solubilit	y unit is the Bunsen	
coefficient x 100.		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The apparatus consists of a reaction flask connected to a water jacketed	(1) Hydrogen. From commercial cylinders, source and purity not	
gas buret, a mercury leveling bulb, and a differential manometer. The	given, used as received.	
reaction vessel is attached to a shaking mechanism in an air bath.	(2) Cottonseed oil. Good grade commercial product.	
	Butter oil. Obtained from butter prepared in the lab from fresh	
A 50 cm ³ sample of oil is placed in the flask. Heat and vacuum are	cream.	
applied to remove dissolved gases. The sample is cooled to the temper-	Lard. Good grade commercial product.	
ature of the measurement. Hydrogen gas is admitted, a zero reading	-	
taken. Shaking is continued until the	δT/K = 0.5	
pressure of 1 atm. Three determinat-	$\delta c/c = 0.003$ (Authors, error among three determinations)	
ions were made on each sample.	REFERENCES :	
ature of the measurement. Hydrogen gas is admitted, a zero reading taken. Shaking is continued until the sample takes up no more gas at a	ESTIMATED ERROR: $\delta T/K = 0.5$ $\delta c/c = 0.003$ (Authors, error among three determinations)	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Power, G.G.; Stegall, H.		
2. Olive oil.	J. Appl. Physiology, <u>1970</u> , 29,		
	145-9.		
VARIABLES:	PREPARED BY: C.L. Young.		
	c.n. ioung.		
EXPERIMENTAL VALUES:	*		
T/K Bunsen coefficient, α	S.D. No. of measurements		
310.15 0.0436	0.0003 5		
* Standard deviation.			
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
	1. Matheson Co. sample, purity		
Liquid saturated with gas in a stirred cell. 5.0 cm samples	better than 99.7 mole per		
of liquid removed in a calibrated	cent.		
syringe and amount of gas extracted by two extraction in a van Slyke	2. No details given.		
apparatus determined. Details in source and ref. (1).			
source and rer. (1).			
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1$		
	REFERENCES:		
	 Power, G.G. J. Appl. Physiology, <u>1968</u>, 24, 		
	468.		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Longo, L. D.; Delivoria-
2. Sheep placental tissue	Papadopoulas, M.; Power, G. G.;
	Hill, E. P.; Forster, R. E.,
	Am. J. Physiology, <u>1970</u> , 219,
	561-569.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
T/K Bunsen coeffi	cient, α S.D. [*]
310.15 0.0165	0.0004
* standard deviation	
1	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Liquid samples were equilibrated with gas and then the dissolved gas	No details given.
was stripped out under vacuum and	no actairs given.
measured in a manometric Van Slyke	
apparatus. Some details in ref. 1.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.03.$
	PEPEPENONG
	REFERENCES:
	1. Power, G. G.,
	J. Appl. Physiology, <u>1968</u> , 24,
	468.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; H ₂ ; [1333-74-0]	Campos Carles, A.; Kawashiro, T.; Piiper, J.	
(2) Rat abdominal muscle		
	Pflugers Arch. <u>1975</u> , 359, 209 - 218.	
VARIABLES: T/K: 310.15	PREPARED BY: A. L. Cramer	
	H. L. Clever	
EXPERIMENTAL VALUES:		
T/K Solubility Coefficient	Corrected ²	
Coefficient	Solubility Bunsen Coefficient Coefficient	
µmol dm ⁻³ torr ⁻¹ µm	Coefficient Coefficient ol dm ⁻³ torr ⁻¹ $\alpha \times 10^2$	
310.15 1.00 ± 0.05^{1}	1.13 1.92	
¹ Mean value ± standard error	of 11 measurements.	
² Corrected for unextracted ga lost during transfer of the s	s in the sample, and for gas	
Another report from this labor constant, K =(1.67 ± 0.06) x 1	atory gives Krogh's diffusion	
the diffusion coefficient, D =	$24.7 \times 10^{-6} \text{ cm}^2 \text{ s}^{-1} \text{ for hydro-}$	
gen in rat abdominal muscle at	310.15 K.	
The sample is a non-homogenise	d solid, not a liquid.	
	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The hydrogen gas was presaturated with water vapor, then passed through	(1) Hydrogen. Source not given.	
an equilibration chamber containing	Stated to be 99.9 per cent pure.	
the muscle sample resting on a screen		
to expose all sides. The gas was passed through the equilibration	inal wall muscle layer of about	
chamber for one hour at a rate of 8	1.6 g, 1.4 mm thick, and surface area of 10 cm ² on one side.	
cm ³ m ⁻¹ .	Sample taken from 250 - 430 g	
The muscle was transfered to an	rat.	
extraction chamber filled with air		
for the same length of time as equil-		
ibration. The gas in the extraction chamber was then forced into a gas	ESTIMATED ERROR:	
chromatograph by mercury entering the		
chamber.		
1		
	REFERENCES:	
	1. Kawashiro, T.; Campos Carles, A.;	
1	Perry, S. F.; Piiper, J. Pflugers Arch. <u>1975</u> , 359, 219.	
	- , , , , , , , , , , , , , , , , , , ,	
	· · ·	
1		

COMPONENTS :	ORIGINAL MEASUREMENTS:				
(1) Deuterium; D ₂ ; [7782-39-0]	Symons, E. A.; Buncel, E.				
(2) Water; H ₂ O; [7732-18-5]	Can. J. Chem. <u>1973</u> , 51, 1673 - 1681.				
VARIABLES :	PREPARED BY:				
T/K: 298.15 P/kPa: 101.325 (1 atm)	H. L. Clever				
EXPERIMENTAL VALUES:					
T/K c_{D_2} /mol dm ⁻³ Mol Fraction $c \times 10^4$ $x_1 \times 10^4$					
298.15 8.3 1.50	20.5				
The mole fraction and Ostwald were calculated by the compile					
The value is 2.7 per cent high reported at 298.15 K by Muccit J. Solution Chem. <u>1978</u> , 7, 257 values are preferred.	elli, J. and Wen, WY.				
AUXILIARY	INFORMATION				
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:				
Gas chromatographic method (1, 2). The gas-liquid equilibrium cell was a modified 100 cm ³ round bottom flask equiped with magnetic stirrer, syring sampling portal, and vacuum/gas line. The solvent was added, the flask evacuated several minutes to remove dissolved gases. Then the gas was introduced to a partial pressure of one atm. The solution was stirred for five minutes, then sampled. Three to	 Deuterium. Matheson Co., Inc. Technical grade. Traces of oxygen removed by treatment with uranium turnings. Water. Deionized and distilled. 				
four successive samples were taken.	ESTIMATED ERROR:				
The 5.0 cm ³ samples were taken by gas tight syringe. The sample was intro- duced to a stripping cell, stripped out over a period of 1-2 minutes by the nitrogen carrier gas and then passed into a Varian Aerograph (No. 1420) equiped with an injection portal, column (10' $\frac{1}{4}$ " stainless steel, packed with 40-60 mesh 13X molecular sieve) at ambient tempera- ture, and a thermal conductivity cell at 65 °C.	δc/c = 0.02 (author's estimate) REFERENCES: Symons, E. A. Can. J. Chem. <u>1971</u>, 49, 3940. Gubbins, K. E.: Carden, S. N.; Walker, R. D. Jr. J. Gas Chromatogr. <u>1965</u>, 98. 				

ORIGINAL MEASUREMENTS:
Muccitelli, J.; Wen, WY. J. Solution Chem. <u>1978</u> , 7, 257 - 267
PREPARED BY:
H. L. Clever
-

EXPERIMENTAL VALUES:		
	mol Fraction	Ostwald
	$x_1 \times 10^5$	Coefficient L x 10 ³
278.15	1.7829	22.795
4	1.7904	22.891
	1.7891 1.7851	22.875 22.824
283.15	1.6825	21.970
	1.6691	21.795
	1.6757	21.882
1	1.6802 1.6714	21.940 21.825
288.15	1.6028	21.388
	1.5936	21.265
	1.5948	21.281
293.15	1.5892 1.5175	21.207 20.714
293.13	1.5118	20.636
	1.5187	20.731
	1.5016	20.559
298.15	1.4637 1.4555	20.469 20.354
	1.4663	20.505
	1.4569	20.374
303.15	1.3980	20.069
	1.3901 1.3978	19.956 20.066
	1.3952	20.029
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:		COUDCE AND BUDITY OF MATERIALC.
The apparatus and procedu	iro uoro	SOURCE AND PURITY OF MATERIALS:
similar to that described		(1) Deuterium. Linde Speciality
and Baer (1) as modified		Gas. Minimum specified purity 99.5 per cent. Used as received.
Hung (2). It consisted of		
<pre>manometer, a gas-volume m buret, a dissolution cell</pre>	neasuring	(2) Water. Distilled, then purified
capacity, and a mercury i		with the Millipore Corp. Milli-
The apparatus is immersed	l in a water	Q system.
bath. The degassing appa		
similar to the one described $attino et al.$ (3). The c		
ing the solvent is degase		
system is filled with sol		ESTIMATED ERROR:
ted gas to a total pressu		$\delta T/K = 0.005$
The solvent is stirred, a solves the pressure is ma		$\delta P/torr = 3$
one atm until equilibrium		$\delta L/L = 0.004$ (precision, authors)
The measured Ostwald coef		REFERENCES:
converted to mole fraction to account the second vir		1. Ben-Naim, A.; Baer, S.
icient of D ₂ . The authors		Trans. Faraday Soc. <u>1963</u> , 59, 2735.
data to the equation		2. Wen, WY.; Hung, J. H.
$R \ln (x/p) = -360.180 + 1$	4525.6/(T/K)	J. Phys. Chem. <u>1970</u> , 74, 170.
52.0206 ln (T/K) - 0.023		 Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. Anal. Chem. <u>1971</u>, 43, 806.

COMPONENTS :	EVALUATOR:	
 (1) Deuterium; D₂; [7782-39-0] (2) Organic solvents 	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA	

CRITICAL EVALUATION:

An Evaluation of the Deuterium Mole Fraction Solubility in Various Organic Solvents at a Deuterium Partial Pressure of 101.325 kPa (1 atm).

The solubility of deuterium in eleven organic solvents has been reported. There is only one set of measurements on each system, except for sulfinylbismethane for which two laboratories reported measurements at 293.15 K. Most of the solubility measurements were made by volumetric methods capable of better than average accuracy and precision (1, 2, 4). One laboratory (3, 5) used a gas chromatographic method, which may not be capable of as good an accuracy and precision. However, their work appears to have been carefully executed and all of the data are classed as tentative.

Tentative equations for the natural logarithm of the mole fraction solubility as a function of temperature, and a table of smoothed values of the mole fraction solubility appear on the individual data sheets, with the exception of the deuterium + cyclopentanamine system which did not have room on the sheet for the additional information. The smoothed data on the system is at the end of this section.

The changes in enthalpy, entropy and heat capacity for the transfer of one mole of deuterium from the gas phase at a deuterium partial pressure of 101.325 kPa to the infinitely dilute solution are summarized in Table 1 for the eleven systems.

The mole fraction solubilities of four of the systems studied by Cook, Hanson, and Alder (1) show a systematic curvature in $\ln x_1$ as a function of 1/T. The measurements of Cook *et al*. were made with great care, and there is reason to believe the curvature is real. Thus the mole fraction solubilities of the four systems were fitted to a three constant equation, and values of the temperature dependent changes in enthalpy and entropy at 25 degree intervals are given in Table 1.

Both Dymond (2), and Symons and Buncel (3) measured the mole fraction solubility of deuterium in dimethylsulfoxide at 298.15 K. The two values agree within 0.6 per cent.

p	ressure of 101 ilute solution		nfinitely
T/K	$\Delta \overline{H}_{1}^{\circ}/kJ \text{ mol}^{-1}$	ΔΞ ₁ /J K ⁻¹ mol ⁻¹	Δ̄C°/J K ⁻¹ mol ⁻¹
Deuterium	+ Heptane [14	2-82-5] (1) ¹	
248.15	3.42	-49.1	14.8
273.15 298.15	3.79 4.17	-47.7 -46.4	14.8 14.8
323.15	4.54	-45.2	14.8
Deuterium	+ Octane [111	-65-9] (1)	
248.15	3.35	-49.4	15.7
273.15	3.74	-47.9	15.7
298.15	4.14	-46.5	15.7
Deuterium	+ 2,2,4-Trime	thylpentane [540-	84-11] (1)
248.15	3.14	-49.0	14.6
273.15	3.50	-47.6	14.6
298.15	3.87	-46.3	14.6
Deuterium	+ Benzene [71	-43-2] (1)	
283.15-308.15	6.18	-47.7	0
Deuterium	+ Methylbenze	ne [108-88-3] (1)	I.
258.15-308.15	4.83	-50.5	0
Deuterium	+ Hexadecafluc	proheptane [335-57	7-9] (1)
248.15	3.39	-43.3	20.1
273.15 298.15	3.89 4.39	-41.4 -39.6	20.1 20.1
		methane [56-23-5]	
273.15-308.15	5.38		0
		lfide [75-15-0] (:	
248.15-298.15	5.80	-53.1	0
	_	nethane ² [67-68-5]	
Only two solubi no temperature the calculation	coefficient of	t 298.15 K are rep f solubility on wh	oorted. There is nich to base
Deuterium	+ Perfluorotri	ibutylamine [311-8	39-7] (4)
288.15-318.15	3.85	-40.6	0
· Deuterium	+ Cyclopentena	amine [1003-03-8]	(5)
213.15-298.15	4.93	-51.8	0

1

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Deuterium + Cyclopentanamine [1003-03-8]

The smoothed data are presented here, because there were not room for them on the data sheet of Symons (5). The tentative equation for use over the 213.15 to 298.15 K temperature range is

 $\ln x_1 = -6.2335 - 5.9271/(T/100K)$

with a standard error about the regression line of 6.03×10^{-6} . The smoothed values of the mole fraction solubility are in Table 2.

Table 2. Solubility of deuterium in cyclopentanamine at a partial pressure of deuterium of 101.325 kPa. Tentative values of the mole fraction solubility.

T/K	Mol Fraction 10 ⁴ x ₁	T/K	Mol Fraction
213.15 223.15 233.15 243.15 253.15	1.22 1.38 1.54 1.71 1.89	273.15 278.15 283.15 288.15 293.15	2.24 2.33 2.42 2.51 2.60
263.15	2.06	298.15	2.69

References:

- Cook, M. W.; Hanson, D. N.; Alder, B. J. J. Chem. Phys. <u>1957</u>, 26, 748.
- 2. Dymond, J. H. J. Phys. Chem. 1967, 71, 1829.
- 3. Symons, E. A.; Buncel, E. Can. J. Chem. 1973, 51, 1673.
- 4. Powell, R. J. J. Chem. Eng. Data 1972, 17, 302.
- 5. Symons, E. A. In press.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Deuterium; D ₂ ; [7782-39-0] (2) Heptane; C ₇ H ₁₆ ; [142-82-5]	Cook, M. W.; Hanson, D. N. Alder, B. J. J. Chem. Phys. <u>1957</u> , 26, 748 - 751.

EXPERIMENTAL VALUES:

T/K	Solubility	Mol Fraction	Bunsen Coefficient	Ostwald Coefficient
	$mol g^{-1} \times 10$	$x_{1} \times 10^{4}$	$\alpha \times 10^2$	$L \times 10^2$
238.15(sic) ¹ 5.002	5.009	8.13	7.24
248.15	5.168 6.160	5.172	8.35	7.58
263.15	5.697	5.705	9.05	8.71
273.15	6.069 6.069	6.077	9.52	9.52
283.15	6.447	6.456	9.99	10.36
294.65	6.881	6.891 ²	10.52	11.34
298.15	7.014 7.025 7.023 <u>7.033</u> 7.024 av	. 7.033	10.69	11.67
308.15	7.406 7.410 7.430 7.424 <u>7.429</u> 7.420 av	. 7.437	11.16	12.59
323.15	8.051	8.061 ²	11.87	14.04
338.15	8.031	8.081 8.752 ²	12.64	15.65

¹Context of paper indicates the temperature is 243.15 instead of 238.15. ²Calculated by the compiler.

The Bunsen and Ostwald coefficients were calculated by the compiler.

Standard error about the regression line = 4.72×10^{-7}

т/к	Mol Fraction
	$X_{1} \times 10^{4}$
243.15 253.15 263.15 273.15 283.15 293.15 293.15	5.005 5.351 5.707 6.074 6.450 6.837 7.034
298.15 303.15 313.15 323.15 333.15	7.233 7.640 8.056 8.481

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(l) Deuterium; D ₂ ; [7782-39-0] (2) Heptane; C ₇ H ₁₆ ; [142-82-5]	Cook, M. W.; Hanson, D. N.; Alder, B. J. J. Chem. Phys. <u>1957</u> , 26, 748 - 751.	
VARIABLES: T/K: 243.15 - 338.15 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long H. L. Clever	
EXPERIMENTAL VALUES:		
See preceding page.		

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus, designed especially for the determination of the solubil- ity of hydrogen in liquids, consists of a gas bulb, a gas buret, a solvent bulb, and a manometer system. All are attached to a mounting plate, and the assembly is shaken in an air bath. The solvent is degassed in the solv- ent bulb by heat and evacuation. The gas is placed in the gas bulb, and after temperature equilibrium is reached it is contacted with the de- gassed solvent. The system is shaken until solubility equilibrium is reached. Mercury is used as the dis- placement fluid.	(1) Deuterium. Source not given. Mass spectrographic analysis showed gas 99.4 per cent pure. Impurity mostly N ₂ with a small amount of HD.
	(2) Heptane. Phillips Petroleum Co. 99 mole per cent grade distilled, used center cut, boiling point 371.45 K. Other solvent proper- ties given in reference 1.
	ESTIMATED ERROR: $\delta x_1/x_1 = 0.001$ (authors)
The solubility is calculated from the initial and final quanties of gas, the pressure measurments, the vapor pressure of the solvent, and the solvent volume.	 REFERENCES: 1. Cook, M. W. University of California Radiation Lab, Report UCRL-2459, <u>1954</u>. 2. Cook, M. W.; Hanson, D. N. <i>Rev. Sci. Instr.</i> <u>1957</u>, 28, 370.

COMPONENTS:	OPICINAL MEASUPENEMES.
(1) Deuterium; D ₂ ; [7782-39-0]	ORIGINAL MEASUREMENTS: Cook, M. W.; Hanson, D. N.;
(1) Dealerran, D_2 , $[7782-39-0]$	Alder, B. J.
(2) Octane; C ₈ H ₁₈ ; [111-65-9]	
	J. Chem. Phys. <u>1957</u> , 26, 748 - 751.
VARIABLES:	PREPARED BY:
T/K: 248.15 - 308.15	P. L. Long
P/kPa: 101.325 (1 atm)	H. L. Clever
	[
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^4$	coefficient Coefficient
	$\alpha \times 10^2 \qquad L \times 10^2$
248.15 5.167	7.49 6.80
273.15 6.047 298.15 6.990	8.53 8.53 9.58 10.46
308.15 7.389	10.02 11.30
The Bunsen and Ostwald coefficients w	ere calculated by the compiler.
Smoothed Data: $\ln x_1 = -9.5382 + 0.6$	414/(T/100K) + 1.8834 ln (T/100)
1 <u> </u>	_
Standard error about	the regression line = 1.98×10^{-7}
T/K	Mol Fraction
	$x_{1} \times 10^{4}$
253.15 263.15	5.338 5.687
273.15	6.047
283.15	6.417
293.15 298.15	6.798 6.992
303.15	7.189
308.15	7.388
	INFORMATION
ME THOD / AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The apparatus, designed especially	(1) Deuterium. Source not given.
for the determination of the solubil- ity of hydrogen in liquids, consists	Mass spectrographic analysis
1 ⁹¹ a gas bulb, a gas buret, a solvent	showed gas 99.4 per cent pure. Impurity mostly N ₂ with a small
Julb, and a manometer system. All	amount of HD.
are attached to a mounting plate, and	(2) Optono Fostman Kodola Co
the assembly is shaken in an air bath.	Distilled, center portion used,
The solvent is degassed in the solv-	b.p. 398.65 K. Other solvent
ent bulb by heat and evacuation. The	properties given in reference (1).
gas is placed in the gas bulb, and after temperature equilibrium is	
reached it is contacted with the de-	ESTIMATED ERROR:
^{yassed} solvent. The system is	
shaken until solubility equilibrium is reached. Mercury is used as the	$\delta x_1 / x_1 = 0.001 \text{ (authors)}$
displacement fluid.	± ±
	REFERENCES:
The solubility is calculated from the initial and final events	
initial and final quantities of gas, the pressure measurements, the vapor	l. Cook, M. W. University of California Radiation
Pressure of the solvent, and the	Lab, Report UCRL-2459, <u>1954</u> .
solvent volume.	2. Cook, M. W.; Hanson, D. N.
	Rev. Sci. Instr. <u>1957</u> , 28, 370.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Deuterium; D_2 ; [7782-39-0]	Cook, M. W.; Hanson, D. N. Alder, B. J.
(2) 2,2,4-Trimethylpentane or isooctane; C ₈ H ₁₈ ; [540-84-1]	J. Chem. Phys. <u>1957</u> , 26, 748 - 751.
VARIABLES:	PREPARED BY:
T/K: 248.15 - 308.15 P/kPa: 101.325 (1 atm)	P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	BunsenOstwaldoefficientCoefficient $\alpha \times 10^2$ L x 10^2
248.15 6.004	8.58 7.80
273.15 6.960 298.15 7.960	9.67 9.67 10.74 11.72
298.15 7.960 308.15 8.396	10.74 11.72
	and colouisted by the compiler
The Bunsen and Ostwald coefficients w	
Smoothed Data: $\ln x_1 = -9.2434 + 0.5$	759/(T/100K) + 1.7534 ln (T/100K)
Standard error about	the regression line = 1.10×10^{-6}
	ol Fraction
	x, x 10 ⁴
253.15	6.190
263.15	6.569
273.15	6.957
283.15 293.15	7.354 7.762
298.15	7.969
303.15 308.15	8.179 8.391
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus, designed especially for the determination of the solubil-	(1) Deuterium. Source not given. Mass spectrographic analysis
ity of hydrogen in liquids, consists	showed gas 99.4 per cent pure.
of a gas bulb, a gas buret, a solvent	Impurity mostly N ₂ with a small
bulb, and a manometer system. All are attached to a mounting plate, and	amount of HD.
the assembly is shaken in an air bath	(2) 2,2,4-Trimethylpentane. Phillips Petroleum Co. Pure grade, 99+
The solvent is degassed in the solv-	mol per cent. Distilled, center
ent bulb by heat and evacuation. The	portion used, b.p. 372.35 K. Other solvent properties given
gas is placed in the gas bulb, and after temperature equilibrium is	in reference (1).
reached it is contacted with the de-	ESTIMATED ERROR:
gassed solvent. The system is shaken until solubility equilibrium is	
reached. Mercury is used as the dis- placement fluid.	$\delta x_1 / x_1 = 0.001 \text{ (authors)}$
The solubility is calculated from the	REFERENCES :
initial and final quantities of gas, the pressure measurements, the vapor	1. Cook, M. W.
pressure of the solvent, and the	University of California Radia- tion Lab, Report UCRL-2459, <u>1954</u> .
solvent volume.	 Cook, M. W.; Hanson, D. N. Rev. Sci. Instr. <u>1957</u>, 28, 370.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Deuterium; D ₂ ; [7782-39-0]	Cook, M. W.; Hanson, D. N.
(2) Benzene; C ₆ H ₆ ; [71-43-2]	Alder, B. J.
(1) Denzene, effe, (11 10 1)	J. Chem. Phys. <u>1957</u> , 26, 748 - 751.
VARIABLES:	PREPARED BY: P. L. Long
T/K: 283.15 - 308.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald
	oefficient Coefficient
	$\alpha \times 10^2$ L x 10^2
283.15 2.328	5.94 6.16 6.66 7.26
298.15 2.655 308.15 2.881	6.66 7.26 7.13 8.05
The Bunsen and Ostwald coefficients w	ere calculated by the compiler.
Smoothed Data: $\ln x_1 = -5.7399 - 7.4$	344/(T/100K)
Standard error about	the regression line = 1.59×10^{-7}
	Mol Fraction
	$x_1 \times 10^{4}$
283.15	2.328
288.15	2.436 2.546
293.15 298.15	2.656
303.15 308.15	2.768 2.880
1	
	INFORMATION
METHOD/APPARATUS/PROCEDURE: The apparatus, designed especially	SOURCE AND PURITY OF MATERIALS; (1) Deuterium. Source not given.
for the determination of the solubil-	Mass spectrographic analysis
ity of hydrogen in liquids, consists of a gas bulb, a gas buret, a solvent	showed gas 99.4 per cent pure. Impurity mostly N ₂ with a small
bulb, and a manometer system. All	amount of HD.
are attached to a mounting plate, and the assembly is shaken in an air bath.	(2) Benzene. Baker and Adamson's
	Reagent Grade. Distilled, center portion used, b.p.
The solvent is degassed in the solv- ent bulb by heat and evacuation.	353.15K. Other solvent
The gas is placed in the gas bulb,	properties given in reference (1).
and after temperature equilibrium is reached it is contacted with the	ESTIMATED ERROR:
degassed solvent. The system is shaken until solubility equilibrium	
is reached. Mercury is used as the	$\delta x_1/x_1 = 0.001$ (authors)
displacement fluid.	
	DEDEDENOUS
The solubility is calculated from	REFERENCES:
the initial and final quantities of	1. Cook, M. W.
the initial and final quantities of gas, the pressure measurements, the vapor pressure of the solvent, and	
the initial and final quantities of gas, the pressure measurements, the	 Cook, M. W. University of California Radiation Lab, Report UCRL-2459, <u>1954</u>. Cook, M. W.; Hanson, D. N.
the initial and final quantities of gas, the pressure measurements, the vapor pressure of the solvent, and	 Cook, M. W. University of California Radiation Lab, Report UCRL-2459, <u>1954</u>.

$ \begin{array}{c} \mbox{COMPONENTS:} & \mbox{ORIGINAL MEASUREMENTS:} \\ (1) \mbox{Deuterium; } D_2; \end{tabular}; \end{tabular} (7782-39-0] \\ (2) \mbox{Hexadecafluoroheptane or per-fluoroheptane; } C_7F_16; \end{tabular}; \end{tabular} (335-57-9] \\ \hline \mbox{(2) Hexadecafluoroheptane; } C_7F_16; \end{tabular}; \end{tabular} (335-57-9] \\ \hline \mbox{VARIABLES:} \\ \mbox{T/K: 248.15 - 308.15 } \\ \mbox{P/kPa: 101.325 (1 atm)} \\ \hline \mbox{VARIABLES:} \\ \mbox{T/K Mol Fraction} \\ \mbox{Coefficient Coefficient} \\ \mbox{Coefficient} \\ \mbox{Coefficient Coefficient} \\ \mbox{Coefficient} \\ Coeffici$	/51.
(2) Hexadecafluoroheptane or per- fluoroheptane; C ₇ F ₁₆ ; [335-57-9] VARIABLES: T/K: 248.15 - 308.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald Coefficient Coefficient $\frac{x_1 \times 10^4}{248.15} - \frac{\alpha \times 10^2}{12.64} + \frac{12.64}{12.64}$ 285.25 13.371 13.48 14.08 298.15 14.427 14.38 15.69 308.15 15.329 15.14 17.08 The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50 x 10 ⁻⁶ $\frac{x_1 \times 10^4}{253.15} + \frac{x_10^4}{12.64}$ 253.15 12.400 263.15 13.19 263.15 13.19 263.15 13.19 263.15 13.19 298.15 14.42	/51.
fluoroheptane; $C_{7}F_{16}$; [335-57-9] VARIABLES: T/K: 248.15 - 308.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald Coefficient Coefficient $\frac{x_{1} \times 10^{4}}{248.15} \frac{\alpha \times 10^{2}}{1.0556} \frac{1.0.99}{9.98} - 9.88}{273.15} \frac{12.403}{12.64} \frac{12.64}{12.64} \frac{12.64}{285.25} \frac{13.371}{13.371} \frac{13.48}{14.08} \frac{14.08}{15.69} \frac{14.427}{308.15} \frac{14.427}{14.38} \frac{14.38}{15.69} \frac{15.14}{17.08}$ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_{1} = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50×10^{-6} $\frac{x_{1} \times 10^{4}}{253.15} \frac{12.40}{12.64} \frac{238.15}{13.19} \frac{13.48}{298.15} \frac{14.42}{13.19} \frac{13.48}{12.40} \frac{14.48}{303.15} \frac{14.48}{14.48}$	251.
$\begin{array}{c} T/K: 248.15 - 308.15 \\ P/kPa: 101.325 (1 atm) \end{array} P. L. Long \\ H. L. Clever \\ \hline \\ $	
$\begin{array}{c} T/K: 248.15 - 308.15 \\ P/KPa: 101.325 (1 atm) \end{array} \qquad P. L. Long \\ H. L. Clever \\ \hline \\ \hline \\ \hline \\ EXPERIMENTAL VALUES: \\ \hline \\ $	
P/kPa: 101.325 (1 atm) H. L. Clever H. L.	
$\frac{1}{x_{1} \times 10^{4}}$ $\frac{x_{1} \times 10^{4}}{248.15}$ $\frac{x_{1} \times 10^{4}}{248.15}$ $\frac{x_{1} \times 10^{2}}{248.15}$ $\frac{x_{1} \times 10^{2}}{216.15}$ $\frac{x_{1} \times 10^{4}}{253.15}$ $\frac{x_{1} \times 10^{4}}{273.15}$ $\frac{x_{1} \times 10^{4}}{298.15}$ $\frac{x_{1} \times 10^{4}}{248.15}$	
$\frac{x_{1} \times 10^{4}}{248.15 10.556 10.99} \frac{x \times 10^{2}}{12.64 12.64}$ $\frac{248.15}{273.15 12.403 12.64 12.64}{285.25 13.371 13.48 14.08}{298.15 14.427 14.38 15.69}{308.15 15.329 15.14 17.08}$ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_{1} = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50×10^{-6} $\frac{x_{1} \times 10^{4}}{253.15 12.40}$ $\frac{253.15 12.40}{283.15 12.40}$ $\frac{298.15 14.42}{298.15 14.42}$	
$\frac{x_1 \times 10^{\circ}}{248.15 10.556 10.99 9.98}{273.15 12.403 12.64 12.64}{285.25 13.371 13.48 14.08}{298.15 14.427 14.38 15.69}{308.15 15.329 15.14 17.08}$ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50×10^{-6} $\frac{T/K Mol \ Fraction}{253.15 11.64}{273.15 12.40}{298.15 14.42}{298.15 14.44}{303.15 14.488}$	
$\frac{248.15}{273.15} \frac{10.556}{12.403} \frac{10.99}{12.64} \frac{9.98}{12.64}$ $\frac{273.15}{285.25} \frac{13.371}{13.48} \frac{14.08}{14.08}$ $\frac{298.15}{308.15} \frac{14.427}{15.329} \frac{14.38}{15.14} \frac{15.69}{17.08}$ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50×10^{-6} $\frac{x_1 \times 10^4}{253.15} \frac{10.91}{13.19}$ $\frac{293.15}{293.15} \frac{14.02}{298.15} \frac{14.88}{13.19}$ AUXILIARY INFORMATION	
$\frac{273.15}{285.25} 12.403 12.64 12.64 \\ 12.64 \\ 285.25 13.371 13.48 14.08 \\ 298.15 14.427 14.38 15.69 \\ 308.15 15.329 15.14 17.08 \\ \hline \\ $	
$\frac{298.15}{308.15} \frac{14.427}{15.329} \frac{14.38}{15.14} \frac{15.69}{17.08}$ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50 x 10 ⁻⁶ $\frac{x_1 \times 10^4}{253.15} \frac{x_1 0^4}{10.91}$ $\frac{298.15}{11.64}$ $\frac{298.15}{13.19}$ $\frac{298.15}{298.15} \frac{14.42}{14.48}$ AUXILLARY INFORMATION	
$ \frac{308.15 15.329 15.14 17.08 }{ 17.08 } $ The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K) $ Standard error about the regression line = 1.50 x 10 ⁻⁶ $ \frac{x_1 \times 10^4}{253.15 10.91} $ $ \frac{x_1 \times 10^4}{263.15 11.64} $ $ 273.15 12.40 $ $ 283.15 13.19 $ $ 293.15 14.02 $ $ 298.15 14.44 $ $ 303.15 14.88 $ $ AUXILIARY INFORMATION $	
Smoothed Data: $\ln x_1 = -9.8296 + 1.9302/(T/100K) + 2.4186 \ln (T/100K)$ Standard error about the regression line = 1.50×10^{-6} T/K Mol Fraction $\frac{x_1 \times 10^4}{253.15 10.91}$ 263.15 11.64 273.15 12.40 283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
Standard error about the regression line = 1.50×10^{-6} T/K Mol Fraction $\frac{x_1 \times 10^4}{253.15}$ 263.15 10.91 263.15 11.64 273.15 12.40 283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
$ \frac{T/K}{253.15} = \frac{x_1 \times 10^4}{10.91} $ $ \frac{253.15}{263.15} = 11.64 $ $ 273.15}{12.40} $ $ 293.15}{13.19} $ $ 293.15}{14.02} $ $ 298.15}{14.44} $ $ 303.15}{14.88} $ AUXILIARY INFORMATION	
$ \frac{T/K}{253.15} \frac{Mol \ Fraction}{10.91} \\ \frac{x_1 \ \times \ 10^4}{263.15} \\ \frac{263.15}{11.64} \\ \frac{273.15}{12.40} \\ \frac{283.15}{13.19} \\ \frac{293.15}{14.02} \\ \frac{298.15}{14.44} \\ \frac{303.15}{14.88} \\ $ AUXILIARY INFORMATION	
253.15 10.91 263.15 11.64 273.15 12.40 283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88	
253.15 10.91 263.15 11.64 273.15 12.40 283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88	
263.15 11.64 273.15 12.40 283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
283.15 13.19 293.15 14.02 298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
293.15 14.02 298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
298.15 14.44 303.15 14.88 AUXILIARY INFORMATION	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
The apparatus, designed especially for (1) Deuterium. Source not given	•
the determination of the solubility of Mass spectrographic analysis showed gas 99.4 per cent pure	•
Pulb, a gas buret, a solvent bulb, and Impurity mostly N, with a small	all
manometer system. All are attached amount of HD.	
S Shaken in an air bath [(2) nexadecalluoroneptane. Source	
The solvent is degassed in the solvent portion used, b.p. 355.65K.	r
build by heat and evacuation. The gas Other solvent properties give	
^s placed in the gas bulb, and after in reference (1).	en
emperature equilibrium is reached it s contacted with the degassed solvent	∋n
ne system is shaken until solubility [ESTIMATED ERROR:	en
equilibrium is reached. Mercury is used as the displacement fluid. $\delta x_1/x_1 = 0.001$ (authors)	en
The solubility is calculated from the nitial and final quantities of gas,	
ne pressure measurements, the vapor REFERENCES:	
Pressure of the solvent, and the l. Cook, M. W. Solvent volume. University of California Radia	
Lab, Report UCRL-2459, 1954.	3)
2. Cook, M. W.; Hanson, D. N. <i>Rev. Sci. Instr.</i> <u>1957</u> , 28, 370	3)
	5) ation

COMPONENTS:		ORIGINAL MEA	CHDEMENTC .
			SUREMENTS: N.; Hanson, D. N.;
(1) Deuterium; D ₂ ; [7782-39-0]			, B. J.
(2) Tetrachloromethane (tetrachloride; CCl ₄		J. Chem. 1	Phys. <u>1957</u> , 26, 748 - 751.
VARIABLES:		PREPARED BY:	
T/K: 273.15 - 3 P/kPa: 101.325 (1			P. L. Long H. L. Clever
EXPERIMENTAL VALUES:		••••••••••••••••••••••••••••••••••••••	······································
1 · · ·	l Fraction	Bunsen	Ostwald Coefficient
-	2, X 10'	$\alpha \times 10^2$	$L \times 10^2$
273.15	2.693	6.41	6.41
298.15	3.280	7.57	8.26
308.15	2.527(sic)	8.041	9.071
¹ The compiler suspects the mole fraction value is 3.527. The Bunsen and Ostwald coefficients and the smoothed data equation were calculated with the 3.527 value.			
The Bunsen and Ostwald o	coefficients w	ere calcula	ated by the compiler.
Smoothed Data: $\ln x_1 =$	-5.8498 - 6.4	741/(T/100F	<)
Standard	d error about	the regress	sion line = 5.23×10^{-7}
		Mol Fractic	
		$x_1 \times 10^4$	
	273.15	2.692	
273.15 278.15 283.15 288.15 293.15 298.15 303.15		2.809	
		2.927 3.046	
		3.165	
		3.284 3.404	
308.15		3.524	
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND P	URITY OF MATERIALS:
The apparatus, designed	especially	(1) Deuter	
for the determination of			spectrographic analysis
ity of hydrogen in liqui of a gas bulb, a gas bur			l gas 99.4 per cent pure. ty mostly N ₂ with a small
bulb, and a manometer sy are attached to a mounti			of HD.
the assembly is shaken i	n an air bath	(2) Tetrac	
The solvent is degassed	in the solv-		on Reagent Grade. Distilled, portion used, b.p.
ent bulb by heat and eva	cuation. The	349.95	K. Other solvent proper-
gas is placed in the gas after temperature equili		ties g	viven in reference (1).
reached it is contacted	with the de-	ESTIMATED ER	ROR:
gassed solvent. The sys until solubility equilib reached. Mercury is use displacement fluid.			$\delta x_1/x_1 = 0.001$ (authors)
The solubility is calcul	ated from the	REFERENCES :	
initial and final quanti	ties of gas,	1. Cook, M	
the pressure measurement pressure of the solvent,			port UCRL-2459, <u>1954</u> .
solvent volume.		2. Cook, M	I. W.; Hanson, D. N. vi. Instr. <u>1957</u> , 28, 370.

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COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Deuterium, D ₂ ; [7782-39-0]	Cook, M. W.; Hanson, D. N.;
2	Alder, B. J.
<pre>(2) Carbon disulfide; CS₂; [75-15-0]</pre>	J. Chem. Phys. <u>1957</u> , 26, 748-751.
VARIABLES:	PREPARED BY:
т/к: 248.15 - 298.15	P. L. Long
P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	I
T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^4$	$\frac{\alpha \times 10^2}{L \times 10^2}$
248.15 1.011	3.96 3.60
273.15 1.300	4.95 4.95
298.15 1.621	5.99 6.54
The Bunsen and Ostwald coefficients w	ere calculated by the compiler.
Smoothed Data: $\ln x_1 = -6.3884 - 6.9$	_
	the regression line = 6.79×10^{-7}
т/к	Mol Fraction
	$x_1 \times 10^4$
253.15	1.067
263.15 273.15	1.185 1.305
283.15	1.429
293.15 298.15	1.554 1.617
	INFORMATION
METHOD/APPARATUS/PROCEDURE: The apparatus, designed especially	SOURCE AND PURITY OF MATERIALS: (1) Deuterium. Source not given.
for the determination of the solubil-	Mass spectrographic analysis
ity of hydrogen in liquids, consists of a gas bulb, a gas buret, a solvent	showed gas 99.4 per cent pure. Impurity mostly N ₂ with a small
bulb, and a manometer system. All	amount of HD.
are attached to a mounting plate, and the assembly is shaken in an air bath	(2) Carbon disulfide Baker and
	Adamson Reagent Grade. Distilled
The solvent is degassed in the solv- ent bulb by heat and evacuation. The	center portion used, b.p. 319.65K Other solvent properties given
gas is placed in the gas bulb, and	in reference (1).
after temperature equilibrium is reached it is contacted with the de-	
gassed solvent. The system is shaken	ESTIMATED ERROR:
until solubility equilibrium is reached. Mercury is used as the dis- placement fluid.	$\delta x_1/x_1 = 0.001$ (authors)
The solubility is calculated from the	REFERENCES:
initial and final quantities of gas,	1. Cook, M. W.
the pressure measurements, the vapor pressure of the solvent, and the	University of California Radiation Lab, Report UCRL-2459, <u>1954</u> .
solvent volume.	2. Cook, M. W.; Hanson, D. N.
	Rev. Sci. Instr. <u>1957</u> , 28, 370.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Deuterium; D ₂ ; [7782-39-0]	Dymond, J. H.
<pre>(2) Sulfinylbismethane or Dimethyl Sulfoxide; C₂H₆OS (CH₃SOCH₃); [67-68-5]</pre>	J. Phys. Chem. <u>1967</u> , 71, 1829-1831.
VARIABLES:	
T/K: 298.15 P/kPa: 101.325 (l atm)	PREPARED BY: M. E. Derrick H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^4$ C	Bunsen Ostwald Defficient Coefficient $\alpha \times 10^2$ L x 10^2
298.15 0.799	2.51 2.74
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The liquid is saturated with the gas at a gas partial pressure of	SOURCE AND PURITY OF MATERIALS: (1) Deuterium. Bio-Rad Labs. Dried.
1 atm. The apparatus is that described by Dymond and Hildebrand (1). The apparatus uses an all-glass pumping system to spray slugs of degassed solvent into the gas. The amount of gas dissolved is calculated from the initial and final gas pressure.	 (2) Dimethyl Sulfoxide. Matheson, Coleman, and Bell Co. Spectro- quality reagent, dried, and a fraction frozen out. Melting pt.: 18.37°C.
	ESTIMATED ERROR:
	REFERENCES: 1. Dymond, J.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. <u>1967</u> , 6, 130.

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COMPONENTS:	ORIGINAL MEASUREMENTS: Symons, E. A.; Buncel, E.			
(1) Deuterium; D ₂ ; [7782-39-0]				
(2) Sulfinylbismethane or dimethyl- sulfoxide; C ₂ H ₆ OS; [67-68-5]	Can. J. Chem. <u>1973</u> , 51, 1673 - 1681.			
VARIABLES:	PREPARED BY:			
T/K: 298.15 D ₂ P/kPa: 101.325 (1 atm)	H. L. Clever			
EXPERIMENTAL VALUES:				
T/K C _{D2} /mol dm ⁻³ Mol Fra				
$x_1 \times 10^3$	10^4 Coefficient Coefficient $\alpha \times 10^2$ L x 10^2			
298.15 1.13 0.8				
The mole fraction, Bunsen coefficient, and Ostwald coefficient values were calculated by the compiler.				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Gas chromatographic method (1, 2). The gas-liquid equilibrium cell was a modified 100 cm ³ round bottom flask equipped with magnetic stirrer, syringe sampling portal, and vacuum/ gas line. The solvent was added, the flask evacuated several minutes to remove dissolved gases. Then the gas Was introduced to a partial pressure of one atm. The solution was stirred for five minutes, then sampled. Three to four successive samples were taken. The 5.0 cm ³ samples were taken by gas tight syringe. The sample was intro- duced to a stripping cell, stripped out over a period of 1-2 minutes by the nitrogen carrier gas and then	 (2) Sulfinylbismethane. Fisher Certified Reagent. Dried 48 h over 4A molecular sieves, vacuum distilled at ca. 1 mmHg. Frac- tion boiling 38-40°C was stored 			
Passed into a Varian Aerograph (No. 1420) equipped with an injection Portal, column (10' ¼" stainless Steel, packed with 40-60 mesh 13X molecular sieve) at ambient tempera- ture, and a thermal conductivity cell at 65°C.	 Symons, E. A. <i>Can. J. Chem.</i> <u>1971</u>, 49, 3940. Gubbins, K. E.; Carden, S. N.; Walker, R. D. Jr. <i>J. Gas Chromatogr.</i> <u>1965</u>, 98. 			

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Deuterium; D₂; [7782-39-0] Powell, R. J. (2) 1,1,2,2,3,3,4,4,4-Nonafluoro-N,N-J. Chem. Eng. Data 1972, 17, 302-304. bis (nonafluorobutyl)-1-butanamine or perfluorotributylamine; C₁₂F₂₇N; [311-89-7] VARIABLES: PREPARED BY: 288.15 - 318.15 T/K: P. L. Long H. P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: ∆log X₁ T/K Mol Fraction Bunsen Ostwald Coefficient $x_1 \times 10^4$ Coefficient R_{Alog T} = N $\alpha \times 10^2$ <u>L x</u> 10² 298.15 16.03 10.1 11.0 3.04 The author states that solubility measurements were made between 288.15 and 313.15 K, but only the solubility at 298.15 was given in the paper. The slope $R(\Delta \log X_1/\Delta \log T)$ was given. The smoothed data below were calculated by the compiler from the slope in the form: $\log X_1 = \log(16.03 \times 10^{-4}) - (3.04/R) \log(T/298.15)$ with R = 1.9872 cal K^{-1} mol⁻¹. T/K Mol Fraction $x_{1} \times 10^{4}$ 15.22 288.15 293.15 15.62 298.15 16.03 303.15 16.44 308.15 16.86 313.15 17.28 17.71 318.15 The Bunsen and Ostwald coefficients were calculated by the compiler. AUXILIARY INFORMATION METHOD / APPARATUS / PROCEDURE : SOURCE AND PURITY OF MATERIALS: (1) Deuterium. Source not given. Dymond and Hildebrand (1) apparatus which uses an all glass pumping system to spray slugs of degassed solvent into the gas. The amount of gas dis-Manufacturers research grade, dried over CaCl, before use. solved is calculated from the initial (2) Perfluorotributylamine. and final gas pressures. The solvent Minnesota Mining & Mfg. Co.. is degassed by freezing and pumping Column distilled, used portion followed by boiling under reduced with b.p. = 447.85-448.64K, pressure. & single peak GC. ESTIMATED ERROR: $\delta N/cal \kappa^{-1} mol^{-1} = 0.1$ $\delta X_1/X_1 = 0.002$ **REFERENCES:** 1. Dymond, J. H.; Hildebrand, J. H. Ind. Eng. Chem. Fundam. 1967, 6, 130.

1		ORIGINAL MEASUREMENTS:			
(1) Deuterium; D ₂ [778	32-39-0]	Symons, E. A.	Symons, E. A.		
<pre>(2) Cyclopentanamine c amine; C₅H₁₁N or ([1003-03-8]</pre>		private communication			
VARIABLES:		PREPARED BY:			
T/K: 213.15 - P/kPa: 101.325			H. L. Clever		
EXPERIMENTAL VALUES:		∎			
Temperature	Mol Fraction ¹	Bunsen Coefficient	Ostwald Coefficient		
t/°C T/K	<i>x</i> ₁ x 10 ⁴	$\alpha \times 10^2$			
		$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
	AUXILIARY	INFORMATION			
METHOD / APPARATUS / PROCEDURE :	····		OF MATERIALS.		
METHOD/APPARATUS/PROCEDURE: Gas chromatography met by author (1).		SOURCE AND PURITY	on on the source and		
Gas chromatography met	hod described solubility of	SOURCE AND PURITY No informatic	on on the source and		
Gas chromatography met by author (1). The author studied the hydrogen in the same s	hod described solubility of ystem. The	SOURCE AND PURITY No informatic	on on the source and		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K}{\frac{Mol \ Fractio}{x_1 \ x \ 10^4}}$	hod described solubility of ystem. The	SOURCE AND PURITY No informatic purity of mat	on on the source and		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K Mol \ Fractio}{ x_1 \times 10^4} \\ \frac{x_1 \times 10^4}{223.15} \\ 263.15 2.19 \\ 298.15 2.97 \\ \end{array}$	hod described solubility of ystem. The n	SOURCE AND PURITY No informatic purity of mat ESTIMATED ERROR: Results show a	on on the source and		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K Mol \; Fractio}{x_1 \; \times \; 10^4}$ $\frac{x_1 \; \times \; 10^4}{223.15 1.45}$ $263.15 2.19$ $298.15 2.97$ The expected isotope e per cent was not found	thod described solubility of ystem. The n 	SOURCE AND PURITY No informatic purity of mat ESTIMATED ERROR: Results show a	on on the source and cerials.		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K Mol \; Fractio}{\frac{x_1 \; \times \; 10^4}{223.15} 1.45}{263.15 2.19} \\ 298.15 2.97}$ The expected isotope e	thod described solubility of ystem. The n 	SOURCE AND PURITY No informatic purity of mat ESTIMATED ERROR: Results show a	on on the source and cerials.		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K Mol \; Fractio}{x_1 \; \times \; 10^4}$ $\frac{x_1 \; \times \; 10^4}{223.15 \qquad 1.45}$ $263.15 \qquad 2.19$ $298.15 \qquad 2.97$ The expected isotope e per cent was not found	thod described solubility of ystem. The n 	SOURCE AND PURITY No informatic purity of mat ESTIMATED ERROR: Results show a REFERENCES: 1. Symons, E.	on on the source and cerials.		
Gas chromatography met by author (1). The author studied the hydrogen in the same s results are: $\frac{T/K Mol \; Fractio}{223.15 1.45} \\ 263.15 2.19 \\ 298.15 2.97 \\ The expected isotope eper cent was not found$	thod described solubility of ystem. The n 	SOURCE AND PURITY No informatic purity of mat ESTIMATED ERROR: Results show a REFERENCES: 1. Symons, E.	on on the source and erials. range of 5 - 8 %.		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Deuterium; D ₂ ; [7782-39-0]	Bar-Eli, K.; Klein, F. S.	
(2) Ammonia; NH ₃ ; [7664-41-7]	J. Chem. Phys. <u>1961</u> , 35, 1915.	
(3) Potassium amide; KNH ₂ ; [17242-52-3]		
VARIABLES: T/K: 209.15, 231.55	PREPARED BY:	
1, 1, 1, 200, 13, 251, 35	H. L. Clever	
EXPERIMENTAL VALUES:	L	
LA BRITENTAL VALUES.		
	insen	
	ficient n ³ (STP) cm ⁻³ atm ⁻¹	
209.15 0	0.0117 ± 0.0005	
231.55 0	0.025 ± 0.0013	
The concentrat	ion of potassium	
amide was not stated to be o	lilute. The authors	
appear to assu does not affect	ume that the salt of the solubility of	
	liquid ammonia.	
AUXILIARY	INFORMATION	
METHOD / AP PARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
A kinetic method in which the rate	No information.	
of reaction between a gas and its solvent is utilized to estimate the		
amount of gas dissolved. The prin-		
ciple of the method is to measure the apparent rate of reaction, while		
shaking the reaction mixture inter- mittently for varying time intervals.		
The chemical reaction has to be		
slow enough to be easily measured,		
and the mixing need to be efficient, so that the partition equilibrium is		
established rapidly, compared to the time for the chemical reaction.	$\delta \alpha / \alpha = 0.10$	
	PERFORMANCE	
	REFERENCES :	

HYDROGEN AND DEUTERIUM SOLUBILITIES ABOVE 200 kPa

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HYDROGEN SOLUBILITIES ABOVE 200 kPa

General Remarks for High Pressure Solubilities Studies on Mixtures Containing Hydrogen

C. L. Young

Up until the last two decades there was comparatively little data available on the solubility of hydrogen in liquids above 200 kPa. However, this position has now completely changed and there is currently much interest in the solubility of hydrogen in liquids, particularly at high pressures. The major reasons for this interest arise from design considerations for processes concerned with the liquefaction of coal and from the "unusual" phase behaviour of some hydrogen mixtures. Some hydrogen mixtures exhibit the barotropic or phase inversion phenomenon and some exhibit the phenomenon of gas-gas immiscibility (1,2).

Unfortunately it has not been possible to give many detailed critical evaluations for hydrogen solubilities at high pressures because there are surprisingly few systems which have been studied over the same pressure and temperature range by more than two workers. In no case has it been possible to classify data as *recommended* because even when several workers have studied the same system usually the overlap of temperature and pressure ranges are fairly small.

Work of Chao and collaborators

Chao and coworkers have made fairly extensive measurements on hydrogen and coal-related organic compounds. The results are thought to be reliable but since, in general, there are no other measurements with which to compare their data at the higher temperatures, any evaluation is In several cases at the highest temperanecessarily rather speculative. tures, Chao and coworkers noticed some decomposition or reaction and it would be surprising if the effects of such were not significant and the dominant factor in determining the overall accuracy of some of the measurements under these conditions. The effect of decomposition or reaction cannot be simply allowed for as hydrogen appears to reduce the For example, Sebastian et al. thermal decomposition of some hydrocarbons. (3) found that hydrogen appeared to reduce the decomposition of thianaphthalene.

Work of Frolich, Trauch, Hogan and Peer

Frolich *et al.* (4) studied the solubility of hydrogen, nitrogen and methane in a range of organic substances. Unfortunately the data were presented in small graphical form. The data have been compiled but in view of the lack of any estimate of probable error the compiled data should be regarded with some caution and are generally classified as doubtful. They have been included principally because they are widely quoted in the literature. In some instances the data were not even presented in graphical form but the solubility data of hydrogen in one liquid quoted as being equivalent to that of hydrogen in another liquid.

Isotopic effects on solubility

Augood (5) made a study of the solubility of isotopic hydrogen, HD and H₂, in a number of solvents in order to obtain information for the production of heavy water. The table below gives values of $\beta_{2/1}$ *i.e.*, the ratio of Henry's law constant for the solubility of HD to H₂.

Solvent	т/к	P/MPa	β2/1	Solvent	т/К	<i>P/</i> MPa	β2/1
H ₂ O	293.2	18.72	1.029	H ₂ S	213.6	18.72	1.058
			1.024			10.44	1.025
NH 3	293.2	19.06	1.028			10.44	1.025
		19.06	1.018			10.30	1.042
		15.61	1.026	NO	119.5	17.61	1.154
		15.61	1.022			15.54	1.155
		8.86	1,015			11.41	1.152
	239.7	19.13	1.040			11.27	1.172 .
		18.23	1.038	CO2	239.7	19.27	1.048
		15.61	1.030			18.85	1.036
		15.61	1.049			18,58	1.018
.		14.51	1.036			10.44	1.043
SO₂	293.2	19.23	1.025			10.44	1.053
		19.13	1.021			10.44	1.040
		10.44	1.061	CO	81.4	18.16	1.090
		10.44	1.039			9.96	1.121
	263.2	19.20	1.038			9.61	1.199
		19.06	1.030	Ar	87.4	18.37	1.090
		12.92	1.040			18.37	1.084
0		10.44	1.036			11.61	1.100
CH4	111.7	18.03	1.055			11.61	1.130
		10.44	1.085	N ₂	. 77.7	17.89	1.033
		6.58	1.065			16.85	1.038
0		2.38	1.079			15.61	1.043
$C_{4H_{10}}$	273.2	18,99	1.013			15.44	1.056
		9.06	1.005			11.55	1.061
		9.06	1.018			9.75	1.075
	213.6	18.82	1.040			8.79	1.075
		18.82	1.034			5.27	1.130
		18.30	1.032			2.86	1.147
		17.47	1.040			2.72	1.166
		9.06	1.043			1.82	1.165
N G		9.06	1.060		67.0	8.86	1.200
H ₂ S	213.6	18.72	1.053			8.72	1.217

The ratio $\beta_{2/1}$ was determined by dissolving a HD + H₂ mixture containing 0.09 mole per cent of HD in the solvent and analysing the dissolved gas by mass spectrometry. Lachowicz *et al.* (6) carried out solubility experiments using H₂ and D₂ separately in n-heptane and octane to pressures of 30 MPa in the temperature range 298 to 323 K but found no differences in the solubility of the two isotopic gases.

Gas-gas immiscibility

Many hydrogen + organic substance mixtures probably exhibit the phenomenon referred to as gas-gas immiscibility although the occurrence of this phenomenon in hydrogen mixtures has not been extensively investigated or documented. The phenomenon was predicted by the author to occur in several hydrogen + alkane mixtures on theoretical grounds and has subsequently been observed experimentally. This phenomenon is relevant to the determination and interpretation of "solubilities" at high temperatures and pressures and is therefore briefly discussed here. The phenomenon is conveniently considered in terms of the pressure-temperature projection of the pressure-temperature composition diagram of a binary mixture. Figure 1 shows the pressure, temperature projection of a simple system such as propane + hexane. In this case there is a continuous gas-liquid critical locus between the critical points of the two pure components. In many cases there is also a liquid-liquid gas line at lower temperatures which meets a liquid-liquid critical line at an upper critical end point as is illustrated in figure 2. There are several other possible types of phase behaviour. Two of these involve gas-gas immiscibility and are illustrated in figures 3 and 4.

In many cases some part of the p, T projection as illustrated in figures 1, 2, 3 and 4 are obscured by solidification of the mixture. In the case of most hydrogen + organic compound mixtures there is a solid phase present for temperatures considerably above the critical temperature of hydrogen (33 K). Therefore, for the present purpose it is only necessary to consider the right hand side of the pressure-temperature projection. The left hand side of projections modified for the existence of solid phases has not been studied for mixtures of hydrogen + organic compounds.

The phase behaviour exhibited in figure 3 is referred to as gas-gas immiscibility of the second kind whereas that exhibited in figure 4 is referred to as gas-gas immiscibility of the first kind. For gasgas immiscibility of the first kind the critical locus starting at the critical point of the less volatile component moves to higher pressures and higher temperatures as the concentration of the more volatile component is increased from zero. It is possible to have two immiscible phases present at pressures and temperatures denoted by all points to the left of the critical locus. Since some of these temperatures are above the critical temperature of both components the phenomenon is referred to as gas-gas immiscibility. In gas-gas immiscibility of the second kind, which has a phase diagram as in figure 3, the critical locus starting at the critical point of the less volatile compound moves initially to lower temperatures and higher pressures but eventually moves back to higher temperatures and still higher pressures. Therefore it is possible at high pressures to have two phases present above the critical temperature of either component.

Probably hydrogen + most hydrocarbons with a carbon number of 8 or more will exhibit gas-gas immiscibility of the first kind. During the last two years several "gas" solubilities for hydrogen + hydrocarbons have been studied 30-50 °C below the critical temperature of the hydrocarbon. No detailed studies have been reported near the critical temperature of the hydrocarbon for systems which exhibit gas-gas immiscibility but it is to be expected that such studies may well soon be extended to such a region in view of the importance of hydrogen "solubilities" to coal liquefaction processes. It should also be pointed out that extrapolation of existing high temperature solubilities to tempera-

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tures near the critical region will lead to grossly inaccurate values.
References:
    Rowlinson, J. S. Liquids and Liquid Mixtures 2nd edn. Butterworths,
1.
         London, 1969.
2. Schneider, G. M. in Spec. Period. Reports No. 22. Chemical
         Thermodynamics Vol. 2, ed. McGlashan, M. L. Chem. Soc.
         London, 1978.
    Sebastian, N. M.; Simnick, J. J.; Lin, H. M.; Chao, K.-C.
з.
         Can. J. Chem. Engng. 1978, 56, 743.
4.
    Frolich, P. K.; Trauch, E. J.; Hogan, J. J.; Peer, A. A.
         Ind. Eng. Chem. 1931, 23, 548.
    Augood, D. R. Trans. Instn. Chem. Engnrs. 1957, 35, 394.
5.
    Lachowicz, S. K.; Newitt, D. M.; Weale, K. E. Trans. Faraday Soc.
6.
        1955, 51, 1198.
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Water

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Water; H₂O; [7732-18-5]</pre>	Colin L. Young, Department of Physical Chemistry, University of Melbourne, Parkville , Victoria 3052, Australia.
	October 1980.

CRITICAL EVALUATION:

This system has been fairly extensively investigated but the evaluator is unable to recommend any particular set of data. Wiebe and Coworkers'(1), (2) data cover the temperature range 273.15 to 373.15 K and pressures up to 100 MPa and are almost certainly the most reliable in this range. The data of Ipat'ev *et al.* (3), which are mostly at 298 K are significantly lower than those of Wiebe and because of their limited scope the former work is not considered further. The data of Ipat'ev and Theodorovich (4) covered the temperature range 373 to 498 K and are in general lower than the data of Wiebe and coworkers and the more recent data of Suciu (5). The data of Frolich *et al.* (6) were presented in a small graphical form and are rejected.

The data of Pray *et al.* (7), Stephan *et al.* (8), Wiebe and co-Workers (1) and (2) and Suciu, Zoss and Sibbitt (9) are all classified as tentative although the latter work is considerably more doubtful. The data of Stephan *et al.* (8) cover the temperature range 373.15 to 435.93 K and the pressure range up to 10 MPa. However there is significant disagreement between the Stephan *et al.* (8) data and that of Wiebe (1), (2). The data of Pray *et al.* (7) are limited to pressures below 2.5 MPa but are included in the compilation since they cover the temperature range 297.0 to 616.5 K. The data of Suciu *et al.* (9) were presented in graphical form, the details given in the compiled tables being taken from theses by Suciu and Zoss. As can be seen from the compilation these data have very significant scatter for each isobar.

The table below gives smoothed values of Kuenen coefficient for the solubility taken from Wiebe and Gaddy.

Kuenen coefficients

T/K	25 atm	50 atm	75 atm	100 atm	150 atm	200 atm	300 atm
273.15 283.15 293.15 303.15 313.15 323.15 343.15 343.15 353.15 363.15 373.15	0.5363 0.4498 0.4263 0.4133 0.4067 0.4053 0.4093 0.4093 0.4203 0.4385 0.4615	1.068 0.9690 0.8945 0.8475 0.8215 0.8090 0.8095 0.8171 0.8385 0.8720 0.9120	1.601 1.453 1.341 1.271 1.232 1.212 1.211 1.224 1.254 1.298 1.355	2.130 1.932 1.785 1.689 1.638 1.612 1.610 1.628 1.667 1.727 1.805	3.168 2.872 2.649 2.508 2.432 2.395 2.393 2.422 2.485 2.576 2.576 2.681	4.187 3.796 3.499 3.311 3.210 3.165 3.168 3.208 3.208 3.286 3.402 3.544	6.139 5.579 5.158 4.897 4.747 4.695 4.692 4.746 4.866 5.042 5.220
	400 atm	500 atm	600 atm	700 atm	800 atm	900 atm	1000 atm
273.15 283.15 293.15 303.15 313.15 323.15 333.15 343.15 353.15 363.15 373.15	8.009 7.300 6.766 6.430 6.245 6.166 6.173 6.249 6.392 6.600 6.841	9.838 8.980 8.328 7.922 7.705 7.613 7.625 7.717 7.885 8.129 8.429	11.626 10.610 9.856 9.390 9.135 9.017 9.016 9.131 9.324 9.665 9.994	13.370 12.214 11.362 10.818 10.524 10.389 10.405 10.527 10.757 11.093 11.512	15.013 13.746 12.808 12.218 11.889 11.735 11.746 11.893 12.169 12.555 12.980	16.548 15.215 14.217 13.583 13.230 13.072 13.084 13.233 13.533 13.946 14.394	18.001 16.623 15.592 14.928 14.569 14.404 14.407 14.557 14.867 15.303 15.775
These smoothed data are presented as tentative values and are expected to be accurate to \pm 1 or 2%.							

COMPONENTS:	EVALUATOR:			
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Water; H₂O; [7732-18-5]</pre>	Colin L. Young, Department of Physical Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia. October 1980.			
CRITICAL EVALUATION:	······································			
References:				
l. Wiebe, R.; Gaddy, V. L.; Heins, C	C. Ind. Eng. Chem. <u>1932</u> , 24, 823.			
2. Wiebe, R.; Gaddy, V. L. J. Am. Cha	em. Soc. <u>1934</u> , 56, 76.			
3. Ipat'ev, V. V.; Druzhina-Artemovic Zh. Obshchei. Khim. <u>1931</u> , 1				
4. Ipat'ev, V. V.; Theodorovich, V. I	P. Zh. Obshchei. Khim. <u>1934</u> , 4, 395.			
5. Suciu, S. Ph.D. Thesis, Purdue Unit	versity <u>1951</u> .			
6. Frolich, K.; Tauch, E. J.; Hogan, <u>1931</u> , 23, 548.	, J. J.; Peer, A. A. Ind. Eng. Chem.			
7. Pray, H. A.; Schweichert, C. E.; 44, 1147.	Minnich, B. H. Ind. Eng. Chem. <u>1952</u> ,			
8. Stephan, E. L.; Hatfield, N. S.; Battelle Memorial Institute				
9. Suciu, S.; Zoss, L. M.; Sibbitt, Mech. Engnrs. Nov/Dec <u>1953</u> N				

P	
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Wiebe, R.; Gaddy, V ₉ HL.; Heins, C.; Ind. Eng. Chem. <u>1932</u> , 24, 823-825.
2. Water; H ₂ O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
10 ³ Mole fraction	on of hydrogon
T/K P/bar in wa	ater,
10	³ ^{<i>x</i>} _{H₂}
298.15 25.33 0.311	
50.66 0.619	9
101.3 1.23 202.6 2.41	
405.3 4.673 607.9 6.799	
810.6 8.825 1013.3 10.745	5
1013.3 10.74	,
AUXIL	IARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Simple steel cylinder containing	1. Purity 99.8 mole per cent, major
water through which hydrogen was passed. Pressure measured using	impurity being nitrogen.
dead weight gauge. Water satura	ted 2. No details given.
with hydrogen and liquid phase an lysed using a volumetric techniqu	.a- .e.
Details in source.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.2; \delta P/bar = \pm 0.2;$
	$\delta x_{\rm H_2} = \pm 0.5$ % (estimated by compiler).
	REFERENCES :
	l l

			0.0.7.0.7.1				
COMPONENT				ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]			Wiebe,	R.; Gaddy,	V. L.		
2. Wa	ter; H ₂ O;	[7732-18-5]	J. Am.	Chem. Soc.	<u>1934</u> , <i>56</i> , 76-79.		
VARIABLES	S:		PREPARED B	Y:			
Temper	ature, press	sure	С. L. У	oung			
EXPERIMEN	NTAL VALUES:	Mole fraction of hydrogen	I		Mole fraction of hydrogen		
т/к	P/bar	in liquid, ^x H ₂	т/к	P/bar	in liquid, ^x H ₂		
273.15	25.33 50.66 101.33 202.65 405.30 607.95 810.60	0.000383 0.000768 0.001520 0.002983 0.005690 0.008239 0.010619	323.15 348.15	405.30 607.95 810.60 1013.25 25.33 50.66 101.32	0.004387 0.006402 0.008316 0.010188 0.000295 0.000590 0.001173		
298.15	1013.25 25.33 50.66 101.33 202.65 405.30	0.012700 0.000311 0.000619 0.001233 0.002417 0.004673	373.15	202.65 405.30 607.95 810.60 1013.25 25.33	0.002310 0.004487 0.006545 0.008504 0.010385 0.000330		
323.15	607.95 810.60 1013.25 25.33 50.66 101.33 202.65	0.006799 0.008825 0.010745 0.000290 0.000578 0.001151 0.002256		50.66 101.32 202.65 405.30 607.95 810.60 1013.25	0.000651 0.001288 0.002526 0.004865 0.007091 0.009190 0.011147		
		AUXILIARY	INFORMATION				
METHOD /	APPARATUS/PR	······		PURITY OF MA	TERIALS		
Single vessel analys dead we taken h low pre	pass flow m adsorption used as sou is. Pressu eight gauges both for a h	ethod with two train. Second rce of sample for re measured with . Measurements igh pressure and ach to equilibrium.	1. Pur: majo		le per cent; nitrogen.		
			$\delta x_{\rm H_2} = 4$ REFERENCES 1. Wieb Heir	0.05; δP/k 1%. : pe, R.; Gad			

Water

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•••	
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen; H₂; [1333-74-0] (2) Water; H₂O; [7732-18-5]</pre>	Suciu, S. Ph. D. thesis, 1951 Purdue University
_	Zoss, L. M. Ph. D. thesis, 1952 Purdue University
VARIABLES: T/K: 273.15 - 609.3 (32-637 °F) Total P/kPa: 6895 - 20,680 (1000 - 3000 lb in ⁻²)	PREPARED BY: H. L. Clever
EXPERIMENTAL VALUES:	
Solubility/cm ¹ (STP) H ₂ 9 ⁻¹ H ₂ O	$O_{H_{1}}^{2}$, $C_{H_{1}}^{2}$, C_{H
<pre>vs hydrogen partial pressure isothe and Sibbitt (2). In addition to the data from the Ph used data from: Pray, H. A. H.;Schweichert, C. E.;M: Report BMI-T-25: Ind. Eng. Chem. 19</pre>	hydrogen solubility <i>vs</i> temperature middle), and (c) hydrogen solubility erms were constructed by Suciu, Zoss, . D. theses of Suciu and of Zoss, they innick, B. H. Battelle Memorial Inst. 52, 44, 1146 - 1151. Ind. Eng. Chem. 1932, 24, 823 - 825.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was described by Zoss, Suciu, and Sibbitt (1). The apparatus consisted of a high pressure vessel with integral vapor and liquid sample chambers, heaters, temperature Controls, auxillary pumps, and ana- lytical equipment.	
The sequence of operations was: (a) The pressure vessel was evacuated, (b) Charged with a known volume of water (about 175 cm ⁻³), (c) brought to a selected temperature level, (d) char- ged with gas (under conditions of Constant total pressure, constant temperature, and continual agitation) until phase equilibrium was reached, (e) fastened in a vertical position until the vapor and liquid phases separated.	ESTIMATED ERROR: $\delta t / {}^{0}F = 0.5$
The gas and liquid phases were sepa- ratly analyzed. The results were summarized in graphs	Trans. ASME 1954, 76, 69 - 71. 2. Suciu,S.;Zoss,L.M.;Sibbitt,W.L. Paper No. 53-A64
(2).	Engineers Meeting, Nov/Dec 1953,Na

COMPONENTS:	· · · · · · · · · · · · · · · · · · ·	ORIGINAL	MEASUREMENTS :	· <u>·</u> ··································
(1) Hydrogen; H ₂	.: [1333-74-0]	Suciu,		
(2) Water; H ₂ O;	-	Ph. D.	thesis, 1951 University	
			. M. thesis, 1952 University	
EXPERIMENTAL VAI	LUES:	· •	· · · · · · · · · · · · · · · · · · ·	
Temperature		Hydrogen	Vapor Compositic	n
$\frac{t/{}^{0}F}{}$	<u> 1b in⁻²</u>	Hydrogen Solubility <u>S/cm³ (STP) g⁻¹</u>	с _{H2O} /moldm ⁻ " п	ol fraction ^{<i>x</i>H₂O}
	9.8 500 4.3 (34.0 atm,	0.55 ¹ 0.70 ¹		
200 366	5.5 3450 kPa)	0.57^{1} 0.59^{1}		
300 422 350 449		0.581		
400 477 445 502		0.50^{1} 0.27^{1}		
	3.15 1000	0.847		
76 297	7.6 (68.0 atm,		0.050^{2}_{2}	
77 298	8.15 6895 kPa) 3.7	1.197	0.009 ² 0.018	0.0067
103 312	2.6	1.170 1.095		
143 334	1.8		0.037 ²	0.01452
145 335 155 341		0.951	0.037	0.0145 ² 0.0134
192 362	2.0	1.112	0.087^{2}	0.022 2
245 391 246 392	2.0	2	0.007	0.031 ²
248 393 297 420	3.15).4	1.30 ² 1.64 ²		
298 420	0.9		0.170^{2}	0.067 ²
	3.15 2.6	1.90 ²	0.309 ²	?
359 454 400 477		2.10^{2}		0.150^{2} 0.263^{2}
455 508	3.15	2.10 ² 1.94 ² 1.64 ²	0.900^{2}	0.489 ²
	L.5 3.15	1.04		0.661^{2}
	2.6 4.3	1.20 ²	1.787 ²	0.750 ²
		1.82		
125 324	4.8 (102.1 atm,	1.70		
	1.5 10,340 kPa) 1.5	1.70 2.17		
410 483	3.15	3.41 3.88		
	7.6 3.7	2.58		
32 273	3.15 2000	0.981		
85 302	2.6 (136.1 atm,	2.34		
	4.8 13,790 kPa) 6.5		0.049 ²	i
	7.0	3.07²		0.0065 ²
252 395	5.4	2.94 ²		
	5.5 2.0			0.0189 ² 0.040 ²
302 423	3.15 4.8	3.34 ²	0.170 ²	
400 477	7.6	J • J 7	0.510 ²	0.007
	B.15 B.7			0.131 ² 0.144 ²
403 479	9.3 3.7	4.69 ²	1.049 ²	
487 525	5.9	2	4.042	0.295²
488 526	5.5	5.86 ²		
		Cc	ontinued on next	page.

COMPONENTS	:			ORIGINAL	MEASUREMENTS:	
(1) Hyd	rogen; H ₂ ;	[1333-74-0]		Suciu, Ph. D.	thesis, 1951	
(2) Water; H ₂ O; [7732-18-5]			Purdue	Purdue University		
					. M. thesis, 1952 University	
EXPERIME	NTAL VALUES	5:				
Tempe	rature	Pressure	Hydroge		Vapor Com	
t∕°F	т/к	p/lb in ⁻²	Solubil S/cm ⁻³ ((STP) g ⁻¹	c _{H2O} /mol dm ⁻³	mol fraction #H20
500 545	533.15	2000	6.1		1.200 ²	0.345 ²
345	228°T2		0.3	004	2	2

567	570.4		2.22	1.825 ²	0.535 ²	
575	574.8		6.07 ²	2.612^{2}	•	
577	575.9				0.695 ²	
620	599.8			_	0.782 ²	
622	600.9		2.50 ²	2.750 ²		
637	609,3			4.725 ²		
32	273.15	3000	1.215			
89	304.8	(204.1 atm,	3.40			
115	319.3	20,680 kPa	3.39			
128	326.5	20,000 KIA/	3.38			
142	334.3		3.45			
			3.45			
151	339.3					
201	367.0		3.86			
238	387.6		4.28			
305	424.8		5.18			
340	444.3			0.257	0.035	
405	480.4		7.18	0.407	0.101	
510	538.7			1.341	0.175	
523	545.9		10.03			
575	574.8		10.45	1.655	0.218	
632	606.5		10.50	2.400	0.266	

All of the values in the table above appeared in the Ph. D. thesis of L. M. Zoss.

¹Values calculated from the data of Pray, H. A.; Schweickert, C. E.; Minnick, B. H. Battelle Memorial Institute, BMI-T-25, May 1950.

²Values from the Ph. D. thesis of Suciu, S.

Both Ph. D. thesis were directed by W. L. Sibbitt of the Department of Mechanical Engineering.

The hydrogen solubility values were reported as Kuenen coefficients, S/cm³ H₂ at 1 atm and 273.15 K g⁻¹ water.

COMPONENTS:		ORIGINAL MEASUREMENTS:
l. Hydr	ogen; H ₂ ; [1333-74-0]	Pray, H. A.; Schweichert, C. E.;
	ogen, n ₂ , [1555 /4 0]	Minnich, B. H.; Ind. Eng. Chem.
2. Wate	r; H ₂ O; [7732-18-5]	1952, 44, 1147-1151.
Į		
VARIABLES:		PREPARED BY:
Temperat	ure, pressure	C. L. Young
EXPERIMENTAL	VALUES:	· · · · · · · · · · · · · · · · · · ·
(10^3 Mole fraction of	f hydrogen
т/к	P/bar in water	· ·
	$10^{3}x_{H_2}$	
297.0	13.79 0.24	
1	20.68 0.29	
533.1	24.13 0.32 6.89 0.28	
333.1	13.79 0.65	
588.7	20.68 0.89 6.89 0.46	
588./	6.89 0.46 13.79 0.94	
]	20.68 1.43	
616,5	6.89 1.00 7.93 1.16	
	8.27 1.20	
	8.62 1.24	
}		
ļ		
	AUXILIARY	INFORMATION
METHOD/APP	ARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Rocking e	equilibrium cell of 3 l	
capacity	. Pressure measured with	
dead weig	ght gauge and temperature using chromel-alumel	No details given.
	uple. Cell contents	
equilibra	ated and liquid sample	
removed.	The amount of dissolved nated volumetrically.	
1		
		ESTIMATED ERROR:
l		$\delta T/K = \pm 1; \delta P/bar = \pm 1;$
1		$\delta x_{H_2} = 1-5$ (estimated by compiler).
1		REFERENCES :
1		

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Water; H₂O; [7732-18-5]</pre>	Stephan, E. L.; Hatfield, N. S.; Peoples, R. S.; Pray, H. A. H. Battelle Memorial Institute Report BMI-1067, 1956.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES: Mole fraction of hydrogen T/K p^{\dagger}/bar in liquid, x_{H_2}	Mole fraction of hydrogen T/K P [†] /bar in liquid, ^x H ₂
373.15 15.5 0.000257 15.5 0.000265 16.2 0.000281 16.9 0.000281 16.9 0.000281 36.2 0.000539 37.6 0.000571 39.0 0.000595 39.0 0.000595 70.7 0.00111 71.4 0.00108 72.1 0.00108 72.1 0.00108 72.1 0.00108 97.6 0.00145 98.9 0.00151 100.3 0.00155 408.15 14.1 0.000291 14.8 0.000292 15.5 0.000289 16.2 0.000643 36.2 0.000675 36.9 0.000699 + 61.0 0.00114 partial pressure of hydrogen	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE: Static equilibrium cell. Gas and liquid equilibrated for 18 hours. Pressure measured with Bourdon gauge and temperature measured with thermo- Couple. Composition of liquid estimated by volumetric method. Details in source. Partial pressure estimated by subtracting vapor pres- sure from total pressure.	SOURCE AND PURITY OF MATERIALS: NO details given.
	ESTIMATED ERROR: $\delta T/K = \pm 0.6; \delta P/bar = \pm 0.3;$ $\delta x_{H_2} = \pm 0.00002 \text{ (estimated by compiler).}$ REFERENCES:

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COMPONENT	S:	······································		ORIGINA	L MEASUR	EMENT	S:	
1. Hyd	rogen; H ₂	; [1333-74-0]		Wiebe	∋, R.;	Gad	dy, V. L.	
		; [7727-37-9]		J. Am. Chem. Soc.				
		[7732-18-5]		1935	, 57, 1	L487-	8.	
VARIABLES	•			PREPARE		÷		
VARIADELL				FREFARE.	U DI;			
	Pre	ssure			C	с. г.	Young	
EXPERIMEN	ITAL VALUES:							
					centage		Mole [*] frac	
p/atm	p*/MPa	$solubility^{\#}$		of hyd:	rogen in ga			
p/acm	p"/MPa	botability	±	rrdara			x _{H₂}	^{<i>x</i>} N ₂
								1
50	5.07	0.8344 0.8359		0.27	76.5 76.4		0.000538 0.000538	0.000132 0.000134
100	10.13	1.638		0.73	76.4		0.00106	0.000254
		1.643		0.96	76.5		0.00107	0.000251
200	20.27	1.645 3.215		0.88	76.6	50	0.00107 0.00212	0.000253 0.000459
		3.205	8	3.13			0.00214	0.000434
400	40.53	6.063 6.072		4.20	76.3 76.3		0.00409 0.00411	0.000769 0.000758
600	60.80	8.805	8	5.05	76.3		0.00598	0.001057
800	81.06	8.813 11.312		4.80	- 76.3	20	0.00597 0.00772	0.001076 0.00131
800	81.00	11.342		5.04	76.4	41	0.00769	0.00136
1000	101.33	13.748 13.701		5.96	76.2	28	0.00941 0.00934	0.00155 0.00158
	[#] Volum	lated by compiler e of gas, measure	ed at	273.1	5 K and	4 101	3 kPa, di	issolved
	by l	g of water at the	spe	cified	temper	ratur	e and pres	ssure.
		AUXIL	IARY	INFORMAT	TION			
METHOD/AF	PARATUS/PROC	EDURE :		SOURCE	AND PURI	TTY OF	MATERIALS:	
-		thod with two		1 an			ire prepare	
	-	n train. Second	1				ing hydroge	
		ource of sample				-	r impurity	was
1	-	Pressure measured	1		3	argor	1.	
with d	ead weight	gauges.			3. 1	No de	etails.	
					ED ERROF			+0.0F.
				· ·			δp/MPa = :	±0.05;
1				δ <i>¤</i> H ₂	, ^{δx} N ₂	= ±2	έ τ.	
				REFEREN	1045.		······································	
				I I I I I I I I I I I I I I I I I I I				

COMPONENTS:		OPTOTNAL MOLOUPENERS
		ORIGINAL MEASUREMENTS:
1. Deuter	cium; D ₂ ; [7782-39-0]	Stephan, E. L.; Hatfield, N. S.;
2. Water-	-d ₂ ; D ₂ O; [7789-20-0]	Peoples, R. S.; Pray, H. A. H.
		battelle Memorial Institute Report
		_
		<i>BMI-1067</i> , <u>1956</u> .
VARIABLES:		PREPARED BY:
Temperatu	re, pressure	C. L. Young
remperatu		
EXPERIMENTAL	VALUES:	
	. Mole fraction of d	leuterium
T/K	<i>P</i> [^] /bar in liquid,	
	² D ₂	
435.93	16.7 0.000375	
433.93	17.4 0.000433	
	18.5 0.000464	
	26.5 0.000660 27.2 0.000625	
ł	27.9 0.000696	
533.15	20.6 0.001088	
	21.40.00111522.30.001124	
	25.0 0.001293	
	26.4 0.001257	
574.82	28.5 0.001444 4.1 0.000312	
574.02	5.1 0.000419	
1	6.5 0.000553	
	21.6 0.001729 22.3 0.001907	
	23.4 0.001845	
		······································
*	_	
P*	partial pressure of deuter	ium
	AUXILIARY	INFORMATION
METHOD/APPA	RATUS/PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Gas and 1	iquid equilibrated for 18	
	Pressure measured with	
	auge and temperature	No details given.
sition of	with thermocouple; compo- liquid estimated by	
	c method. Details in	
source.	Partial pressure estimated	
total pre	cting vapor pressure from ssure.	
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.6; \delta P/bar = \pm 0.3;$
		$\delta x_{D_2} = \pm 3$ % (estimated by compiler).
		REFERENCES:

COMP	ONENTS:			ORIGINAL MEASUREMENTS:
1.	Hydrogen; H ₂	• []333-74-0	11	Wisniak, J.; Hershkowitz, M.;
			1	Leibowitz, R.; Stein, S.
2.	Water; H ₂ O; D-mannitol (C ₆ H ₁₄ O ₆ ; [69-	cordycepic a	cid);	J. Chem. Engng. Data, <u>1974</u> , 19, 247-249.
AR	LABLES:			PREPARED BY:
Те	mperature, pro	essure, conc	centration	C.L. Young
XPI	ERIMENTAL VALUES: T/K		Conc. /mo (soln	
-	353.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26	0.5 0.5 0.5 0.5 0.5 0.5 0.5	1.13 2.12 3.03 3.99 5.00 5.96 7.75
	373.15	55.16 6.895 13.79 20.68 27.58 34.47 41.37 48.26	0.5 0.5 0.5 0.5 0.5 0.5 0.5	7.87 1.29 2.35 3.45 4.48 5.66 6.75 7.84 8.84
	393.15	55.16 6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	1.36 2.55 3.72 4.92 6.19 7.33 8.47 9.69
			AUXILIARY	INFORMATION
ſΕT	HOD /APPARATUS	PROCEDURE :		SOURCE AND PURITY OF MATERIALS;
La wi ga wi hy le tr	rge high press th liquid samp rried at by st s buret appara th components drogen and equ ast 15 minutes ansferred to a paratus.	sure autocla pling port. tripping sol atus. Cell pressurized illibrated f s. Liquid s	Analysis ution in charged with or at ample	 No details given. Distilled. Sigma sample purity 99.9 mole per cent.
				ESTIMATED ERROR: $\delta T/K = \pm 1.0; \ \delta P/bar = \pm 0.7;$ $\delta x_{H_2} = \pm 3-5$ %. REFERENCES:

COMPONENTS:		ADTATNAL ARTACHDRAMING
	. 11222 74 01	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂		Wisniak, J.; Hershkowitz, M.; Leibowitz, R.; Stein, S.
2. Water; H ₂ O;	[7732-18-5]	J. Chem. Engng. Data, 1974, 19,
3. Xylose; C ₅ H ₁	₀O₅;[25990-60-7]	247-249
VARIABLES:		
	ressure, concentration	PREPARED BY: C.L. Young
EXPERIMENTAL VALUE	S:	-1
т/к	P/bar Conc./m (sol	
353.15	6.895 0.5 13.79 0.5 20.68 0.5 27.58 0.5 34.47 0.5 41.37 0.5 48.26 0.5 55.16 0.5	1.20 2.16 3.13 4.06 5.12 6.10 7.05 8.15
373.15	6.8950.513.790.520.680.527.580.534.470.541.370.548.260.555.160.5	1.18 2.21 3.36 4.33 5.47 6.57 7.53 8.66
393.15	6.8950.513.790.520.680.527.580.534.470.541.370.5	1.52 2.76 4.07 5.21 6.43 7.77 cont.
	AUXILIARY	INFORMATION .
METHOD /APPARATU	US/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Large high pres With liquid san Carried at by s Gas buret appar With components hydrogen and ed least 15 minute	ssure autoclave fitted mpling port. Analysis stripping solution in ratus. Cell charged s pressurized with quilibrated for at es. Liquid sample a two buret stripping	 No details given. Distilled. Sigma sample purity 99.9 mole per cent.
		ESTIMATED ERROR: $\delta T/K = \pm 1.0; \ \delta P/bar = \pm 0.7;$ $\delta x_{H} = \pm 3-5\%.$ REFERENCES:

Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS : L. Hydrogen; H_2 ; [1333-74-0] 2. Water; H_2O ; [7732-18-5] 3. Xylose; $C_5H_{10}O_5$; [25990-60-7]			ORIGINAL MEASUREMENTS : Wisniak, J.; Hershkowitz, M.; Leibowitz, R.; Stein, S. J. Chem. Engng. Data, <u>1974</u> , 19, 247-249.
XPERIMENTAL VA	LUES :		
T/K	P/bar	Conc./mol (soln	1 ⁻¹ 10 ⁴ Mole fraction of hydrogen in liquid, $10^{4}x_{H_{2}}$
393.15	48.26 55.16	0.5	8.97 10.29
353.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.37 2.73 3.86 4.97 6.35 7.56 8.65 9.88
373.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.20 2.28 3.25 4.31 5.58 6.36 7.41 8.47
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.33 2.56 3.78 4.99 6.20 7.37 8.49 9.76
373.15	6.895 13.79 20.68 27.58 34.47 41.37 42.26 55.16	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.41 2.88 3.99 5.44 6.65 7.86 8.51 10.41
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.51 2.66 4.02 5.38 6.72 7.69 9.01 10.33

COMPONENTS :		······	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂	; [1333-74-0]		Wisniak, J.; Hershkowitz, M.;		
2. Water; H_20 ;	[7732-18-5]		Leibowitz, R.; Stein, S.		
3. Xylitol; C ₅ H ₁₂ O ₅ ; [87-99-0]			J. Chem. Engng. Data. <u>1974</u> , 19, 247-249.		
VARIABLES:			PREPARED BY:		
Temperature,	pressure, conc	centration			
EXPERIMENTAL VALUE	S:				
т/к	P/bar	Conc. /mo (soln			
353.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	1.13 2.03 2.92 3.98 4.91 5.74 6.67 7.75		
373.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	0.5 0.5 0.5 0.5 0.5 0.5 0.5	1.23 2.20 3.22 4.35 5.37 6.22 7.37 8.34		
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26	0.5 0.5 0.5 0.5 0.5 0.5	1.60 2.89 4.18 5.47 6.77 7.95 9.33		
		AUXILIARY	INFORMATION		
METHOD /APPARATUS Large high pres with liquid sar carried at by s gas buret appa: with components hydrogen and ed least 15 minute transferred to apparatus.	ssure autoclav mpling port. stripping solu ratus. Cell c s pressurized quilibrated fo es. Liquid sa	Analysis tion in harged with r at mple	<pre>SOURCE AND PURITY OF MATERIALS; 1. No details given. 2. Distilled 3. Sigma sample purity 99.9 mole per cent. ESTIMATED ERROR:</pre>		
			$\delta T/K = \pm 1.0; \ \delta P/bar = \pm 0.7;$ $\delta x_{H_2} = \pm 3-5\%.$ REFERENCES:		

Hydrogen and Deuterium Solubilities above 200kPa

. Water; H ₂ O; [7732-18-5 . Xylitol; C ₅ H ₁₂ O ₅ ; [87-99-0]			. Chem. Engng. Data. <u>1974</u> , 19, 47-249.
PERIMENTAL VA	LUES :		
т/к	P/bar	Conc. /mol 1- (soln)	hydrogen in liquid,
			10 ⁴ <i>x</i> _{H2}
393.15	55.16	0.5	10.73
353.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	0.5 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.35 2.61 3.88 5.03 6.22 7.45 8.91 9.87
373.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.50 2.92 4.11 5.44 6.84 8.04 9.43 10.71
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.60 2.96 4.41 5.94 7.33 8.73 9.92 11.39
353.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.41 2.54 3.58 4.69 5.83 7.07 8.17 9.27
373.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.34 2.42 3.50 4.56 5.92 6.92 8.30 9.44
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.40 2.73 3.84 5.00 6.34 7.42 8.71 10.05

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H_2 ; [1333-74-0]	Wisniak, J.; Hershkowitz, M.;			
	Leibowitz, R.; Stein S.			
2. Water; H ₂ O; [7732-18-5]	J. Chem. Engng. Data, 1974,19, 247-9			
3. D-Glucitol, (Sorbitol); C ₆ H ₁₄ O ₆ ; [50-70-4]	0. 0.0 Diginge Sucus <u>2571</u> ,103 217 5			
VARIABLES:	PREPARED BY:			
Temperature, pressure, concentration	C.L. Young			
EXPERIMENTAL VALUES: T/K P/bar Conc./mol (soln)	1^{-1} 10 ⁴ Mole fraction of hydrogen in liquid, $10^{4}x_{H_2}$			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.08 2.08 2.97 3.94 5.01 5.86 6.81 7.75			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.29 2.38 3.58 4.72 5.86 6.85 8.02 9.29			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.25 2.54 3.64 4.68 5.85 7.21 8.28			
AUXILIARY	INFORMATION -			
METHOD /APPARATUS/PROCEDURE: Large high pressure autoclave fitted with liquid sampling port. Analysis carried at by stripping solution in gas buret apparatus. Cell charged with components pressurized with hydrogen and equilibrated for at least 15 minutes. Liquid sample transferred to a two buret stripping apparatus.	<pre>Source AND PURITY OF MATERIALS: 1. No details given. 2. Distilled. 3. Sigma sample purity 99.9 mole per cent. ESTIMATED ERROR: δ T/K = ±1.0; δP/bar = ±0.7; δx_{H2} = ±3-5%. REFERENCES:</pre>			

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Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS :	. <u></u>		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]			Wisniak, J.; Hershkowitz, M.;
 Water; H₂O; [7732-18-5] D-Glucitol, (Sorbitol); C₆H₁₄O₆; [50-70-4] 			Leibowitz, R.; Stein, S.
		C ₆ H ₁₄ O ₆ ;	J. Chem. Engng. Data, <u>1974</u> , 19, 247 –9.
EXPERIMENTAL V	ALUES :	······	
T/K	P/bar	Conc./mol (solr	
393.15	55.16	0.5	9.43
353.15	6.859 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.22 2.29 3.25 4.54 5.44 6.47 7.61 8.53
373.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.23 2.22 3.21 4.37 5.28 6.32 7.47 8.50
393.15	6.895 13.79 20.68 27.58 34.47 41.37 48.26 55.16	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.45 2.52 3.83 5.30 6.46 7.89 8.98 10.24

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Methane; CH₄; [74-82-8]</pre>	Colin L. Young, Department of Physical Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia. October 1980.

CRITICAL EVALUATION:

The most extensive data on this system are those of Tsang *et al*. (1) who made measurements up to 138 MPa at temperatures between 92.3 K and 180.0 K. The mixture critical line and the pressure-temperature locus of solid-liquid-vapor equilibrium were also determined. Their measurements were carried out using proven apparatus and experimental technique and are classified as recommended.

The limited results of Augood (2) at 111.7 K are broadly consistent with those of Tsang *et al.* but the scatter is very great and therefore Augood's data are classified as doubtful. The results of Freeth and Verschoyle (3) at 90.6 K show considerable scatter and are somewhat smaller than would be expected from an extrapolation of the data of Tsang *et al.* (1) and are therefore classified as doubtful. The data of Steckel and Tsin (4) were presented in small graphical form and are not considered further.

The data of Fastovskii and Gonikberg (5) appear to be in reasonable agreement with those of Tsang $et \ all$. (1) although they are considerably less precise. Similarly the measurements of Kirk and Ziegler (6) are in reasonable agreement with those of Tsang $et \ all$. (1) but show more scatter and are restricted to pressures below 13 MPa. The limited data of Benham and Katz (7) at 116.5 K, 144.3 K and 172 K are also in fair agreement with those of Tsang $et \ all$. (1) but are limited to pressure below 16 MPa. The data of Sagara $et \ all$. (8) give mole fraction solubilities which are slightly greater than those of Tsang $et \ all$. (1). The data of Fastovskii and Gonikberg (5), Kirk and Ziegler (6), Benham and Katz (7) and Sagara $et \ all$. (8) are all classified as tentative but all thought to be considerably less reliable than the measurements of Tsang $et \ all$. (1).

The data of Yorizane *et al.* (9) deviate considerably from the data of Tsang *et al.* (1) at pressure below 10 MPa but are in fair agreement at the pressures above 10 MPa. The former data are therefore classified as doubtful.

References:

1.	Tsang, C. Y.; Clancy, P.; Calado, J. C. G.; Streett, W. B. Chem. Eng. Comm. <u>1980</u> , 6, 365-383.
2.	Augood, D. R. Trans. Instn. Chem. Engnrs. <u>1957</u> , 35, 394.
3.	Freeth, F. A.; Verschoyle, T. T. H. Proc. Roy. Soc. A 1931, 130, 453.
4.	Steckel, F. A.; Tsin, N. M. Zh. Khim. Prom. <u>1939</u> , 16, 24.
5.	Fastovskii, V. G.; Gonikberg, M. G. <i>Acta Physicochim. U.S.S.R.</i> <u>1940</u> , <i>12</i> , 485.
6.	Kirk, B. S.; Ziegler, W. T. Adv. Cryogenic Engng. <u>1965</u> , 10, 160.
7.	Benham, A. L.; Katz, D. L. Am. Inst. Chem. Engnrs. J. 1957, 3, 33.
8.	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Eng. Japan <u>1972</u> , 5, 339.
9.	Yorizane, M.; Yoshimura, S.; Mazouka, H.; Toyama, A. Proc. ICECI 1968, p.59. Heywood Temple, London.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Freeth, F. A.; Verschoyle, T. T. H.;
2. Methane; CH ₄ ; [74-82-8]	Proc. Roy. Soc. A <u>1931</u> , 130, 453-463.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hydrogen T/K P/bar in liquid, in vapor, $x_{\rm H_2}$ $y_{\rm H_2}$	Mole fraction of hydrogen T/K P/bar in liquid, in vapor, ${x_{ m H_2}} {y_{ m H_2}}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	90.63 100.64 0.0559 0.9882 90.67 129.89 0.0819 0.9846 90.62 129.92 0.0760 0.9683 90.61 166.97 0.0784 0.9789 90.65 168.99 0.0890 0.9783 90.64 188.55 0.1016 - 90.67 198.34 0.1020 0.9789 90.63 208.14 - 0.9769 90.62 208.15 0.0958 0.9787
	INFORMATION
METHOD /APPARATUS/PROCEDURE: Static equilibrium cell fitted with liquid and vapor sampling parts and magnetically operated stirrer. Pressure measured on pressure balance (dead weight gauge). Temperature measured with platinum resistance thermometer. Gas analysed by com- bustion and absorption. See ref. 1 and source, few details given.	 SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. Crude sample passed through fuming sulfuric acid, ordinary sulfuric acid and potassium hydroxide solution fractionally distilled six times.
	ESTIMATED ERROR: $\delta T/K = \pm 0.02; \delta P/bar = \pm 0.1;$ $\delta x_{H_2}, \delta y_{H_2} = \pm 0.005.$ REFERENCES: 1. Verschoyle, T. T. H.; <i>Phil. Trans. A</i> <u>1931</u> , <i>230</i> , 189.

COMPONENT	S:			ORIGINAL	MEASUREME	NTS:			
<pre>l. Hydrogen; H₂; [1333-74-0]</pre>				Fasto	Fastovskii, V. G.; Gonikberg, M. G.				
2. Methane; CH4; [74-82-8]			Acta 1	Acta Physicochim. U.S.S.R.					
			<u>1940</u> ,	12, 485-	-488 and				
			Zh. Fa	iz. Khim.					
					14, 426.	•			
VARIABLES	:			PREPARED	BY:				
	Tempera	ture, pre	ssure		c	. L. Yo	ung		
EXPERIMEN	TAL VALUES	:							
			lole fraction				Mole fraction of hydrogen		
T/K	P/atm	P/MPa	of hydrogen in liquid,	т/к	P/atm	<i>P/</i> MPa			
			$x_{\rm H_2}$				$x_{\rm H_2}$		
							<u></u>		
90.5 90.5	49 76	5.0 7.7	0.024 0.036	110.2 110.2	78 90	7.9 9.1	0.064 0.077		
90,5	102	10.3	0.050	110.2	97	9.8	0.085		
90.5	139	14.1	0.064	110.2	103	10.4	0.087		
90.5 90.5	164 171	16.6 17.3	0.081 0.082	110.2 110.2	138 141	14.0 14.3	0.111 0.119		
90.5	221	22.4	0.097	110.2	187	18.9	0.156		
103.3 103.3	39	4.0	0.022	122.2	36	3.6	0.032		
103.3	77 104	7.8 10.5	0.063 0.092	122.2 122.2	77 96	7.8 9.7	0.063 0.092		
103.3	111	11.2	0.099	122.2	112	11.3	0.099		
103.3 103.3	146	14.8	0.075	122.2	140	14.2	0.116		
103.3	175 234	17.7 23.7	0.105 0.138	122.2 127.2	187 37	18.9 3.7	0.162 0.038		
110.2	32	3.2	0.033	127.2	62	6.3	0.067		
110.2 110.2	49	5.0	0.042	127.2 127.2	85 131	8.6 13.3	0.093 0.143		
	66	6.7	0.058						
			AUXILIARY	INFORMATI	ION				
METHOD/AP	PARATUS/PR	OCEDURE:		T	SOURCE AND PURITY OF MATERIALS:				
Recircu	ulating v	apor flow	method						
			ich could						
		by compi			No	details	given.		
	obcarmen	. Dy compi							
				ł					
				1					
				FSTTMATE	D ERROR:				
					$= \pm 0.5;$	δ₽/м₽⇒	= +0 1.		
				° ^x H ₂	= ±0.002				
				REFERENC		comp	iler).		
						۵			
					kolov, A.				
				1			tigating native		
					gases", <u>1932</u> (Russian).				

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Methane; CH₄; [74-82-8] 	Benham, A. L.; Katz, D. L. Am. Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33-36.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hyd T/K P/bar in liquid, in ^x H ₂	drogen vapor, ^y H ₂
68.95 0.0877 0.4 88.25 0.1255 0.4	L583 1060 1631 1678
144.3 34.5 0.0343 0.6 68.95 0.0781 0.7 102.7 0.1310 0.7	3392 7618 7931
116.5 33.8 0.0318 0.9 102.7 0.0950 0.9	7823 279 466 383
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Recirculating vapor flow system described in ref. 1. Temperature measured with thermocouple. Pressure measured with Bourdon gauge. Vapor recirculated by high pressure mag- netic pump. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed by gas density measurements. Details in ref. 1.	 Purity better than 99.5 mole per cent; further purified to re- move water vapour. Purity better than 99.0 mole per cent; further purified to re- move water and higher hydro- carbons.
	ESTIMATED ERROR: $\delta T/K = \pm 0.6; \delta P/bar = \pm 0.5\%;$ $\delta x_{H_2}, \delta y_{H_2} = \pm 0.5\%.$
	REFERENCES: 1. Aroyan, H. J.; Katz, D. L. Ind. Eng. Chem. <u>1951</u> , 43, 185.

COMPONENTS:			ORIGINAL MEASUREMENTS:	
	-	[1333-74-0]	Augood, D. R.	
2. Methar	ne; CH ₄ ;	[74-82-8]	Trans. Instn. Chem. Engnrs.,	
			<u>1957</u> , <i>35</i> , 394-408.	
VARIABLES:			PREPARED BY:	
	Pressure	e	C. L. Young	
EXPERIMENTAL	WAT WEG		1	
ATERIMENTAL	VALUES:			
T/K	P/psig ⁺	P/MPa	Mole fraction of hydrogen	
			in liquid, x_{H_2} in gas, y_{H_2}	
117 5				
111.7	2600 1500	18.03 10.44	0.121 0.942 0.091 0.940	
	330	2.38	0.022 -	
	+ psig	- pounds per s	quare inch gauge pressure	
		AUXILIAR	/ INFORMATION	
METHOD/APPAR	ATUS/PROCEDUR		SOURCE AND PURITY OF MATERIALS:	
Static equ	ilibrium ce	ell fitted with	1. Electrolytic sample containing	
After equi	librium bad	l Stirrer.	0.09 mole per cent HD.	
I - VUDIIGNO	d campled c	t ase and light	2. National Coal Board sample.	
condensed	en. The me	thane was		
Ratio of W	estimated	volumetrically.		
by mass sp	ectrometry.		ESTIMATED ERROR:	
			ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/MPa = \pm 0.1;$	
			$\delta x_{H_2}, \delta y_{H_2} = \pm 4\% \text{ (estimated by}$	
			- compiler)	
			REFERENCES:	
			· ·	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Kirk, B. S.; Ziegler, W. T. Int. Adv. Cryog. Eng.
2. Methane; CH ₄ ; [74-82-8]	<u>1965</u> , <i>10</i> , 160-170.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES: Mole fraction of hydrogen	Mole fraction of hydrogen
T/K P/bar in liquid, in vapor ^x H ₂ ^y H ₂	, T/K P/bar in liquid in vapor, $x_{\rm H_2}$ $y_{\rm H_2}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Single flow apparatus with two- compartment equilibrium cell. Pres- sure measured with Bourdon gauge. Temperature measured with a platinum resistance thermometer. Pure hydrogen bubbled through liquid methane. Samples analysed by gas chromatography. Details in source ref. and ref. 1.	 Purified gas, traces of nitrogen and oxygen. Phillips research grade; purity 99.57 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.03; \delta P/bar = \pm 0.03; \delta x_{H_2}, \delta y_{H_2} = \pm 2$ %. REFERENCES: 1. Kirk, B. S. <i>Ph.D. Thesis</i> , Georgia Institute of Technology, <u>1964</u> .

		Saturated H	ydrocarbons	327
COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Methane; CH ₄ ; [74-82-8]			Masuoko, H.; T	Yoshimura, S.; Yoyama, A. 1968, p.59, Heywood
VARIABLES:			PREPARED BY:	
Temperature, pressure			c.	L. Young
EXPERIMENTAL VA	LUES:			· · · · · · · · · · · · · · · · · · ·
т/к	P/atm	P/MPa	Mole fraction in liquid, ^{°°} H ₂	of hydrogen in vapor, ^y H ₂
163.15 143.15 123.15 103.15	20 20 30 40 50 60 80 100 120 140 150 10 20 30 40 50 20 30 40 50 20 30 40 50 20 30 50	2.03 2.03 3.04 4.05 5.07 6.08 8.11 10.13 12.16 14.19 15.20 1.01 2.03 3.04 4.05 5.07 2.03 3.04 4.05 5.07 1.01 1.52 2.03 3.04 5.07	- 0.011 0.030 0.028 0.047 0.081 0.140 0.178 0.286 0.286 0.003 0.008 0.035 0.055 0.064 0.020 0.038 0.035 0.055 0.004 0.038 0.038 0.035 0.055 0.004 0.038 0.038 0.035 0.055 0.004 0.038 0.038 0.035 0.055 0.004 0.038 0.035 0.055 0.004 0.038 0.035 0.055 0.005 0.055 0.005	0.136 0.132 0.341 0.456 0.521 0.521 0.569 0.608 0.599 0.576 0.550 0.152 0.510 0.682 0.693 0.745 0.886 0.931 0.909 0.902 0.930 0.953 0.962 0.968 0.963
			INFORMATION	
METHOD /APPARATU	S/PROCEDURE:		SOURCE AND PURITY	OF MATERIALS:
Vapor recycl magnetic pum	e equilibriu p. Temperat m resistance measured wi r and liquid ly and expan temperature.	ure measured thermometer th Bourdon sampled ded to 200 analysed	 Purity 99. better. Purity 99. and nitrog impurities 	<pre>99 mole per cent or 93 mole per cent oxygen en being principle P/MPa = ±0.03 up to 7.5 = ±2%.</pre>
			REFERENCES:	

COMPONENTS: ORIGINAL MEASUREMENTS:				
1. Hydrogen; H_2 ; [1333-74-0] 2. Methane; CH_k ; [74-82-8]	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Eng. Japan <u>1972</u> , 5, 339- 348.			
VARIABLES:	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Eng. Japan <u>1972</u> , 5, 339- 348. PREPARED BY: C. L. Young T/K P/bar in liquid, in vapor, m_{H_2} y_{H_2} 143.05 59.9 0.0684 0.779 79.7 0.0992 0.802 101.5 0.127 0.810 172.05 87.5 0.136 0.435 103.6 0.201 0.429 173.65 35.7 0.0168 0.148 40.6 0.0257 0.206 60.7 0.0709 0.362 71.0 0.0938 0.406 81.7 0.124 0.424 83.8 0.131 0.424 100.5 0.190 0.420 103.4 0.205 0.411 108.3 0.225 0.401 NIFORMATION SOURCE AND PURITY OF MATERIALS: 1. Nippon Sanso Co. Ltd. sample; purity 99.99 mole per cent. 2. Takachiho Chemical Industry Co.			
Temperature, pressure	C. L. Young			
EXPERIMENTAL VALUES: Mole fraction	Mole fraction			
T/K P/bar in liquid, in vapor, ${}^{\omega}_{\mathrm{H}_{2}} = {}^{y}_{\mathrm{H}_{2}}$	of hydrogen T/K P/bar in liquid, in vapor,			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Static stainless steel cell of capacity 5×10^5 mm ³ fitted with magnetic stirrer and sampling valves. Cell enclosed in cryostat. Tempera- ture measured with thermocouple. Pressure measured using Bourdon gauge. Gases added to cell and equilibrated. Samples of liquid and gas withdrawn and analysed using a gas chromatograph with thermal conductivity detector. Details in source.	 Nippon Sanso Co. Ltd. sample; purity 99.99 mole per cent. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1;$ $\delta x_{H_2} = \delta y_{H_2} = \pm 1$ %.			
	REFERENCES :			

COMPONEN	TS:			ORIGINAL M	EASUREMENTS	5:		
1. Hydrogen; H ₂ ; [1333-74-0]							. :	
2. Methane; CH ₄ ; [74-82-8]			Tsang, C. Y .; Clancy, P.; Calado, J. C. G.; Streett, W. B.					
			4	•		•		
			Chem.	eng. comm	. <u>1980</u> , <i>6</i> ,	365-383.		
				[
VARIABLE	S :			PREPARED B	Y:			
	Tempe	erature, pre	ssure		с.	L. Young		
	-							
EXPERIME	NTAL VALUES	5:	<u></u>					
		Mole fra				Mole fra		
T/K	<i>P/</i> MPa	of hydr	ogen in vapor,	of hydrogen T/K ^P /MPa in liquid, in				
,	, u	ин 1144ала, ^ж Н2	и чарог, У _Н ,	-,	,	^ж н ₂	^у н ₂	
		112	112					
92.3	0.22	0.0018	0,9084	92.3	55.26	0.2393	0.9386	
	0.31	0.0023	0.9257	<i></i>	69.07	0.2836	0.9233	
	0.38	0.0031	0.9509		82.96	0.3300	0.8998	
	0.45 0.52	0.0035 0.0040	0.9561 0.9625		97.01 110.77	0.3780 0.4324	0.8808 0.8571	
	0.52	0.0040	0.9672		125.08	0.4967	0.8264	
	0.65	0.0050	0.9722		131.38	0.5361	0.7983	
	0.79	0.0060	0.9770		134.58	0.5591	0.7918	
	1.14 1.48	0.0085 0.0113	0.9821 0.9857	100.0	137.98 0.51	0.5875 0.0041	0.7563 0.9175	
	1.83	0.0140	0.9875		0.60	0.0050	0.9285	
	2.18	0.0163	0.9888		0.67	0.0055	0.9358	
	2.87 3.56	0.0209 0.0251	0.9904 0.9917		0.77 1.12	0.0063 0.0094	0.9420	
	4.22	0.0293			1.40	0.0116	0.9607	
	5.63	0.0382	0.9914		1.67	0.0140	0.9667	
	7.02	0.0461	0.9904		1.96	0.0163	0.9717 0.9758	
	10.42 13.91	0.0647 0.0826	0.9893 0.9860		2.86 3.56	0.0230 0.0283	0.9786	
	17.47	0.0988	0,9821		4.23	0.0331	0.9814	
	20.83	0.1134	0.9791		4.92	0.0388	0.9819	
	27.87 41.56	0.1416 0.1926	0.9707 0.9546		5.63	0.0436 (c	0.9819 ont.)	
1 miles		·····	AUXILIARY	INFORMATION	-			
METHOD /AI	PPARATUS/PF	ROCEDURE:				MATERIALS:		
Recircu	ilating w	apor flow ag	naratuc	1. Matheson ultra high purity sample,				
				purit	y 99.999	mole per c	ent or	
pump.		netically og		bette	er.			
-		e measured v	vith	2. Mathe	son samp	le, purity	99.99	
		re gauge.		2. Matheson sample, purity 99.99 mole per cent or better.				
		sured with p						
	ance ther		Samples of					
		ysed using a	thermal					
conduct	tivity gas	s analyser.		ESTIMATED	FRROR			
						$P/MPa = \pm 0.5$	8;	
			$\delta x_{\rm H_2}, \delta y$	$H_{2} = \pm 0.0$	005 (but mag	y be as		
						ear critica	l point).	
				REFERENCES	:			
					•	.; Calado,	J. C. G.	
						nodyn. <u>1978</u>		
				1089.		· ·		
				L				

COMPON	ENTS:			ORIGINAI	L MEASURE	MENTS :	
l. Hyd:	rogen; H	2; [1333-74	1-0]	Tsang, (c. y.; c	Clancy, P.;	
2. Met	hane; CH	4; [74-82-8	3]	Calado,	J. C. G.	; Streett,	W. B.
				Chem. Er	ng. Comm.	1980, 6, 36	5-383.
EXPERT	MENTAL VA	LUES :					
		Mole frac	ction			Mole fra	
T/K	<i>P/</i> MPa	of hydro in liquid,		т/к	<i>P/</i> MPa	of hydr in liquid,	ogen in vapor,
1/1	- / m a	^x H ₂	^y H ₂	1710	.,	^ж н ₂	y _{H₂}
		<u>-</u>					
100.0	7.04	0.0530	0.9824	120.0	9.54	0.0942	0.9315
	10.42 13.94	0.0753 0.0965	0.9796 0.9742		12.22 13.95	0.1204 0.1362	0.9351 0.9292
	17.32	0.1162	0.9705		17.53	0.1710	0.9182
	20.91	0.1396	0.9660		20.94	0.2027	0.9104
	24.35	0.1579	0.9607		24.21 27.82	0.2332	0.8982 0.8878
	27.71 41.74	0.1755 0.2449	0.9553 0.9280		27.82	0.2693 0.3031	0.8685
	55.37	0.3080	0.9016		34.58	0.3384	0.8437
	68.95	0.3813	0.8733		38.17	0.3819	0.8325
	82.44	0.4637	0.8327		41.52	0.4293	0.8035
	89.78 93.17	0.5324 0.5777	0.8037 0.7574		43.51 44.87	0.4651 0.4963	0.7839 0.7560
	94.58	0.6103	0.7396		46.73	0.5746	0.6941
	95.61		0.7096	130.0	0.81	0,0053	0.6245
110.0	0.34	0.0021	0.7252		1.48	0.0139	0.7572
	0.45	0.0032	0.8355		2.17 2.87	0.0212 0.0289	0.8128 0.8478
	0.56 0.58	0.0046	0.8649		4.20	0.0444	0.8656
	0.78	0.0068	0.8867		5.66	0.0602	0.8774
	1.11	0.0096	0.8958		6.99	0.0748	0.8850
	1.49	0.0136	0.9228		9.75	0.1070	0.8927 0.8894
	1.83 2.18	0.0165 0.0198	0.9308 0.9391		12.49 15.26	0.1394 0.1719	0.8867
	2.82	0.0252	0.9485		20.97	0.2386	0.8649
	3.56	0.0318	0.9541		24.41	0.2834	0.8447
	4.98	0.0442	0.9607		27.63	0.3295	0.8254
	6.37 7.78	0.0556 0.0672	0.9632		31.07 33.20	0.3874 0.4320	0.7935 0.7617
	9.07	0.0780	0.9632		34.01	0.4521	0.7456
	13.97	0.1153	0.9593		35.60		0.7305
	17.34	0.1417	0.9497		36.27		0.6363
	20.86	0.1684	0.9422	140.0	1.59 1.85	0.0124 0.0152	0.5782
	27.64 34.70	0.2164 0.2674	0.9264 0.9050		2.49	0.0152	0.6558
	41.54	0.3152	0.8837		2.89	0.0285	
	44.89	0.3413	0.8690		3.18		0.7291
	48.31	0.3703	0.8505		2.89	0.0285 0.0464	0.7200 0.7628
	48.86 51.86	0.3755 0.4012	0.8509 0.8325		4.26 5.66	0.0484	0.7971
[53.20	0.4145	0.8229		8.33	0.0998	0.8243
[55.29	0.4361	0.8181		11.15	0.1386	0.8305
	55.39	0.4372	0.8108		13.90	0.1780 0.2278	0.8276 0.8138
	57.32 58.85	0.4592 0.4768	0.8017 0.7973		17.28 20.24	0.2278	0.7929
1	62.28	0.5402	0.7634		21.17	0.2912	0.7856
	63.58	0.5830	0.7053		22.95	0.3242	0.7674
	63.90	0.6065	0.6902		25.83	0.3923	0.7288
120.0	0.79	0.0062	0.7178 0.7893	150.0	27.85 1.55	0.4751 0.0089	0.6652 0.4428
	1.13 1.51	0.0101 0.0138	0.8300	T20.0	3.22	0.0325	0.6511
	2.18	0.0206	0.8741		4.26	0.0468	0.6910
	3.58	0.0345	0.9104		5.58	0.0657	0.7193
	5.65	0.0549	0.9280		7.01	0.0871	0.7329 0.7449
1	7.20	0.0702	0.9325		8.47	0.1102	ont.)

COMPON	ENTS:			ORIGINA	L MEASURE	MENTS :	
l. Hyd	rogen; H	I ₂ ; [1333-74	1-0]	Tsang, (c. y.; c	lancy, P.;	
2. Met	hane; CH	14; [74-82-8	3]	Calado,	J. C. G.	; Streett,	W. B.
				Chem. En	ng. Comm.	<u>1980</u> , 6, 36	65-383.
EXPERI	MENTAL VA	LUES:		······································			
т/к	P/MPa	Mole frac of hydrc in liquid, ^x H ₂	ogen	T/K	P/MPa	Mole frac of hydro in liquid, ^x H ₂	ogen
						** 2	••• 2
150.0	9.70 12.52 15.38 17.77 20.21 20.90 22.41 2.43 2.84 3.68 5.07 6.26 8.71 10.43 11.75 12.79 14.03 15.27 16.06 16.64 17.32	0.1311 0.1784 0.2305 0.2782 0.3449 0.3695 0.4708 0.0146 0.0204 0.0355 0.0582 0.0793 0.1231 0.1569 0.1838 0.2059 0.2364 0.2725 0.3006 0.3238 0.3629	0.7492 0.7468 0.7366 0.7115 0.6780 0.6605 0.6692 0.5860 0.2661 0.3363 0.4505 0.5457 0.5950 0.6384 0.6491 0.6466 0.6357 0.6181 0.6030 0.5842 0.5527	170.0	3.74 4.44 5.76 7.10 8.56 9.78 11.14 11.79 12.58 12.82 4.76 5.30 5.80 6.19 6.73 7.21 7.77 8.33 8.67	0.0271 0.0405 0.0662 0.0949 0.1307 0.1617 0.2066 0.2275 0.2702 0.2933 0.0332 0.0460 0.0589 0.0700 0.0873 0.1023 0.1241 0.1517 0.1810	0.2436 0.3137 0.3995 0.4481 0.4750 0.4816 0.4754 0.4647 0.4384 0.4147 0.1608 0.1953 0.2242 0.2399 0.2581 0.5159 0.2726 0.2667 0.2528

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COMPONENTS :	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] Ethane; C₂H₆; [74-84-0] 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
	August 1980

CRITICAL EVALUATION:

This system has been investigated by five groups. The data of Levitskaya (1) and Levitskaya and Pryannikov, (2) are rejected since they are of low precision and deviate considerably from more recently published The data of Hiza $et \ al.$ (3), which cover the temperature range data. 107 to 190 K and pressures between 2 and 15 MPa, and those of Cohen et al.(4), which cover the range 144 to 200 K and pressures between 0.7 and 140 MPa, are in good agreement. Both sets of data give K-values which are in good agreement with those quoted by Williams and Katz (5). The mole fraction solubility data of Sagara $et \ all$. (6) are somewhat smaller than those of Hiza et al. (3) and Cohen et al. (4). Sagara et al. (6) data are more limited than those of refs. (3) and (4) and cover the temperature range 148 to 223 K and pressure between 2 and 8 MPa, and are classified as doubtful. Williams and Katz (5) data are only presented in graphical form and in the form of K-values (K = mole fraction in gas phase/mole fraction in liquid phase). The data of Hiza $et \ al.$ (3) and Cohen $et \ al.$ (4) are classified as tentative.

References:

- 1. Levitskaya, E. P. Zh. Tekh. Fiz. 1941, 11, 197.
- 2. Levitskaya, E. P.; Pryannikov, K. Zh. Tekh. Fiz. 1939, 9, 1849.
- Hiza, M. J.; Heck, C. K.; Kidnay, A. J. Adv. Cryogenic Engng. 1968, 13, 343.
- Cohen, A. E.; Hipkin, H. G.; Koppany, C. R. Chem. Engng. Progr. Symp. Ser. 1967, no. 81, 63, 10.
- 5. Williams, R. B.; Katz, D. L. Ind. Eng. Chem. <u>1954</u>, 46, 2512.
- 6. Sagara, H.; Arai, Y.; Saito, S. J. Chem. Eng. Japan <u>1972</u>, 5, 339.

COMPONENTS:			ORIGINAL MEASUREMENTS:
	H ₂ ; [1334-74	4-01	Williams, R.B.; Katz, D.L.
2. Ethane; C	2H6; [74-84-0	0]	Ind. Eng. Chem. <u>1954</u> , 46,2512-20.
VARIABLES:		- <u></u>	PREPARED BY:
	ure, pressure	e	C.L. Young
EXPERIMENTAL VAL	UES:		
т/к	P/bar	K-value of	hydrogen K-value of ethane
283.15	34.5 69.0 137.9 172.4	12.1 6.4 3.2 2.1	5 0.657 1 0.567
255.37	17.2 34.5 69.0 137.9 275.8 413.7	48.8 24.4 12.2 6.1 2.8 1.8	0.534 0.347 2 0.264 2 0.296
227.59	17.2 34.5 69.0 137.9 275.8 551.6	75.4 36.8 18.1 9.0 4.4 2.1	0.246 0.148 5 0.113 9 0.116
199.82	17.2 34.5 69.0 137.9 275.8	101.2 49.0 24.3 12.4 6.3	0.0850 0.0545 0.0432
		AUXILIARY	INFORMATION
METHOD: /APPARA Flow system of Temperature m couple. Pres Bourdon gauge by high press	lescribed in heasured with sure measure . Vapor rec	ref. (1). thermo- d with irculated	 SOURCE AND PURITY OF MATERIALS; 1. Purity 99.9 mole %. Dried. 2. Phillips Petroleum Co. pure grade, purity 99.7 mole %, dried.
Cell charged of each phase temperature a gas density m ref. (1).	e expanded to ind pressure	room analysed by	
			ESTIMATED ERROR: $\delta T/K = \pm 0.6; \ \delta P/bar = \pm 0.5\%; \ \delta K/K < 0.01.$ REFERENCES: 1. Aroyan, H.J.; Katz, D.L.
			Ind. Eng. Chem. <u>1951</u> , 43,185.

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COMPONENTS			ORIGI	NAL MEASURE	MENTS	
1. Hydrogen; H ₂	; [1334-74	-0]	Will:	iams, R.B.;	Katz,	D.L.
2. Ethane; C_2H_6	; [74-84-0]	Ind.	Eng. Chem.	<u>1954</u> ,	46,2512-20
EXPERIMENTAL VA	LUES:		L			
т/к	P/bar	K-value of	hydrogen	K-value	of etl	nane
199.92	551.6	3.	38	0.	0750	
172.04	17.2 34.5 69.0 137.9 275.8 551.6	124. 62. 31. 16. 8. 4.	2 3 3 75		0362 0206 0143 0127 0157 0277	
144.26	17.2 34.5 69.0 137.9 275.8 551.6	160 83. 43. 23. 13. 7.	2 6 1	0.(0.(0.(0.(00462 00314 00266 00272 00432 00934	
152.04	17.2 34.5 69.0 137.9 275.8 551.6	238 129 70. 40. 22. 13.	0 7			
138.15	17.2 34.5 69.0 137.9 275.8 551.6	320 179 100 57. 33. 19.	3			

COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Hydrogen, H ₂ ; [1333-74-0]	Cohen, A.E.; Hipkin, H.G.;
² . Ethane, C_2H_6 ; [74-84-0]	Koppany, C.R.
	Chem. Eng. Prog. Symp. Ser. No. 81,
	<u>1967</u> , 63,10-17.
VARIABLES:	PREPARED BY:
Temperature, pressure.	C.L. Young
EXPERIMENTAL VALUES:	l
	e fraction of hydrogen liquid, in vapor,
	x _{H2} y _{H2}
	0036 0.9933
	0062 0.9967
	0118 0.9975 0185 0.9979
	0258 0.9975
	0378 0.9951
	0454 0.9979
	0033 0.9728
	0103 0.9884
	0175 0.9928
158.21 51.59 0.	0266 0.9939
158.21 68.80 0.	0345 0.9956
158.21 103.77 0.	0470 0.9953
	0545 0.9944 .
	0036 0.9398
	0078 0.9769
	0169 0.9815
	0256 0.9852
	0355 0.9878
	0.9887
	0674 0.9890 0043 0.7290
	0135 0.8870
	0235 0.9284
	0341 0.9453
	0470 0.9528
	0700 0.9600
199.65 137.9 0.	0897 · 0.9618
METHOD /APPARATUS/PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
^{Equilibrium} established in cell by re-	1. Air Reduction Corp. sample "bone-
	dry" grade minimum purity 99.8 mole
	per cent. Dried over molecular sieve.
* essure measured with dead weight	
Judge. Temperature measured with	2. CP grade from Matheson, purity 99
platinum resistance thermometer.	mole per cent. Dried over molecular
⁴⁴ Yuid and vapor samples analysed by	sieve.
Sas Chromatography using thermal	
-Suguctivity and flame ionication	
detectors. Details in source and ref. 1.	
1.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.05$; $\delta P/bar = \pm 0.07$ or 1% whichever greater; $\delta x_{H_2} \approx \delta y_{H_2} \approx 3\%$
	at high concentration varying to ±0.001 at 0.01 and 0.0003 at 0.0005.
	REFERENCES: 1. H.G. Hipkin, Am. Inst. Chem. Eng.J.
	<u>1966</u> , <i>12</i> ,484.
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COMPONENTS:		ORIGINAL MEASUR	
COMPONENTS:		ORIGINAL MEASURE	EMENTS:
 Hydrogen; H₂; 	[1333-74-0]	Hiza, M.J.;	Heck, C.K. Kidnay, A.J.
2. Ethane; C ₂ H ₆ ;	[74-84-0]	Adv. Cryoger 343-355.	nic Eng. <u>1968</u> , 13,
VARIABLES: Temperatur	e, pressure	PREPARED BY:	C.L. Young
EXPERIMENTAL VALUES:		L	
T/K	p/10⁵Pa	Mole fraction in liquid, ^x H ₂	of hydrogen in gas, ^y H ₂
189.55	25.2	-	0.9327
189.55 189.57	25.5 41.4	0.0145 0.0239	- 0.9538
189.57	60.9	0.0354	0.9640
189.73	91.9	-	0.9706
189.59 189.73	102.7 121.8	0.0570	0.9718 0.9730
189.55	145.4	0.0775	0.9739
189.58	153.5 24.6	- 0.0121	0.9741 0.9779
169.40 169.40	40.7	0.0193	0.9846
169.39	61.0	0.0286	0.9876
169.43 169.43	89.9 121.6	0.0409	0.9890 0.9895
169.46	146.2	-	0.9892
169.41 149.43	149.9 19.0	0.0651 0.00745	0.9894
149.43	20.3	0.00745	-
149.69	22.0	-	0.99424
149.62 149.41	39.3 40.0	- 0.0150	0.99611
149.09	60.2	0.0226	-
149.52 149.68	60.8 89.2	-	0.99670 0.99690
149.31	91.2	0.0332	- cont.
	AUXILIARY	INFORMATION	Conci
METHOD / APPARATUS / PROCE	EDURE :	SOURCE AND PURT	TY OF MATERIALS:
Flow cell describ		1. No detail	
ref. (1). Temper.			9.96 mole per cent.
and pressure meas gauge. Cell char vapor recirculate	ured with Bourdon ged with components, d and vapor and thdrawn and analysed aphy. Details of		
		ESTIMATED ERROR	::
		$\delta T/K = \pm 0$ $\delta x_{H_2}, \delta (1)$	0.02; $\delta P/10^5 Pa = \pm 0.1;$ 1- y_{H_2}) = $\pm 2-3\%$
		REFERENCES: 1. Herring,	R.N.; Barrick, P.L.
		Int. Adv. 10, 151.	. Cryogenic Engng, <u>1965</u> ,

우리 전문 우리가 물 모든 관심을 두 두 것 수 속이 없다. 우지 않는 것들은 수 많다.

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1. Hydrogen; H ₂ ; [1333-74-0] Hiza, M.J. Heck, C.K.; Kidnay, A.J. 2. Ethane; C ₂ H ₆ ; [74-84-0] Adv. Cryogenic Eng. 1968, 1 343-355. EXPERIMENTAL VALUES: T/K p/10 ⁵ Pa Mole fraction of hydrogen in liquid, in gas, m_2 149.54 120.5 0.0414 - 130.00 5.02 - 0.99742 130.00 10.13 - 0.99865 130.00 10.13 - 0.99865 130.00 26.73 - 0.999254 130.00 26.73 - 0.999254 130.00 91.8 - 0.999377 123.53 113.3 0.0154 - 130.00 121.9 - 0.999395 130.00 121.9 - 0.999316 130.00 121.9 - 0.999328 122.00 10.45 - 0.999242 122.00 10.45 - 0.999377 122.00 121.9 - 0.999377 122.00 122.9 - 0.999373 1	2. Ethane; $C_{2}H_{6}$; $[74-84-0]$ EXPERIMENTAL VALUES: T/K $p/10^{5}Pa$ 149.54 120.5 149.78 148.6 130.00 5.02 130.00 6.35 130.00 10.13 130.00 10.59 129.74 25.6 130.00 26.73 130.00 40.53 129.58 51.3 130.00 60.79 129.49 80.9 130.00 91.8 129.59 113.3 130.00 91.8 129.59 113.3 130.00 121.9 129.78 148.2 130.00 151.7 122.00 5.83 122.00 10.45 122.00 10.51 121.91 25.7 122.00 26.41 122.00 40.92 121.91 51.5	Kidna Adv. 343-3 Mole fractic in liquid, $x_{\rm H_2}$ 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -	ay, A.J. Cryogenic Eng. <u>1968</u> , 13, 355. on of hydrogen in gas, y_{H_2} - 0.99742 0.99786 0.99855 0.99863 0.999254 0.999328 - 0.999328 - 0.999207 0.999106 0.999444
2. Ethane; C_{2H_4} ; $[74-84-0]$ Adv. Cryogenio Eng. 1968, 1 343-355. EXPERIMENTAL VALUES: Mole fraction of hydrogen in liquid, in gas, T_{H_2} y_{H_2} 149.54 120.5 0.0414 - 149.78 130.00 5.02 - 0.99742 130.00 5.02 - 0.99745 130.00 10.13 - 0.99863 120.74 25.6 0.00769 - 130.00 10.59 - 0.999863 120.74 25.6 0.00769 - 130.00 40.53 - 0.999377 125.58 51.3 0.0154 - 130.00 121.9 - 0.999328 122.59 113.3 0.0223 - 130.00 151.7 - 0.999328 122.00 583 - 0.999328 122.00 1645 - 0.999444 122.00 1645 - 0.999444 122.00 1645 - 0.999446 122.00 1645 - 0.999446 122.00<	EXPERIMENTAL VALUES: T/K $p/10^{5}$ Pa 149.54 120.5 149.78 148.6 130.00 5.02 130.00 10.13 130.00 10.59 129.74 25.6 130.00 26.73 130.00 40.53 129.58 51.3 130.00 60.79 129.49 80.9 130.00 91.8 129.59 113.3 130.00 91.8 129.59 113.3 130.00 121.9 129.78 148.2 130.00 151.7 122.00 5.83 122.00 10.45 121.91 25.7 122.00 26.41 122.00 40.92 121.91 51.5	Adv. 343-3 Mole fractic in liquid, x _{H2} 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -	Cryogenic Eng. <u>1968</u> , 13, 355. on of hydrogen in gas, y_{H_2} - 0.99742 0.99786 0.99855 0.99863 - 0.999254 0.999328 - 0.999328 - 0.999207 0.999106 0.999444
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	T/K $p/10^5 Pa$ 149.54120.5149.78148.6130.005.02130.0010.13130.0010.59129.7425.6130.0040.53129.5851.3130.0060.79129.4980.9130.0091.8129.59113.3130.00151.7129.78148.2130.00151.7122.005.83122.0010.45122.0010.51121.9125.7122.0026.41122.0040.92121.9151.5	343-3 Mole fractio in liquid, ^x H ₂ 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -	355. on of hydrogen in gas, y _{H2} 0.99742 0.99786 0.99855 0.99863 0.999254 0.999377 - 0.999328 - 0.999328 - 0.999207 0.999106 0.999444
Mole fraction of hydrogen in liquid, in gas, π_{H_2} y_{H_2} 149.54 120.5 0.0414 - 149.78 148.6 0.0507 - 130.00 5.02 - 0.99742 130.00 10.13 - 0.99865 130.00 10.59 - 0.999863 129.74 25.6 0.00769 - 130.00 40.53 - 0.999863 129.74 25.6 0.00154 - 130.00 40.53 - 0.9993254 130.00 60.79 - 0.999328 129.78 148.2 0.0223 - 130.00 151.7 - 0.999328 129.78 148.2 0.0368 - 130.00 151.7 - 0.999328 122.00 10.45 - 0.9999166 122.00 10.45 - 0.9999171 122.00 10.45 - 0.999971 122.00	T/K $p/10^5 Pa$ 149.54120.5149.78148.6130.005.02130.0010.13130.0010.59129.7425.6130.0026.73130.0040.53129.5851.3130.0060.79129.4980.9130.00121.9129.59113.3130.00151.7122.005.83122.0010.45122.0010.45122.0026.41122.0026.41122.0040.92121.9151.5	in liquid, ^x H ₂ 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -	in gas, y _{H2} 0.99742 0.99786 0.99855 0.99863 0.999254 0.999377 0.999422 0.999328 0.999328 0.999207 0.999106 0.999444
T/K $p/10^5 Pa$ in liquid, in $\frac{1}{gas}$, $\frac{w_{H_2}}{149.78}$ $\frac{1}{120.5}$ 0.0414 - 130.00 5.02 - 0.99742 130.00 6.35 - 0.99786 130.00 10.59 - 0.999853 130.00 10.59 - 0.999863 129.74 25.6 0.00769 - 130.00 40.53 - 0.999377 122.58 51.3 0.0154 - 130.00 60.79 - 0.999328 129.59 113.3 0.0223 - 130.00 121.9 - 0.999328 122.78 148.2 0.0368 - 130.00 151.7 - 0.999328 122.00 10.51 - 0.999328 122.00 10.51 - 0.999326 122.00 10.51 - 0.999376 122.00 10.51 <t< td=""><td>$\begin{array}{cccccccccccccccccccccccccccccccccccc$</td><td>in liquid, ^xH₂ 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -</td><td>in gas, y_{H2} 0.99742 0.99786 0.99855 0.99863 0.999254 0.999377 0.999422 0.999328 0.999328 0.999207 0.999106 0.999444</td></t<>	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	in liquid, ^x H ₂ 0.0414 0.0507 - - 0.00769 - 0.0154 0.0223 0.0299 0.0368 - - -	in gas, y _{H2} 0.99742 0.99786 0.99855 0.99863 0.999254 0.999377 0.999422 0.999328 0.999328 0.999207 0.999106 0.999444
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	x _{H2} 0.0414 0.0507 - - 0.00769 - - 0.0154 0.0223 0.0299 0.0368 - -	y_{H_2} - 0.99742 0.99786 0.99855 0.99863 - 0.999377 0.999422 0.999395 - 0.999328 0.999207 0.999106 0.999444
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122.00 10.51 - 0.999446 121.91 25.7 0.00670 - 122.00 26.41 - 0.999697 122.00 40.92 - 0.999731 121.91 51.5 0.0126 - 122.00 59.6 - 0.999738 121.86 80.6 0.0191 - 122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 137.2 - 0.999619 122.00 137.2 - 0.999605 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999574 108.00 84.7 - 0.9999574 108.00 84.7 - 0.9999574 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999300 107.85 152.9 0.0237 -Additional vapor-liquid equilibrium data in source.Vaporcomposition at 130.00 K and below were determined in a-	122.0010.51121.9125.7122.0026.41122.0040.92121.9151.5	- - 0.00670	
121.9125.7 0.00670 $-$ 122.0026.41- 0.999697 122.0040.92- 0.999731 121.9151.5 0.0126 -122.0059.6- 0.999738 121.8680.6 0.0191 -122.0081.7- 0.999724 121.71109.8 0.0249 -122.00113.4- 0.999675 122.00137.2- 0.999605 121.84156.0 0.0326 -108.0025.9- 0.9999571 108.0042.4- 0.9999571 108.0061.6- 0.9999574 108.00111.5- 0.9999467 107.7691.0 0.0160 -108.00146.1- 0.9999300 107.85122.8 0.0201 -108.00146.1- 0.9999899 107.85122.8 0.0201 -108.00146.1- 0.9999889 107.85152.9 0.0237 -	121.9125.7122.0026.41122.0040.92121.9151.5	0.00670	
122.00 26.41 - 0.999697 122.00 40.92 - 0.999731 121.91 51.5 0.0126 - 122.00 59.6 - 0.999738 121.86 80.6 0.0191 - 122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999605 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 84.7 - 0.9999574 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999300 107.85 152.9 0.0237 -Additional vapor-liquid equilibrium data in source.Vapor composition at 130.00 K and below were determined in a	122.0026.41122.0040.92121.9151.5	0.000/0	
122.00 40.92 - 0.999731 121.91 51.5 0.0126 - 122.00 59.6 - 0.999738 121.86 80.6 0.0191 - 122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999605 122.00 143.3 - 0.999605 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 42.4 - 0.9999571 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999574 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999300 107.85 152.9 0.0237 -Additional vapor-liquid equilibrium data in source.Vapor composition at 130.00 K and below were determined in a	122.0040.92121.9151.5	-	
122.00 59.6 - 0.999738 121.86 80.6 0.0191 - 122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 84.7 - 0.9999574 108.00 84.7 - 0.9999574 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999300 107.85 152.9 0.0237 -		-	
121.86 80.6 0.0191 - 122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999605 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 84.7 - 0.9999574 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		0.0126	-
122.00 81.7 - 0.999724 121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999605 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999571 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999574 108.00 61.6 - 0.9999574 108.00 84.7 - 0.99999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		-	0.999738
121.71 109.8 0.0249 - 122.00 113.4 - 0.999675 122.00 137.2 - 0.999619 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999349 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 84.7 - 0.9999574 108.00 11.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 11.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		-	0,999724
122.00 137.2 - 0.999619 122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999349 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		0.0249	_
122.00 143.3 - 0.999605 121.84 156.0 0.0326 - 108.00 10.4 - 0.9999349 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		-	
121.84 156.0 0.0326 - 108.00 10.4 - 0.9999349 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		-	
108.00 10.4 - 0.9999349 108.00 25.9 - 0.9999571 108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		0.0326	-
108.00 42.4 - 0.9999608 107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 -		-	0.9999349
107.83 61.3 0.0114 - 108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 - Additional vapor-liquid equilibrium data in source. Vapor composition at 130.00 K and below were determined in a		-	
108.00 61.6 - 0.9999574 108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 - Additional vapor-liquid equilibrium data in source. Vapor composition at 130.00 K and below were determined in a		-	0.9999608
108.00 84.7 - 0.9999467 107.76 91.0 0.0160 - 108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 - Additional vapor-liquid equilibrium data in source. Vapor composition at 130.00 K and below were determined in a		0.0114 _	-
108.00 111.5 - 0.9999300 107.85 122.8 0.0201 - 108.00 146.1 - 0.9999889 107.85 152.9 0.0237 - Additional vapor-liquid equilibrium data in source. Vapor composition at 130.00 K and below were determined in a	108.00 84.7	-	
107.85122.80.0201-108.00146.1-0.999889107.85152.90.0237-Additional vapor-liquid equilibrium data in source.Vaporcomposition at 130.00 K and below were determined in a	107.76 91.0	0.0160	-
108.00146.1-0.999889107.85152.90.0237-Additional vapor-liquid equilibrium data in source.Vapor composition at 130.00 K and below were determined in a		-	0.9999300
107.85 152.9 0.0237 - Additional vapor-liquid equilibrium data in source. Vapor composition at 130.00 K and below were determined in a		-	-
composition at 130.00 K and below were determined in a		0.0237	_
	Additional vapor-liquid equilik composition at 130.00 K and bel	orium data in	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Ethane; C₂H₆; [74-84-0]</pre>	Sagara, H.; Arai, Y.; Saito, S J. Chem. Eng. Japan <u>1972</u> , 5, 339- 348.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
	drogen gas, ⁹ H ₂
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	986 991 994 995 964 977 983 985 881 930 947 951 688 812 862 884
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static stainless steel cell of capacity 5×10^5 mm ³ fitted with magnetic stirrer and sampling valves. Cell enclosed in cryostat. Tempera- ture measured with thermocouple. Pressure measured using Bourdon gauge. Gases added to cell and equilibrated. Samples of liquid and gas withdrawn and analysed using a gas chromatograph with thermal conductivity detector. Details in source.	 Nippon Sanso Co. Ltd. sample; purity 99.99 mole per cent. Takochiho Chemical Industry Co. Ltd. sample; purity 99.7 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1;$ $\delta x_{H_2} = \delta y_{H_2} = \pm 1$ %. REFERENCES:

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1334-74-0] Propane; C₃H₈; [74-98-6] 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
_	August 1980

CRITICAL EVALUATION:

This system has been investigated by five groups of workers. Benham and Katz (1) presented a limited amount of data as part of a more general study of ternary and multicomponent systems containing hydrogen and propane. Their binary data are not considered further here. Frolich et al. (2) studied the hydrogen + propane system but there is some uncertainty as to the interpretation of their data when both components are gases at 298.15 K. Their data give mole fraction solubilities which are considerably greater than those derived by interpolation from the data of Williams and Katz (3), Trust and Kurata (4) and Buriss et al. (5). The data of Frolich et al. (2) are therefore classified as doubtful. Williams and Katz (3) studied this system between 88.7 K and 297 K at pressures up to 55 MPa but presented their results in terms of K-values (i.e., mole fraction in the liquid phase divided by mole fraction in the gas phase). Trust and Kurata (4) studied the system between 98 K and 348 K at pressures up to 20 MPa. Buriss et al. (5) studied the system between 273 K and 348 K up to pressures of 55 MPa. There is good agreement between the data of Trust and Kurata (4) and Williams and Katz (3). The mole fraction solubility data of Buriss et al. (5) are slightly smaller than those of the other two groups of workers at pressures above 7 MPa when the data are interpolated. In view of the need to convert Williams and Katz K-values into mole fractions and the interpolation needed because of the different temperatures employed, it is difficult to make a more precise evaluation.

The data of the three groups, (3), (4) and (5) are classified as tentative.

References:

1. Benham, A. L.; Katz, D. L. Am. Inst. Chem. Engnrs. J. 1957, 3, 33.

- Frolich, P. K.; Trauch, E. J.; Hogan, J. J.; Peer, A. A. Ind. Eng. Chem. <u>1931</u>, 23, 548.
- 3. Williams, R. B.; Katz, D. L. Ind. Eng. Chem. <u>1954</u>, 46, 2512.
- 4. Trust, D. B.; Kurata, F. Am. Inst. Chem. Engnrs. J. <u>1971</u>, 17, 86.

 Buriss, W. L.; Hsu, N. T.; Reamer, H. H.; Sage, B. H. Ind. Eng. Chem. 1953, 45, 210.

COMPONENTS :			ORIGINAL MEASUREMENTS:
	11 . [1222.74.0]		
i. nydrogen;	H ₂ ; [1333-74-0]		Frolich, P. K.; Tauch, E. J.;
2			Hogan, J. J.; Peer, A. A.
2. Propane;	C ₃ H ₈ ; [74-98-6]		Ind. Eng. Chem. <u>1931</u> , 23, 548-550.
WARTARI FC .			
VARIABLES:			PREPARED BY:
	Pressure		C. L. Young
EXPERIMENTAL VAL	UES:		
			* Mole fraction of hydrogen
т/к <i>Р</i>	/MPa So	lubilit	y, S in liquid, †
			<i>x</i> _{H₂}
298.15	1.0	4.2	
	2.0 3.0	8.5 12.7	
	4.0	17.0	0.0583
	5.0	21.2	
	6.0 7.0	25.4 29.7	
	8.0	33.9	
	9.0	38.2	• • • • • •
	10.0 18.04	42.4 91.5	
* Data t	aken from graph in	origin	nal article. Volume of gas
measur	ed at 101.325 kPa	pressur	e and 298.15K dissolved by
unit v	olume of liquid me	asured	under the same conditions.
+ calcul	ated by compiler.		
	AU	XILIARY	INFORMATION
METHOD 'APPARATUS	/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
	ibrium cell. Liqu	uid	1. Highest purity available.
	th gas and after		
equilibrium	established samples	5	2. Purity 98 to 99 mole per cent.
removed and	analysed by volume	tric	
method. Al	lowance was made fo	or	
vapor pressu	re of liquid and th	ne	
	f the gas at atmos		
-	Details in source.	911CI 10	
pressure.	Details in source.		ESTIMATED ERROR:
			$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 5 \text{\&}.$
			REFERENCES:

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COMPONENT	S:			ORIGINAL MEASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] Propane; C₃H₈; [74-98-6] 				Buriss, W. L.; Hsu, N. T.; Reamer, H. H.; Sage, B. H. Ind. Eng. Chem. <u>1953</u> , 45, 210-21;			
VARIABLES	:			PREPARED	BY:		
Tempera	ture, pr	essure		C. L. Y	oung		
EXPERIMEN	TAL VALUE	S:]			
T/K	<i>P/</i> bar	Mole : of h	fraction ydrogen in vapor, ^y H ₂	т/к	P/bar	of h	fraction ydrogen in vap ^y H ₂
277.59	34.5 69.0 103.4	0.025 0.052 0.079	0.810 0.882 0.909	310.93	241.3 275.8 310.3	0.241 0.275 0.310	0.841 0.842 0.841
	137.9 172.4 206.8 241.3 275.8 310.3 344.7 413.7 482.6 551.6	0.10 0.131 0.156 0.181 0.206 0.231 0.255 0.303 0.350 0.350 0.399	0.921 0.929 0.932 0.933 0.935 0.936 0.934 0.931 0.925 0.922	344.26	344.7 413.7 482.6 543.3 34.5 69.0 103.4 138.0 172.4 206.8	0.346 0.415 0.493 0.666 0.012 0.071 0.128 0.186 0.245 0.319	0.840 0.822 0.793 0.666 0.142 0.437 0.534 0.581 0.593 0.591
310.93	34.5 69.0 103.4 137.9 172.4 206.8	0.024 0.062 0.099 0.136 0.171 0.206	0.522 0.534 0.717 0.780 0.814 0.829 0.835	360.93	236.5 69.0 86.2 103.4 108.9	0.477 0.075 0.121 0.190 0.244	0.477 0.235 0.277 0.278 0.244
Static of pressured measured thermome in refs. liquid a determin	cell. balanc lusing ter. l and	e. Temper platinum re Details of 2. Coexis phase prope	easured with cature esistance apparatus sting orties	 Math lytz per Phil 	D PURITY (neson Ch ic sampl cent; Llips Pe	DF MATERIALS: emical Co. e; purity oxygen mair troleum san ty 99.9 mol	electro- 99.8 mole 1 impurity 1ple.
				δx _{H2} , δ REFERENCE 1. Sage, Am. 1	$b_{H_2} = \pm \frac{b_{H_2}}{b_{H_2}}$	Lacey, W. ning Met. E	. N. <i>Tro</i>

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1334-74-0]		Williams, R.B.; Katz, D.L.
2. Propane; C ₃ H ₈ ; [74-98-6]		Ind. Eng. Chem. <u>1954</u> , 46, 2512-20.
VARIABLES:		PREPARED BY:
Temperature, pressure		C.L. Young
EXPERIMENTAL VALUES:	<u> </u>	
т/к	p/10 ⁵ Pa	K-values of hydrogen
297.04	17.24 34.47 68.95 137.90 275.79 551.58	52.0 26.0 13.2 6.85 3.62 1.825
283.15	17.24 34.47 68.95 137.90 275.79 551.58	60.8 30.4 15.3 7.85 4.15 2.27
255.37	17.24 34.47 68.95 137.90 275.79 551.58	78.4 39.4 19.8 10.1 5.40 3.00
277.59	17.24 34.47 68.95 137.90	100 51.0 26.0 13.3 cont.
	AUXILIARY	INFORMATION
METHOD APPARATUS / PROCEDURE :		SOURCE AND PURITY OF MATERIALS;
Flow system described in ref. (1). Temperature measured with thermo- couple. Pressure measured with Bourdon gauge. Vapor recirculated by high pressure magnetic pump. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed by gas density measurements. K-values of propane given in source.		 Purity 99.9 mole %. Dried. Phillips Petroleum Co. purity 99.8 mole %.
		<pre>ESTIMATED ERROR:</pre>

COMPONENTS: 1. Hydrogen; H ₂ ; [1334-74-0] 2. Propane; C ₃ H ₈ ; [74-98-6]		ORIGINAL MEASUREMENTS: Williams, R.B.; Katz, D.L. <i>Ind. Eng. Chem.</i> <u>1954</u> , 46,2512- 20.				
			EXPERIMENTAL VALUES:			
			т/к	p/10⁵Pa	K-values of hydrogen	
277.59	275.79 551.58	6.95 3.95				
199.82	17.24 34.47 68.95 137.90 275.79 551.58	123 63.8 32.9 16.9 9.08 5.11				
172.04	17.24 34.47 68.95 137.90 275.79 551.58	158 82 43.6 22.5 12.1 7.0				
144.26	17.24 34.47 68.95 137.90 275.79 551.58	214 114 61.3 33.3 18.6 10.8				
116.48	17.24 34.47 68.95 137.90 275.79 551.58	330 177 96.1 55.5 32.3 19.5				
88.71	17.24 34.47 68.95 137.90 275.79 551.58	664 366 204 120 71.9 45.7				

COMPONENTS:			ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]			Trust, D. B.; Kurata, F.		
2. Propane; C ₃ H ₈ ; [74-98-6]			Am. Inst. Chem. En	gnrs. J.	
-		1971, 17, 86-91.			
ARIABLES:		<u> </u>	PREPARED BY:		
Те	mperature, pre	ssure	C. L. Yo	ung	
XPERIMENTAL	VALUES:	<u> </u>			
/	<i>,</i> .	(1.47)	Mole fraction		
T/K	p/psia	p/MPa	in liquid, ^x H2	in vapor, ^y H2	
			H ₂	⁶ H ₂	
98.15	250	1.72	0.0021	-	
	1000	6.89 10.34	0.0056 0.0074	-	
	1500 2250	10.34	0.0108	-	
	3000	20.68	0.0134	-	
113.15	300	2.07	0.0027 0.0093	-	
	1000 1700	6.89 11.72	0.0147	-	
	2600	17.93	0.0214	-	
123.15	250	1.72	0.0031	-	
	1000 2000	6.89 13.79	0.0110 0.0207	-	
	2500	17.24	0.0242	-	
	3000	20.68	0.0281	-	
148.15	150 30 0	1.03 2.07	0.0025 0.0052	-	
	600	4.14	0.0106	-	
	900	6.21	0.0154	-	
	1300 1700	8.96 11.72	0.0218 0.0274	-	
	2100	14.48	0.0329	-	
	2800	19.31	0.0443	-	
3000 20.68			0.0473	cont.)	
		AUXILIAR	Y INFORMATION		
METHOD /APPARATUS / PROCEDURE :			SOURCE AND PURITY OF MAT	ERIALS:	
Static equ	ulibrium cell	(0.1 dm ³			
capacity)	fitted with ma	Ignetic	1. Purity 99.93 mol	e per cent.	
stirrer.	Temperature m	easured			
with plati	num resistance	thermo-	2. Purity 99.91 mol	e per cent.	
-	ressure measur				
	uge. Content				
	equilibrated,				
	and analysed b		ESTIMATED ERROR:		
	aphy. Detail	s in	$\delta T/K = \pm 0.05; \delta p/M$	1Pa = ±0.02;	
source and	l ref. (1).		$\delta x_{\rm H_2}$, $\delta y_{\rm H_2}$ = ±1 to	28.	
			REFERENCES :		
			1. Sinor, J. E.; S	chindler, D. L.	
			Kurata, F.		
			Kurata, F.	Engnrs. J.	
				Engnrs. J.	

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Saturated Hydrocarbons

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]		Trust, D. B.; Kurata, F.		
2. Propane; C ₃ H ₈ ; [74-98-6]		Am. Inst. Chem. Engnrs. J.		
			1971, 17, 86-91.	
EXPERIMENTAL	VALUES:		Mole fraction	of hydrogen
T/K	p/psia	p/MPa	in liquid,	in vapor,
			$x_{\rm H_2}$	<i>y</i> _{H₂}
173.15	250	1.72	0.0061	0.99783
	300	2.07	0.0077	0.99812 0.99865
	500 1000	3.45 6.89	0.0121 0.0241	0.99899
	2000	13.79	0.0441	0.99901
	2500	17.24	0.0545	0,99888
	2600 2900	17.93 19.99	0.0618	0.99884
	3000	20.68	0.0645	0.99880
198.15	250	1.72		0.98712
1	270 500	1.86 3.45	0.00908 0.01659	0.99300
	1000	6.89	0.03159	0.99530
	1500	10.34	-	0.99581
	2000	13.79	0.07220	0.99602 0.99592
	2500 3000	17.24 20.68	0.08468	0.99570
223.15	200	1.38	0.00777	0,95620
	500	3.45	0.02047	0.97422 0.98127
	750 1000	5.17 6.89	0.02952 0.03960	0,98585
	1500	10.34	0.05761	-
	2000	13.79	0.07418	0.98892
	2500	17.24 20.68	0.08869 0.10750	0.99069 0.98964
248.15	, 3000 250	1.72	0.01065	0.8333
	500	3.45	0.02427	0.91859
	1000	6.89	0.04751	0.96270 0.97140
	1500 2000	10.34 13.79	0.09034	0.97500
	2500	17.24	,. -	0.98720
273 15	3000	20.68	0.13400	0.97860
273.15	300 500	2.07 3.45	0.01342 0.02373	0.7245 0.8063
	1000	6.89	0.05220	0.8970
	1500	10.34	0.07724	0.91912
	2000	13.79 17.24	0.10920 0.13400	0.92840 0.93192
	2500 3000	20.68	0.15860	0.93344
298.15	250	1.72	0.00884	
	400	2.76	u.02486	0.5760
	500 1000	3.45 6.89	0.06020	0.8002
	1500	10.34	0.09712	0.8455
	2000	13.79	0.1239	0.8573 0.8793
	2500 3000	17.24 20.68	0.1649 0.1945	0.8868
323.15	500	3.45	0.02284	0.3884
ł	1000	6.89		0.6013 0.6976
	1500 2000	10.34 13.79	0.11140 0.15470	0.7341
	2500	17.24	0.20100	0.7602
348.15	3000	20.68	0.24460	0.7750
~*0.15	750 1000	5.17 6.89	0.03819 0.06804	0.2587 0.3840
}	1250	8.62	0.09755	0.4300
ļ	1500	10.34	0.13050	0.4892
	2250 2700	15.51 18.62	0.23650	0.5223 0.5231
	3000	20.68	0.35260	-

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COMPONENTS:	EVALUATOR:
1. Hydrogen; H_2 ; [1333-74-0] 2. Butane; C_4H_{10} ; [106-97-8]	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052,
	Australia.
	August 1980

CRITICAL EVALUATION:

This system has been investigated by five groups. The data of Aroyan and Katz (1), which cover the temperature range 144 K to 297 K and pressures up to 54 MPa, the data of Klink *et al.* (2), which cover the temperature range 328 K to 394 K and pressures up to 17 MPa and the data of Nelson and Bonnell (3), which cover the temperature range 297 K to 389 K and pressure up to 10 MPa are in satisfactory agreement. An exact comparison of the three sets of data is impossible because the work was not carried out at one common temperature.

The data of Augood (4) agree within experimental error with that of Aroyan and Katz (1). However, in view of the poor precision of Augood data for this system, his data are classified as doubtful. Frolich $et \ all$. (5) studied this system at 298 K at pressures up to 10 MPa. Their results, which are classified as doubtful, yield mole fraction solubilities which are significantly larger than those of Aroyan and Katz (1) and Nelson and Bonnell (3).

The data of Aroyan and Katz (1), Nelson and Bonnell (3) and Klink $et \ all$. (2) are classified as tentative.

References:

- 1. Aroyan, H. J.; Katz, D. L. Ind. Eng. Chem. 1951, 43, 185.
- Klink, A. E.; Chen, H. Y.; Amick, A. H. Jr. Am. Inst. Chem. Engnrs. J. 1975, 21, 1142.
- 3. Nelson, E. E.; Bonnell, W. S. Ind. Eng. Chem. 1943, 35, 204.
- 4. Augood, D. Trans. Instn. Chem. Engnrs. 1957, 35, 394.
- Frolich, P. K.; Trauch, E. J.; Hogan, J. J.; Peer, A. A. Ind. Eng. Chem. <u>1931</u>, 23, 548.

Saturated Hydrocarbons

COVID AND AND AND AND AND AND AND AND AND AN			
COMPONENTS:	ORIGINAL MEASUREMENTS:		
l. Hydrogen; H ₂ ; [1333-74-0]	Frolich, P. K.; Tauch, E. J.;		
	Hogan, J. J.; Peer, A. A.		
2. Butane; C ₄ H ₁₀ ; [106-97-8]	Ind. Eng. Chem. <u>1931</u> , 23, 548-550.		
VARIABLES:	PREPARED BY:		
Pressure	C. L. Young		
EXPERIMENTAL VALUES:			
	* Mole fraction of hydrogen		
T/K P/MPa Solubilit			
	^{<i>x</i>} _{H₂}		
	······		
298.15 1.0 2.7	0.0115		
2.0 5.4 3.0 8.1			
4.0 10.8	35 0.0445		
5.0 13.6			
6.0 16.3 7.0 19.0			
8.0 21.7	0.0853		
9.0 24.4			
10.0 27.1	.5 0.104		
[†] Calculated by compiler.			
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Static equilibrium cell. Liquid	1. Highest purity available.		
saturated with gas and after			
^{equilibrium} established samples	2. Purity 98 to 99 mole per cent.		
removed and analysed by volumetric			
method. Allowance was made for			
Vapor pressure of liquid and the			
solubility of the gas at atmospheric			
Pressure. Details in source.			
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 5\%.$		
	REFERENCES:		

COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Hydrogen; H ₂ ; [1333-74-0]	Nelson, E. E.; Bonnell, W. S. Ind. Eng. Chem. 1943, 35, 204-9.
2. Butane; C ₄ H ₁₀ ; [106-97-8]	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
	drogen n gas,
* _{H2}	^y _{H₂}
297.05 22.5 0.020 0	.832
79.6 0.062	-
104.4 0.074 355,35 43.2 0.040 0	.627
61.6 0.063	-
69.9 0.070 94.8 0.099 0	833
107.2 0.111	-
388.75 39.1 0.032 49.5 0.051 0	.420
66.8 0.075 71.9 0.083	-
	.624
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Rocking stainless steel bomb fitted with sampling tube. Pressure measured by Bourdon gauge. Tempera- tures measured by iron-constantan	 Commercially pure. Purity estimated as > 99.5 mole per cent.
thermocouple. Bomb charged with hydrocarbon, heated to desired tem- perature. Charged with hydrogen, equilibrated. Composition of liquid	 Purity estimated as > 99 mole per cent.
and gas samples estimated from change in volume on removal of hydrogen by oxidation. Source reference contains details.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.2; \delta P/bar = \pm 0.2; \delta x_{H_2} = \pm 5\%; \delta y_{H_2} = \pm 7\%.$
	REFERENCES:
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CONTRACTOR			1007.07		
COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0]			ORIGINAL MEASUREMENTS:		
				yan, H.J.; Katz, D.L.	
2. Butane; $C_{4} H_{10}$;	[106-97-8]		Ind	. Eng. Chem. <u>1951</u> ,43, 185-9	
VARIABLES:	<u></u>		PREPA	ARED BY:	
Temperature,	pressure			C.L. Young	
EXPERIMENTAL VALUES:					
т/к	P/bar			action of hydrogen	
			liqu	-	
			°H₂	y _{H2}	
207 04	22.47		010	0.000	
297.04	22.41 77.91	0.	019 062	0.869 0.954	
	104.46 233.39		080 216	0.964 0.975	
	275.86		341	0.974	
277.59	21.37		016	0.931	
	54.68 164.79		036	0.967 0.983	
	286.13	0.	182	0.984	
	541.2	0.	302	- ,	
260.93	21.10 56.68		0165	0.958 0.979	
	166.16	Ο.	105	0.989	
	274.41 289.58		163 162	0.989 0.989	
	501.94	٥.	260	0.990	
	524.00 534.34		268 274	0.988 0.988	
244.26	21.72	٥.	015	0.979	
·	58.47	0.	036	0.990 cont.	
		IARY	INFOR	MATION	
METHOD /APPARATUS/PR	OCEDURE:			CE AND PURITY OF MATERIALS:	
Recirculating vapor on that described i	n ref. (1).	ased	1.	Purity 99.9%, dried over anhydrous CaSO,	
Details of present	apparatus in	L .	2.	Phillips Petroleum Co., pure	
thermocouple. Pressure measured with				grade purity > 99.0 mole %, major impurity 2-methylpropane.	
Bourdon gauge. Hig magnetic circulatin	h pressure			impulity z-methylplopane.	
Cell charged under	pressure. Sam				
each phase expan	ded to room				
temperature and pre gas density measures	ssure; analysed ments.	y ya u			
			ESTIMATED ERROR:		
			$\delta T/K = \pm 0.3 - 0.5; \delta P/bar = \pm 1.3;$		
1			δx _H	$y_{H_2} = \pm 0.0025; \delta y_{H_2} = \pm 0.001.$	
				RENCES :	
				odge, B.F.; Dunbar, A.K.;	
				. Am. Chem. Soc. <u>1927</u> , 49,591.	

Hydrogen and Deuterium Solubilities above 200kPa

EXPERIMENTAL VALUES: T/K P/bar Mole fraction of hydrogen in liquid in vapor x_{H_2} y_{H_2} 244.26 136.52 0.074 0.993 288.20 0.1445 0.994 513.66 0.229 0.995 227.59 27.65 0.017 0.992 55.16 0.030 0.994 140.65 0.070 0.996 262.00 0.119 0.996 441.27 0.180 0.997 199.82 23.24 0.013 0.998 55.57 0.024 0.998 99.97 0.040 0.998 193.7 0.071 0.098 193.7 0.008 0.000 193.7 0.008 0.000 193.7 0.008 0.000 193.7 0.008 0.000 193.7 0.008 0.000 193.7 0.008 0.000
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20.7 0.008 -
129.6 0.037 - 129.6 0.038 - 293.0 0.073 1.00 508.8 0.116 1.00
144.26 37.6 0.010 1.00 141.3 0.030 1.00 286.1 0.050 286.1 493.0 0.067 1.00

Saturated Hydrocarbons

Saturated Hydrocarbons				
COMPONENTS	:		ORIGINAL MEASUREMENTS	S:
1. Hydrogen; H ₂ ; [1333-74-0]			Augood, D. R.	
2. Butane; C ₄ H ₁₀ ; [106-97-8]		Trans. Instn. C	hem. Engnrs.,	
		<u>1957</u> , 35, 394-4	08.	
VARIABLES:			PREPARED BY:	
T	emperature, p	ressure	С. L. Y	oung
EXPERIMENT	AL VALUES:		(,,,,,,,,	
т/к	P/psig ⁺	P/MPa	Mole fraction in liquid, x_{H_2}	of hydrogen in gas, y _{H2}
273.2	2740 1300 1300	18.99 9.07 9.07	0.127 0.073 0.070	0.982 0.955 0.963
213.6	2715 2715	18.82 18.82	0.087 0.081	0.996
	2640 1300	18.82 18.31 9.07	0.074 0.054	-
	1300	9.07	0.047	-
METHOD ADD			INFORMATION	
	ARATUS/PROCEDURE		SOURCE AND PURITY OF	MATERIALS:
Static equilibrium cell fitted with magnetically operated stirrer. After equilibrium had been established samples of gas and liquid phases taken. The butane was condensed out and both components estimated volumetrically. Ratio of H./W.im.im.		0.09 mole per 2. Shell Petrole		
H ₂ /HD ir spectron	l limid octi	nated by mass	ESTIMATED ERROR:	
	"GCTÀ"		$\delta T/K = \pm 0.1; \ \delta P/I$	
			$\delta x_{H_2}, \delta y_{H_2} = \pm 4\%$	(estimated by compiler)
			REFERENCES:	

COMPONENTS:			ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]			Klink, A. E.; Chen, H. Y.; Amick,		
	≥; C ₄ H ₁₀ ; [A. H. Jr. Am. Inst. Chem. Eng. 1142.		
VARIABLES:			PREPARED BY:		
Temperati	ire, pressure		C. L. Young		
EXPERIMENTAL	L VALUES:	<u> </u>			
т/К	<i>P/</i> bar	p [†] /bar	Mole fraction in liquid, $x_{\rm H_2}$	of hydrogen in vapor, ^{YH} 2	
327.65	31.27 42.54 49.28 68.69 83.76 84.67 104.31 117.42 130.31 138.04 138.21 157.77 168.47 27.78 41.77 54.97 69.30 83.46 96.79 106.28 111.01 124.64 139.81	25.13 36.15 55.85 61.54 76.20 92.48 96.11 108.75 121.28 128.70 128.94 147.81 156.02 19.11 32.69 45.53 59.40 73.05 85.89 95.20 99.81 112.76 127.30	0.025 0.036 0.047 0.063 0.074 0.086 0.094 0.110 0.123 0.128 0.129 0.147 0.160 0.022 0.036 0.053 0.068 0.098 0.098 0.109 0.113 0.129 0.141 (con	0.777 0.828 0.863 0.879 0.896 0.903 0.910 0.916 0.922 0.924 0.925 0.930 0.932 0.638 0.741 0.791 0.825 0.846 0.860 0.871 0.875 0.881 0.888 t.)	
		AUXILIARY	INFORMATION		
METHOD /APP	ARATUS/PROCEDU	RE :	SOURCE AND PURITY OF MAT	ERIALS:	
Pressure piston ga pressure Samples a graphy us	ell fitted with measured with of uge-diaphragm of indicator combi- nalysed by gas ing a squalane n source.	lead weight lifferential ination. chromato-	 Ultra-pure sampl mole per cent. Instrument grade 99.5 mole per ce 	sample; purity	
			ESTIMATED ERROR: $\delta T/K = \pm 0.05; \delta P/b.$ $\delta x_{H_2}, \delta y_{H_2} = \pm 0.04.$ REFERENCES:	ar = ±0.05;	

Saturated	Hydrocarbor	۱S
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COMPONENTS :			ORIGINAL MEASUREME	NTS:
 Hydrogen; 	H ₂ ; [1	333-74-0]	Klink, A. E.; Che	n, H. Y.; Amick,
2. Butane;	C ₄ H ₁₀ ;	[106-97-8]	A. H. Jr. Am. Inst. Chem. En 1142.	g.J. <u>1975</u> , 21,
EXPERIMENTAL	VALUES:			
T/K	P/bar	P [†] /bar	Mole fractio in liquid, ^x H ₂	n of hydrogen in vapor, ^y H ₂
344.25	150.84	137.80	0.159	0.891
360,95	166.53 27.93 41.17 56.17 68.09 83.19 98.68 110.85 123.56	152.67 15.62 28.42 43.16 54.56 68.91 83.93 95.66 107.82	0.173 0.021 0.037 0.058 0.069 0.090 0.108 0.122 0.134	0.894 0.483 0.619 0.706 0.743 0.772 0.799 0.814 0.825
377.55	138.47 149.97 167.88 28.34 41.74 54.03 65.68 77.78 90.25	122.07132.92149.7611.7624.4636.2247.4359.0471.09	0.158 0.166 0.193 0.019 0.037 0.053 0.071 0.084 0.106	0.835 0.839 0.843 0.322 0.480 0.566 0.621 0.662 0.695
394.25	103.21 117.64 128.59 141.40 154.61 167.38 34.31 48.62	83.51 97.28 107.70 119.54 132.02 143.97 11.23 25.07	0.119 0.143 0.153 0.175 0.195 0.217 0.021 0.049	0.719 0.739 0.750 0.753 0.759 0.760 0.213 0.367
	61.46 77.17 88.65 101.50 112.87 125.33 138.91 138.99 152.89 168.76	37.17 52.27 63.41 75.79 86.65 98.74 111.58 111.63 124.77	0.066 0.095 0.109 0.135 0.149 0.172 0.193 0.194 0.228	0.444 0.514 0.555 0.588 0.609 0.632 0.637 0.638 0.633 0.633 0.615

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COMPONENTS :	EVALUATOR:
1. Hydrogen; H_2 ; [1333-74-0] 2. Alkanes; C_5 to C_{14}	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
	August 1980

CRITICAL EVALUATION:

The solubility of hydrogen in n-alkanes at low pressures is treated separately. Data on the solubility of hydrogen in n-alkanes at high pressures are relatively scarce and it is not possible to recommend any data.

Hydrogen + Pentane

This system has been investigated by Frolich $et \ al$. (1). Their data were presented in graphical form and are classified as doubtful.

Hydrogen + Hexane

This system has been investigated by three groups of workers. Frolich et al. (1) presented their data at 298 K in a graphical form which are classified as doubtful. Nichols et al. (2) made an extensive study of this system over the temperature range 277 K to 477 K and at pressures up to 70 MPa. Sattler (3) investigated this system at 308 K at pressures up to 15 MPa and his mole fraction solubility data are considerably smaller than those obtained by interpolation of Nichols $et \ al.$ data (2). Frolich et al. (1) data are larger than either Nichols et al. (2) or Sattler (3) when any reasonable estimate of the temperature dependence of solubility is used for extrapolation. A comparison with the low pressure data of Walter et al. (4) and Katayama and Nitta (5) when extrapolated to 308 K would indicate that Sattler's values (3) are too small, whereas Nichols' et al. (2) mole fractions are too large. However, such a comparison relies on an extrapolation to 1 atmosphere partial pressure and an extrapolation or interpolation to 308 K and must be made with caution. The data of Sattler (3) and Nichols $et \ al.$ (2) must nevertheless be considered in disagreement with each other and the low pressure data and are therefore classified as doubtful.

Hydrogen + Heptane Deuterium + Heptane

Lachowicz (6), (7) studied the solubility of hydrogen and deuterium in heptane between 298 K and 323 K at pressures between 10 MPa and 30 MPa and found no difference in the solubility of the isotopes within the experimental error of about one per cent. The data of Lachowicz *et al.* (7) were given in graphical form and in terms of linear equations. Therefore no data table is given and the data are not evaluated in detail here. The equations given may be rewritten as:

$\ln x_{\rm H_2}$, 2	98.15 K	=	6.94 ×	(p/atm)	
$\ln x_{\rm H_2}$, 3	10.65 к	=	7.44 ×	(p/atm)	
$\ln x_{\rm H_2}$, 3	23.15 к	2	7.89 ×	(p/atm).	(cont.)

COMPONENTS:		EVALUATOR:
	 Hydrogen; H₂; [1333-74-0] Alkanes; C₅ to C₁₄ 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
		August 1980

CRITICAL EVALUATION:

The deuterium solubilities were identical, in terms of mole fractions to the hydrogen solubilities.

Peter and Reinhartz (8) studied hydrogen and heptane in the pressure range 424 K to 499 K at pressures up to 30 MPa. Although detailed comparison of the work of Lachowicz *et al.* (7) with that of Peter and Reinhartz (8) is not possible because of the difference in the temperature range studied, these two studies are, at least, in qualitative agreement. The data of Peter and Reinhartz (8) are classified as tentative.

Hydrogen + Octane Deuterium + Octane

Lachowicz (6), (7) studied the solubility of hydrogen and deuterium in octane between 298 K and 323 K at pressures between 5 MPa and 30 MPa and found no difference in the solubility of the isotopes within the experimental error of about one per cent (as in the case of heptane + hydrogen or + deuterium).

Lachowicz *et al.* (7) presented their data in graphical form and in terms of linear equations. The data were not compiled or evaluated in detail. The equations given may be rewritten as

> $\ln x_{H_2}, 298.15 \text{ K} = 6.78 \times (p/\text{atm})$ $\ln x_{H_2}, 310.65 \text{ K} = 7.38 \times (p/\text{atm})$ $\ln x_{H_2}, 323.15 \text{ K} = 7.89 \times (p/\text{atm})$

The deuterium solubilities were identical, in terms of mole fractions, to the hydrogen solubilities.

The hydrogen + octane system has also been studied by Frolich $et \ all$. (1) and by Connolly (9). Connolly (9) studied the system between 463 K and 553 K and reported his data as K-values (mole fraction in the gas phase divided by mole fraction in the liquid phase). The temperature range of these results is sufficiently different from that both of other high pressure studies on this system and from low pressure measurements, to make meaningful comparison impossible. The data are classified as tentative.

The data of Frolich *et al.* (1) were presented in graphical form and are classified as doubtful.

^Hydrogen + Decane

This system has been investigated by three groups of workers. The most recent data by Sebastian *et al.* (10) are thought to be reliable and cover the temperature range 462 K to 583 K and pressures up to 25 MPa.

COMPONENTS: **EVALUATOR:** Colin L. Young, 1. Hydrogen; H₂; [1333-74-0] School of Chemistry, University of Melbourne, Parkville, Victoria 3052, 2. Alkanes; C₅ to C₁₄ Australia. August 1980 CRITICAL EVALUATION: The considerably less extensive data of Sokolov and Polyakov (11) cover the temperature range 358 K to 483 K and pressure up to 30 MPa and are consistent with the data of Sebastian et al. (10). Nederbragt (12) made some preliminary measurements on this system but was mainly concerned with the solubility of decane in the gas phase. His data are rejected. The data of Sebastian $et \ al.$ (10) and Sokolov and Polyakov (11) are both classified as tentative. The gas-liquid critical temperature of decane is 617.7 K (13) and Young (14) has made a preliminary observation of gas-gas immiscibility in this system. The phase behaviour of this system needs to be further investigated and extreme caution needs to be exercised in extrapolating the solubility data to temperatures above 583 K. Hydrogen + Dodecane Hydrogen + 2-Methylpropane The data of Dean and Tooke (15) are the only set of data on These workers' data on the system hydrogen + 2,2,4-trithese systems. methylpentane appear to be consistent with other data on that system.

Therefore their data are classified as tentative for the hydrogen + dodecane system.

Hydrogen + Tetradecane

The data of Sokolov and Polyakov (11) are classified as tentative as their data appear to be reliable for the hydrogen + decane system (see above) and there are no other data available for this system.

Hydrogen + Hexadecane

The recent data of Chao and coworker appear to be reliable and the data of this group for this system are therefore classified as tentative. Hydrogen + 2,2,4-Trimethylpentane

The data of Dean and Tooke (15) and Peter and Reinhartz (8) are classified as tentative on the basis of the experimental techniques used and the agreement between the two sets at the common temperature of 423.95 K. The temperature range of the data of Laugier *et al.* (16) do not overlap with those of the measurements of Dean and Tooke (15) or Peter and Reinhartz (8). References:

 Frolich, P. K.; Trauch, E. J.; Hogan, J. J.; Peer, A. A. *Ind. Eng. Chem.* <u>1931</u>, 23, 548.
 Nichols, W. B.; Reamer, H. H.; Sage, B. H. Am. Inst. Chem. Engnrs. J. <u>1957</u>, 3, 262.
 Sattler, Z. Tech. Physik. <u>1940</u>, 21, 410.

(cont.)

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COMPONENTS:	EVALUATOR:			
 Hydrogen; H₂; [1333-74-0] Alkanes; C₅ to C₁₄ 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.			
	August 1980			
CRITICAL EVALUATION:				
References (cont.)				
	Clements, H. E. J. Chem. Engng.			
Data <u>1970</u> , 15, 174. 5. Katayama, T.; Nitta, T. J. Chem.	Engng. Data <u>1976</u> , 21, 194.			
6. Lachowicz, S. K. Thesis, Universit	ty of London, Dec. <u>1954</u> .			
	Weale, K. E. Trans. Faraday Soc.			
	<u>1955</u> , <i>51</i> , 1198. Peter, S.; Reinhartz, K. 2. <i>Phys. Chem.</i> <u>1960</u> , 24, 10.			
9. Connolly, J. F. Amer. Petr. Inst.	Report <u>1965</u> , 45, (III), 62.			
	J. Chem. Engng. Data <u>1980</u> , 25, 68. • Sokolov, B. I.; Polyakov, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 1403.			
12. Nederbragt, G. W. Appl. Sci. Res.	<u>1948</u> , <i>A1</i> , 237.			
114	Rep. 107. Teddington, U.K. Young, C. L. Unpublished results.			
15. Dean, M. R.; Tooke, J. W. Ind. A	ing. Chem. <u>1946</u> , 38, 389.			
16. Laugier, S.; Richon, D.; Renon,	H. J. Chem. Engng. Data <u>1980</u> , 25, 274.			

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Pentane; C₅H₁₂; [109-66-0] 	Frolich, P.K.; Tauch, E.J.; Hogan, J.J.; Peer, A.A. Ind. Eng. Chem. <u>1931</u> , 23, 548-550
VARIABLES: Pressure	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:	
T/K P/MPa Solub	ility * Mole fraction of hydrogen in liquid, ⁺ ^x H ₂
2.0 4 3.0 6 4.0 9 5.0 11 6.0 13 7.0 15 8.0 17 9.0 19 10.0 21 * Data taken from graph in o measured at 101.325 kPa pr	.4 0.0113 .5 0.0209 .7 0.0308 .0 0.0410 .35 0.0511 .6 0.0606 .8 0.0698 .95 0.0865 .9 0.0942 riginal article. Volume of gas essure and 298.15 K dissolved by sured under the same conditions.
AIIXILI	ARY INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Liquid saturated with gas and after equilibrium established samples removed and analysed by volumetric method. Allowance was made for th vapor pressure of the liquid and the solubility of the gas at atmospheric pressure. Details in source.	Stated that the materials were the highest purity available. Pentane purity 98 to 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 5\%$ REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Frolich, P.K.; Tauch, E.J.; Hogan,
	J.J.; Peer, A.A.
2. Hexane; C ₆ H ₁₄ ; [110-54-3]	
	Ing. Eng. Chem. <u>1931</u> , 23, 548-550.
VARIABLES:	PREPARED BY:
Pressure	C.L. Young
EXPERIMENTAL VALUES:	······································
T/K P/MPa Solubility*	Mole fraction of hydrogen ⁺
	in liquid, x _{H2}
	112
298.15 1.0 1.85	0.0098
2.0 3.65	0.0193
3.0 5.5	0.0287
4.0 7.3	0.0378
5.0 9.1	
6.0 10.95 7.0 12.8	0.0556 0.0644
8.0 14.6	0.0728
9.0 16.4	0.0811
10.0 18.25	0.0894
11.0 20.1	0.0976
* Data taken from granh in ori	
baca caken riom graph in orr	ginal article. Volume of gas sure and 298.15 K dissolved by
	ed under the same conditions.
+ Calculated by compiler.	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Liquid	
Saturated with gas and after	Stated that the materials used
equilibrium established samples	were the highest purity available.
removed and analysed by volumetric	Purity of hexane 98 to 99 mole per
method. Allowance was made for the vapor pressure of the liquid and	cent.
the solubility of the gas at	
atmospheric pressure. Details in	
source.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 5\%$
	H_2
	REFERENCES:

; [1333-74-0]	ORIGINAL MEASUREN			
	Sattler, H.;	;		
2. Hexane; C ₆ H ₁₄ ; [110-54-3]		Z. Tech. Physik, <u>1940</u> , 21,410-413.		
	PREPARED BY:			
ssure	C.L. Young			
S:				
P/bar Kuene	n Coefficient S	Mole fraction of hydrogen in liquid ${}^{x}_{\rm H_{2}}$		
51.5 94.1 1 132.6 2 137.0 2 138.0 2 148.3 2	8.96 6.09 2.54 3.30 3.63 5.23	0.03289 0.03332 0.05829 0.07980 0.08227 0.08333 0.08848 0.09080		
	INFORMATION			
METHOD:/APPARATUS/PROCEDURE: Rocking homb with liquid sampling attachment. Solvent and hydrogen charged into evacuated cell. Amount of solvent in liquid sample estimated gravimetrically and hydrogen in liquid stripped out and estimated volumetrically. Details in source.		Y OF MATERIALS:		
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta$ $\delta x_{H_2} = \pm 2$ %. () REFERENCES:	<pre>P/bar = ±0.2; estimated by compiler).</pre>		
	SSURE S: P/bar Kuene 51.0 51.5 94.1 1 132.6 2 137.0 2 138.0 2 148.3 2 151.7 2 AUXILIARY S/PROCEDURE: ith liquid sampling olvent and hydrogen in liquid sample estimated y and hydrogen in l out and estimated	SSUREPREPARED BY: C.L. YoungS: P/bar Kuenen Coefficient S p/bar Kuenen Coefficient S 51.0 8.84 51.5 $9/bar$ 8.96 94.1 132.6 22.54 137.0 138.0 23.63 148.3 25.23 151.7 25.96 SOURCE AND PURITYInterview of the system S/PROCEDURE: ith liquid sampling plvent and hydrogen vacuated cell. Amount liquid sample estimated γ and hydrogen in d out and estimated Details in source.SURCE AND PURITYInterview of the system S/PROCEDURE: ith liquid sample estimated γ and hydrogen in d out and estimated γ and hydrogen in f out and estimated γ and hydrogen in f a source.ESTIMATED ERROR: $\delta T/K = \pm 0.11 \beta \delta$ $\delta x_{H_2} = \pm 2 \&$ (

		Saturated	Hydrocarbons	361
COMPONENTS:			ORIGINAL MEASUREMENTS:	
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Hexane; C₆H₁₄; [110-54-3]</pre>			Nichols, W. B.; Reamer Sage, B. H. Am. Inst. Chem. Engnrs. <u>1957</u> , 3, 262-7.	
VARIABLES:		<u></u>	PREPARED BY:	
	mperature, pres	ssure	C. L. Young	
EXPERIMENTAL V	VALUES:			
	· · · · · · ·		Mole fraction of	hydrogen
T/K	P/psia	P/MPa	in liquid, x	in gas, y
			H ₂	H 2
277.59 310.93	500 1000 1500 2000 2500 3000 4000 4500 5000 6000 7000 8000 9000 10000 10000 1000 1500 2000 2500 3000	3.447 6.895 10.34 13.79 17.24 20.68 24.13 27.58 31.03 34.47 41.37 48.26 55.16 62.05 68.95 3.447 6.895 10.34 13.79 17.24 20.68 24.13	0.028 0.054 0.078 0.099 0.120 0.140 0.160 0.179 0.199 0.218 0.256 0.294 0.334 0.376 0.422 0.031 0.059 0.084 0.108 0.131 0.153 0.175 (cont	0.996 0.998 0.995 0.995 0.995 0.995 0.995
Martin		AUXILIARY	INFORMATION	
	TUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS	5:
PVT cell charged with mixture of known composition. Pressure measured with pressure balance and temperature measured with platinum resistance thermometer. Bubble point and dew point determined for various compositions from dis- continuities in the pressure-volume isotherm. Co-existing liquid and gas phase properties determined by graphical means. Details in ref. (1) and source.			 Commercial electrolyt sample, purified by p platinum wire, dried, purity 99.9 mole per Phillips Petroleum Co stated purity 99.7 mo dried and degassed. ESTIMATED ERROR: δT/K = ±0.02; δP/MPa = δx_{H2}, δy_{H2} = ±0.001. REFERENCES: Sage, B. H.; Lacey, M Trans. Am. Inst. Mini: Engnrs. <u>1940</u>, 136, 136 	assage over final cent. . sample, le per cent, ±0.001; W. N. ng. Met.

<pre>1. Hydrogen; H₂; [1333-74-0] 2. Hexane; C₆H₁₄; [110-54-3]</pre>			Nichols, W. B.; Reamer, H. H.; Sage, B. H. Am. Inst. Chem. Engnrs. J. <u>1957</u> , 3, 262-7.		
EXPERIMEN	TAL VALUES:	<u></u>			
т/к	P/psia	P/MPa	Mole fraction o in liquid, ^x H ₂	f hydrogen in gas, ^y H ₂	
310.93	4000 4500 5000 6000 7000 8000	27.58 31.03 34.47 41.37 48.26 55.16	0.196 0.217 0.238 0.279 0.322 0.366	0.995 0.995 0.995 0.995 0.995 0.995 0.995	
344.26	9000 10000 500 1500 2000 2500 3000 3500	62.05 68.95 3.447 6.895 10.34 13.79 17.24 20.68 24.13	0.412 0.461 0.034 0.064 0.092 0.119 0.144 0.169 0.193	0.995 0.995 0.961 0.978 0.983 0.986 0.987 0.988 0.988	
377.59	4000 4500 5000 6000 7000 8000 9000 10000 500 10000	27.58 31.03 34.47 41.37 48.26 55.16 62.05 68.95 3.447 6.895	0.216 0.230 0.262 0.309 0.356 0.405 0.456 0.511 0.036 0.070	0.988 0.988 0.988 0.988 0.988 0.988 0.988 0.988 0.988 0.988 0.988 0.904 0.946	
	1500 2000 2500 3000 3500 4000 4500 5000 6000 7000	$10.34 \\ 13.79 \\ 17.24 \\ 20.68 \\ 24.13 \\ 27.58 \\ 31.03 \\ 34.47 \\ 41.37 \\ 48.26$	0.102 0.132 0.160 0.187 0.215 0.241 0.267 0.293 0.345 0.396	0.960 0.966 0.971 0.973 0.974 0.974 0.974 0.974 0.974 0.974	
410.93	8000 9000 10000 500 1500 2000 2500 3000 3500 4000	55.16 62.05 68.95 3.447 6.895 10.34 13.79 17.24 20.68 24.13 27.58	0.450 0.508 0.570 0.038 0.078 0.115 0.149 0.181 0.213 0.244 0.274	0.974 0.974 0.973 0.797 0.886 0.914 0.927 0.934 0.939 0.942 0.944	
444.26	4500 5000 6000 7000 8000 9000 10000 500 1000 1500 2000 2500	31.03 34.47 41.37 48.26 55.16 62.05 68.95 3.447 6.895 10.34 13.79 17.24	0.304 0.334 0.393 0.451 0.511 0.576 0.649 0.037 0.086 0.132 0.172 0.210 (cont.)	0.945 0.946 0.945 0.944 0.941 0.931 0.606 0.772 0.826 0.851 0.865	

<pre>1. Hydrogen; H₂; [1333-74-0] 2. Hexane; C₆H₁₄; [110-54-3]</pre>		Nichols, W. B.; Reamer, H. H.; Sage, B. H. Am. Inst. Chem. Engnrs. J. <u>1957</u> , 3, 262-7		
EXPERIMENT	TAL VALUES:			**
Т/К	P/psia	P/MPa	Mole fraction in liquid, ^x H ₂	of hydrogen in gas, ^y H2
444.26	$\begin{array}{c} 3000\\ 3500\\ 4000\\ 4500\\ 5000\\ 6000\\ 7000\\ 8000\\ 9000\\ 9200+\\ 500\\ 1000\\ 1500\\ 2000\\ 2500\\ 3000\\ 3500\\ 4000\\ 4500\\ 5920+ \end{array}$	$\begin{array}{c} 20.68\\ 24.13\\ 27.58\\ 31.03\\ 34.47\\ 41.37\\ 48.26\\ 55.16\\ 62.05\\ 63.43\\ 3.447\\ 6.895\\ 10.34\\ 13.79\\ 17.24\\ 20.68\\ 24.13\\ 27.58\\ 31.03\\ 34.47\\ 40.82 \end{array}$	0.249 0.285 0.322 0.359 0.394 0.461 0.528 0.597 0.691 0.768 0.032 0.103 0.165 0.224 0.283 0.341 0.396 0.448 0.500 0.555 0.688	0.873 0.878 0.882 0.884 0.885 0.884 0.885 0.885 0.865 0.815 0.768 0.310 0.568 0.656 0.700 0.722 0.736 0.745 0.745 0.749 0.750 0.747 0.688
	[†] critical	point		

COMPONENT	<u>S:</u>		<u></u>	ORIGINAL	MEASUREMEN	rs:	
<pre>l. Hydrogen; H₂; [1333-74-0] 2. Heptane; C₇H₁₆; [142-82-5]</pre>			Peter	S.; Rein		03-18.	
VARIABLES: Temperature, pressure				PREPARED C. L.			
EXPERIMEN	TAL VALUES:						
т/к	<i>P/</i> 10 ⁵ Pa	Mole fr of hyd in liquid, ^x H ₂	lrogen	T/K	<i>P/</i> 10 ⁵ Pa	of hyd	caction drogen , in gas, ^y H ₂
424.15	24.5 49.0 98.1 147.1 196.1 294.2 392.2 588.4 784.5 24.5 49.0 98.1 147.1	0.030 0.062 0.121 0.171 0.216 0.295 0.363 0.482 0.572 0.020 0.074 0.150 0.216	0.824 0.903 0.942 0.952 0.957 0.962 0.964 0.965 0.964 0.561 0.752 0.854 0.890	471.65 498.85	294.2 392.2 490.3 588.4 686.5	0.272 0.377 0.469 0.554 0.633 0.710 0.023 0.077 0.170 0.252 0.329 0.401 0.468 0.537	0.905 0.915 0.914 0.908 0.898 0.883 0.355 0.638 0.758 0.758 0.794 0.813 0.825 0.829 0.816
			SOURCE AN 1. Elec mole meth 2. Phil pure mole ESTIMATEL $\delta T/K =$	ND PURITY O ctrolytic = per cent hane. llips Petr = grade, r = per cent D ERROR: $\pm 0.1; \delta P$ $\delta y_{H_2} \approx \pm 0$ er).	F MATERIALS; grade, pur t, 0.05 mol coleum Co. ninimum pur t. P/bar = ±0. .005 (estim	e per cent sample; ity 99 1; δx _{H2} =	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Octane; C₆H₁₈; [111-65-9]</pre>	Frolich, P.K.; Tauch, E.J.; Hogan, J.J.; Peer, A.A. Ind. Eng. Chem. 1931, 23, 548-550.
VARIABLES:	PREPARED BY:
Pressure	C.L. Young
EXPERIMENTAL VALUES: T/K P/MPa Solubili	ty, Mole fraction of + hydrogen in liquid, + ^x H ₂
298.15 1.0 1.4 2.0 2.75 3.0 4.15 4.0 5.6 5.0 7.0 6.0 8.4 7.0 9.85 8.0 11.3 9.0 12.7 10.0 14.1 11.0 15.5 12.0 17.0 13.0 18.4 14.0 19.8 15.0 21.3 16.0 22.8 17.0 24.3 18.0 25.75 19.0 27.2 * Data taken from graph in orig measured at 101.325 kPa press unit volume of liquid measure + Calculated by compiler.	0.0270 0.0361 0.0447 0.0532 0.0618 0.0702 0.0783 0.0861 0.0939 0.102 0.110 0.117 0.125 0.125 0.132 0.140 0.147 0.154 inal article. Volume of gas ure and 298.15 K dissolved by
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Liquid saturated with gas and after equilibrium established samples removed and analysed by volumetric method. Allowance was made for the vapor pressure of the liquid and the solubility of the gas at atmospheric pressure. Details in source.	SOURCE AND PURITY OF MATERIALS: Stated that the materials were the highest purity available. Purity of octane 98 to 99 mole per cent. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 5\%$ REFERENCES:

COMPONENTS :		ORIGINAL MEASUREMENTS:			
<pre>1. Hydrogen; H₂; [</pre>	1333-74-0]	Connolly, J.F.,			
2. Octane; C ₈ H ₁₈ ;	[111-65-9]	Amer. Petr. Inst. Report, <u>1965</u> , 45 (III), 62-67.			
VARIABLES: Temperature,	pressure	PREPARED BY: C.L. Young			
EXPERIMENTAL VALUES: T/K	P/bar	K values ^K C ₈ H ₁₈ K _{H2}			
463.15	13.8 20.7 27.6 34.5 51.7 68.9	1.000 114.2 0.705 79.8 0.387 42.5 0.273 29.2 0.212 22.4 0.175 18.2 0.127 12.5 0.130 9.57 0.079+ -			
473.15	5.51 6.89 13.8 20.7 27.6 34.5 51.7 68.9	1.000 86.6 0.832 71.3 0.464 38.9 0.331 26.9 0.261 20.7 0.216 16.9 0.158 11.7 0.128 8.98 0.099+ 6.2+			
483.15	6.89 13.8 20.7 27.6	1.000 66.3 0.970 64.4 0.555 35.5 0.400 24.8 0.318 19.1 0.265 15.6 0.194 10.9			
	AUXILIAR	Y INFORMATION			
METHOD/APPARATUS/PROCED Sample of known cor over mercury. Mixt constant temperatur bubble point deterr Data smoothed.	mposition confined ture compressed at te. Dew point and				
		ESTIMATED ERROR: $\delta T/K = \pm 0.2; \ \delta P/bar = \pm 0.5; \ \delta K/K = \pm 1$ %. (estimated by compiler). REFERENCES:			

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Octane; C ₀ H ₁₀ ; [111-65-9]		ORIGI	ORIGINAL MEASUREMENTS: Connolly, J.F. Amer. Petr. Inst. Report, <u>1965</u> , 45 (III), 62-67.			
		Conno				
EXPERIMENTAL VALUES	:		K values			
T/K	P/bar		$K_{C_8H_{1.6}}$ K_{H_2}			
		^K C ₈ H ₁₈	H ₂			
483.15	68.9 103.4 137.9	0.159 0.123 0.106+	8.39 5.87			
493.15	7.93	1.000	50.0			
	13.8	0.653	31.7			
	20.7	0.475	22.4			
	27.6	0.380	17.4			
	34.5	0.320	14.2			
	51.7	0.237	10.0			
	68.9	0.195	7.76			
	103.4	0.154	5.47			
	137.9	0.133	4.30			
503.15	9.38	1.000	37.5			
	13.8	0.759	27.7			
	20.7	0.560	20.0			
	27.6	0.452	15.7			
	34.5	0.384	12.9			
	51.7	0.287	9.11			
	68.9	0.237	7.12			
	103.4	0.188	5.04			
	137.9	0.163+	3.97+			
513.15	11.0	1.000	28.1			
	13.8	0.863	24.1			
	20.7	0.647	17.6			
	27.6	0.527	13.9			
	34.5	0.450	11.5			
	51.7	0.343	8.19			
	68.9	0.287	6.42			
	103.4	0.228+	4.59+			
523.15	12.9	1.000	20.7			
	13.8	0.960	20.0			
	20.7	0.742	15.0			
	27.6	0.614	12.0			
	34.5	0.532	10.0			
	51.7	0.414	7.23			
	68.9	0.350	5.71			
	103.4	0.286	4.11			
	137.9	0.253+	3.28+			
533.15	15.0	1.000	14.9			
	20.7	0.835	12.1			
	27.6	0.704	9.93			
	34.5	0.613	8.44			
	51.7	0.487	6.21			
	68.9	0.420	4.95			
	103.4	0.351	3.57+			
543.15	17.4	1.000	10.2			
	20.7	0.915	9.40			
	27.6	0.793	7.93			
	34.5	0.706	6.80			
	51.7	0.579	5.07			
	68.9	0.516	4.06			
	103.4	0.453	2.96			
	137.9	0.422+	2.36+			
553.15	27.6	0.879	5.68			
	34.5	0.802	4.98			
	51.7	0.691	3.80			
	68.9	0.631	3.08			

+ obtained by extrapolation by authors.

COMPONENTS :	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Decane; C₁₀H₂₂; [124-18-5] 	Sokolov, B. I.; Polyakov, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 1403-5.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hyd T/K P/bar in liquid, ^x H ₂	lrogen
358.15 40.5 0.036 101.3 0.086 202.6 0.158	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
483.15 40.5 0.060 101.3 0.147 202.6 0.250 304.0 0.345	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell with stirrer. Solvent placed in cell then pres- surized with hydrogen at room tem- perature, heated to experimental temperature and equilibrated. Liquid samples removed and cooled; analysed by stripping gas out and measuring volume evolved. Remaining liquid estimated gravimetrically.	l and 2 "Pure" grade samples.
	ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$
	$\delta x_{H_2} = \pm 3$ % (estimated by compiler).
	REFERENCES:

COMPONENTS:	· · · · · · · · · · · · · · · · · · ·	-	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]			Sebastian, H. M.; Simnick, J. J.;		
			Lin, H. M.; Chao,		
2. Decane; $C_{10}H_{22}$; [124-18-5]			J. Chem. Eng. Data	1980, 25, 68-70.	
	753 55				
VARIABLES:			PREPARED BY:		
	Temperature	e, pressure	C. L. Yo	oung	
EXPERIMENTAL	VALUES:				
T/K	P/atm	<i>P/</i> MPa	Mole fraction of hydrogen in liquid, in gas,		
1/1	1/atim	1 / MF a	^x H ₂	^y H ₂	
			r1 2	- H 2	
462.5	1.4477 19.01	0.14669 1.926	0.0251	0.9216	
]	29.15	2.954	0.0408	0.9446	
	49.4	5.01	0.0678	0.9676	
	99.6	10.09	0.1309	0.9823 0.9860	
	148.3 200.0	15.03 20.27	0.1890 0.2406	0.9877	
	251.9	25.52	0.2832	0.9891	
503.4	3.485	0.3531			
	19.16 32.46	1.941 3.289	0.0289 0.0511	0.8021 0.8786	
	51.1	5.18	0.0818	0.9207	
	99.9	10.12	0.1550	0.9539 -	
	149.5	15.15	0.2202	0.9657	
	201.7 250.4	20.44 25.37	0.2760 0.3324	0.9706 0.9740	
543.0	7.132	0.7226	0.0024	0.07.00	
	19.35	1.961	0.0286	0.6025	
	30.92 48.8	3.133 4.94	0.0533 0.0903	0.7367 0.8198	
	40.0 99.5	10.08	0.1799	0.9001	
]	149.2	15.12	0.2582	0.9266	
			(cont	t.)	
		AUXILIARY	INFORMATION		
METHOD/APPARA	TUS/PROCEDURE:		SOURCE AND PURITY OF MAT	ERIALS:	
Flow appar	catus with both	liquid and	l. Airco sample, pu	urity 99.95	
	nents continuall		mole per cent.		
1	king tube and th		more per cent.		
	=		2 Aldrich Chemica		
1	nich phases sepa		2. Aldrich Chemical Co. sample,		
1 -	vity. Liquid s	-	purity better the	nan 99 mole	
	rom bottom of ce		per cent.		
Vapor samp	ple from top of	cell.			
Compositio	on of samples fo	ound by			
1	out gas and est		ESTIMATED ERROR:		
	solute volumeti		$\delta T/K = \pm 0.2; \delta P/MI$ (below 3.5 MPa), ± 0	$Pa = \pm 0.003$	
	nt gravimetrical			= ±1%.	
	n ref. (1).		REFERENCES:	····	
				Lawson, C. C.;	
			1. Simnick, J. J.; Lawson, C. C.; Lin, H. M.; Chao, K-C.		
			Am. Inst. Chem.	Lagars	
			1977, 23, 469.		

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Decane; C ₁₀ H ₂₂ ; [124-18-5]			ORIGINAL MEASUREMENT Sebastian, H. M.; S Lin, H. M.; Chao, K J. Chem. Eng. Data <u>1</u>	imnick, J. J.; -C.	
EXPERIMEN	TAL VALUES:	<u>, , , , , , ,</u>]			
T/K	T/K ^P /atm ^P /MPa		Mole fraction of hydrogen in liquid, in gas, x_{H_2} y_{H_2}		
543.0	199.7 251.8	20.23 25.51	0.3249 0.3825	0.9391 0.9446	
583.5	13.378 49.9 99.7 150.1 201.7 243.7	1.3555 5.06 10.10 15.21 20.44 24.69	0.1059 0.2220 0.3247 0.4098 0.5013	0.6355 0.7825 0.8303 0.8505 0.8581	

OMPONENTS:	ORIGINAL MEASUREMENTS:		
. Hydrogen; H ₂ ; [1333-74-0]	Dean, M. R.; Tooke, J. W. Ind. Eng. Chem. 1946, 38, 389-393.		
<pre>Dodecane (isomeric mixture); C12H26;</pre>			
ARIABLES:	PREPARED BY:		
Temperature, pressure	C. L. Young		
XPERIMENTAL VALUES:	• · · · · · · · · · · · · · · · · · · ·		
	drogen vapor, ^y H ₂		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	99831 99900 99929 99930 99930 9868 999227 99520 99602 99652 		
	INFORMATION		
ETHOD /APPARATUS/PROCEDURE: Rocking equilibrium cell fitted with sampling valve which could be used for gas or liquid sample. Pressure measured with Bourdon gauge, tem- perature measured with mercury in glass thermometer. Hydrocarbon placed in cell, pressurized with hydrogen. Agitated and equilibrated samples withdrawn and hydrocarbon Component frozen out in liquid nitrogen; hydrogen estimated Volumetrically. Details in source.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Electrolytic commercial sample, purity better than 99.8 mole per cent. 2. Isomeric mixture prepared by polymerization of isobutylene. ESTIMATED ERROR:</pre>		

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COMPONENTS :		ORIGINAL MEASUREMENTS:		
1. Hydrogen; H_2 ;	[1333-74-0]	Sokolov, B. I.;		
2. Tetradecane; C ₁₄ H ₃₀ ; [629-59-4]			<u>1977</u> , <i>50</i> , 1403-5.	
VARIABLES:	,	PREPARED BY:		
Temperature, pressur	e	C. L. Young		
EXPERIMENTAL VALUES:	*********************************	<u> </u>		
Mol T/K P/bar	e fraction of hyd in liquid, ^x H ₂	lrogen		
328.15 40.5 101.3 202.6 304.0	0.033 0.083 0.146 0.210			
403.15 40.5 101.3 202.6 304.0	0.042 0.104 0.190 0.258			
473.15 40.5 101.3 202.6 304.0	0.059 0.131 0.250 0.326			
		INFORMATION		
METHOD/APPARATUS/PROCEI	OURE :	SOURCE AND PURITY OF	MATERIALS;	
Static equilibrium ce Solvent placed in cel surized with hydroger perature, heated to e temperature and equil Liquid samples remove analysed by stripping measuring volume evol Remaining liquid esti gravimetrically.	1 then pres- a at room tem- experimental ibrated. ad and cooled; g gas out and .ved.	l and 2 "Pure"	grade samples.	
		ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/I$ $\delta x_{H_2} = \pm 3$ % (estimation)	bar = ±0.5; ated by compiler).	
		REFERENCES :		

COMPONENTS :			ORIGINAL MEASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] Hexadecane; C₁₆H₃₄; [544-76-3] 			Lin, HM.; Sebastian, H.M.; Chao, KC. J. Chem. Engng. Data. <u>1980</u> , 25, 252- 257.			
VARIABLES:			PREPARED BY:			
	re, pressure		C.L. Young			
EXPERIMENTAL VALU T/K	P/atm	P/MPa	Mole fraction in liquid, in vapor, ^x CH ₄ ^y CH ₄			
461.65	20.05 29.90 50.0 101.7 149.5 199.5 249.4	2.032 3.030 5.07 10.30 15.15 20.21 25.27	2 0.0311 0.99666 0 0.0468 0.99782 0.0757 0.99850 0.1428 0.99909 0.1978 0.99929 0.2468 0.99939			
542.25	19.83 30.24 50.7 101.8 149.7 199.7 248.9	2.009 3.064 5.14 10.31 15.17 20.23 25.22	0.0617 0.9759 0.1007 0.9849 0.1854 0.99187			
622.85	19.97 29.92 50.4 100.1 150.9 200.7 249.3	2.023 3.032 5.11 10.14 15.29 20.34 25.26	0.0764 0.8663 0.1293 0.9179 0.2354 0.9553			
		AUXILIARY	INFORMATION			
METHOD/APPARATUS,	/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:			
Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a Cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and estimating amount of solute Volumetrically and solvent gravimetr- ically. Temperature measured with thermocouple and pressure with Bourdon gauge. Details in ref. (1).		uid and bassing into a ed under oved from ple from samples and gravimetr- ed with th	 Airco sample, purity 99.95 mole per cent or better. Matheson Coleman and Bell sample purity better than 99 mole per cent. ESTIMATED ERROR: δT/K = ±0.1; δP/MPa = ±0.01; 			
			<pre></pre>			

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COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Hexadecane; C ₁₆ H ₃₄ ; [544-76-3]			ORIGINAL MEASUREMENTS Lin, HM.; Sebastian, H.M.; Chao, KC. J. Chem. Engng. Data. <u>1980</u> ,25, 252-257.		
EXPERIMENTAL V	<u>ALUES</u> : P/atm	P/MPa	Mole fraction in liquid, in vapor, x y		
664.05	19.69 30.02 50.2 100.7 100.4 150.4 199.9 250.5	1.995 3.042 5.087 10.20 10.17 15.24 20.25 25.38	$\begin{array}{cccc} & & & & & & \\ & & & & & & \\ & & & & & $		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Dean, M. R.; Tooke, J. W. Ind. Eng. Chem. 1946, 38, 389-393.		
<pre>2. 2-Methylpropane; C₄H₁₀; [75-28-5]</pre>			
VARIABLES:	PREPARED BY:		
Temperature, pressure	C. L. Young		
EXPERIMENTAL VALUES:	······································		
Mole fraction of hydrogen T/K P/bar in liquid, in vapor, ^x H ₂ ^y H ₂	Mole fraction of hydrogen T/K P/bar in liquid, in vapor, ^x H ₂ ^y H ₂		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	172.4 0.192 0.758 206.8 0.247 0.565 394.3 68.95 0.082 0.370 86.18 0.117 0.406 103.4 0.162 0.424		
AUXILIARY	INFORMATION		
METHOD / APPARATUS/PROCEDURE: Rocking equilibrium cell fitted with sampling valve which could be used for gas or liquid sample. Pressure measured with Bourdon gauge. tempera- ture measured with mercury in glass thermometer. Hydrocarbon placed in cell, pressurized with hydrogen. Agitated and equilibrated samples withdrawn and hydrocarbon component frozen out in liquid nitrogen: hydrogen estimated volumetrically. Details in source.	 Phillips Petroleum sample; 		
salls in source.	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 2 (up \text{ to } 70 \text{ bar}); \pm 10 (up \text{ to } 400 \text{ bar}); \delta x_{H_2} = \pm 1\%; \delta y_{H_2} = \pm 0.1\% (estimated H_2 \text{ by compiler}).$		
	REFERENCES:		

COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H_2 ; [1333-74-0]	Dean , M. R.; Tooke, J. W. Ind. Eng. Chem. <u>1946</u> , 38, 389-393.			
2. 2,2,4 - Trimethylpentane; C ₈ H ₁₈ ; [540-84-1]				
VARIABLES:	PREPARED BY:			
Temperature, pressure	C. L. Young			
EXPERIMENTAL VALUES: Mole fraction	Mole fraction			
T/K P/bar in liquid, in vapor, ^x H ₂ ^y H ₂	of hydrogen			
310.9 12.1 0.0090 0.98950 36.2 0.0272 0.99602 70.33 0.0517 0.99764 139.3 0.0971 0.99831 208.6 0.132 0.99838 276.5 0.166 0.99840	$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
346.5 0.198 0.99832 366.5 17.1 0.0165 0.9490 40.2 0.0404 0.9765 71.36 0.0710 0.9855 104.8 0.0974 0.9888 142.7 0.130 0.9910	106.2 0.129 0.9511 141.0 0.167 0.9601 208.6 0.238 0.9676 275.1 0.292 0.9725 349.2 0.355 0.9748			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Rocking equilibrium cell fitted with sampling valve which could be used for gas or liquid sample. Pressure measured with Bourdon gauge, tempera-	 Electrolytic commercial sample; purity better than 99.8 mole per cent. 			
ture measured with mercury in glass thermometer. Hydrocarbon placed in cell, pressurized with hydrogen. Agitated and equilibrated samples withdrawn and hydrocarbon component frozen out in liquid nitrogen; hydrogen estimated volumetrically. Details in source.	 Rohm and Haas Co. sample; "pure" sample. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 2 \text{ (up to 70)}$ bar); $\pm 10 \text{ (up to 400 bar)}; \delta x_{H_2} = \pm 1\$; \delta y_{H_2} = \pm 0.1\$ \text{ (estimated 1)}$			
	REFERENCES:			

COMPONENTS:	ORIGINAL MEASUREMENTS:					
 Hydrogen; H₂; [1333-74-0] 2,2,4 - Trimethylpentane; C₈H₁₈; 		Peter, S.; Reinhartz, K. Z. Phys. Chem. <u>1960</u> , 24, 103-18.				
[540-84-1]						
VARIABLES:			PREPARED	BY:	<u>, 1992. – "M. – 199</u> 1. – 1992. –	
Temperature, pre	ssure		С. L. Y	oung		
EXPERIMENTAL VALUES:			L			
T/K P/bar i	Mole fract of hydrog n liquid, ^x H ₂	gen –	т/к	<i>P/</i> bar	Mole fra of hydro in liquid, ^x H ₂	ogen
423.95 24.5 49.0 73.5 98.1 147.1 196.1 294.2 392.3 588.4 784.5 980.7 1078.8 471.65 24.5 49.0 73.5 98.1 147.1 196.1	0.178 0.227 0.314 0.388 0.509 0.604 0.683 0.707 0.029 0.072 0.114 0.153 0.225	0.832 0.911 0.934 0.946 0.955 0.966 0.971 0.972 0.971 0.966 0.960 0.958 0.591 0.758 0.824 0.854 0.886 0.903	471.65 499.35	294.2 392.3 490.3 588.4 686.5 711.0 29.4 49.0 73.5 98.1 147.1 196.1 245.2 294.2 343.2 372.6 387.4	0.397 0.488 0.570 0.646 0.742 0.816 0.032 0.076 0.127 0.173 0.261 0.340 0.413 0.483 0.557 0.601 0.729	0.914 0.920 0.916 0.905 0.881 0.816 0.460 0.604 0.703 0.754 0.806 0.828 0.839 0.843 0.843 0.843 0.843 0.845 0.825 0.729
METHOD (3 DD D D D D D D D D D D D D D D D D		AUXILIARY	INFORMATIC	·~		
METHOD /APPARATUS/ Static steel equi with magnetic sti Ports. Temperat platinum resistar Samples withdrawn established. Th Ponent frozen out bath, hydrogen es cally.	ilibrium celi irrer and sam cure measured ne thermomet n after equi ne hydrocarbo	mpling d with a ter. librium on com-	1. Elect	per cer ne.	OF MATERIALS: grade. puri t, 0.05 mole	ty 99.9 per cent
				$\begin{array}{l} 0.1; \delta \\ H_2 \\ t). \end{array}$	P/bar = ±0.1 .005 (estima	n 2

			ORIGINAL MEASUREMENTS:		
 Hydrogen; H₂; [1333-74-0] 2,2,4- Trimethylpentane; C₈H₁₈; [540-84-1] 			Laugier, S.; Richon, D.; Renon, H. <i>J. Chem. Engng. Data.</i> <u>1980</u> ,25, 274-276.		
VARIABLES:			PREPARED BY:		
Temperature, pressure			C.L. Young		
EXPERIMENTAL VALUES:					
T/K	P/MPa		ole fraction of hydrogen Lquid, in vapor, y _{H2}		
226.0 250.0 ^a	3.0 6.2 11.9 18.0 24.6 24.8 31.4 36.8 3.15 8.00 10.20 13.00 15.05 16.05 17.05 17.40 18.10 19.75 20.00	0.11 0.22 0.32 0.42 0.58 0.02 0.12 0.22 0.34 0.37 0.40 0.42 0.42	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
	20.40	0.49	0.636		
METHOD / APPARATUS / PROCEI					
Static equilibrium cell fitted with sampling valves which removed samples of 10 ⁻⁹ m ³ . Samples analysed by gas chromatography. Temperature measured using thermo- couples and pressure measured using pressure transducer cali- brated against a dead weight gauge.			<pre>SOURCE AND PURITY OF MATERIALS: 1. L'Air Liquide sample, purity better than 99.95 mole per cent. 2. Fluka sample, guaranteed purity 99.5 mole per cent or better. ESTIMATED ERROR:</pre>		

COMPONENTS: 1. Hydrogen; H_2 ; [1333-74-0]		ORIGINA	ORIGINAL MEASUREMENTS: Laugier, S.; Richon, D.;		
		Laugie			
2. 2,2,4-Trimethyl C ₈ H ₁₈ ; [540-84-	pentane; 1]	J. Cher	Renon, H. J. Chem. Engng. Data. <u>1980</u> , 25, 274-276.		
EXPERIMENTAL VALUES	:				
т/к	P/MPa	Mole fraction in liquid, ^w H ₂	on of hydrogen in vapor, ^y H2		
250.0 ^b	4.90 5.05 7.80 10.40 14.40 18.70	0.093 0.335 0.444	0.473 		
a) First	set of experiment	nts			
b) Second set of experiments					

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] Cyclohexane; C₆H₁₂; [110-82-7] 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
	August 1980

This system, like hydrogen + benzene, has been studied fairly extensively under a wide range of conditions. The two most extensive studies are that of Berty, Reamer and Sage (1) who studied the system between 310 K and 407 K up to pressures of 62 MPa and that of Krichevskii and Sorina (2) who studied the system between 293 K and 333 K up to pressures of 67 MPa. While it is not possible to carry out a precise comparison because the system was not studied at a common temperature, there are some small discrepancies between the results of these workers. The limited data of Sattler (3) at 308 K agrees with that obtained by interpolation of Krichevskii and Sorina (2). The data of Thomson and Edmister (4) which was studied at 339 K and 394 K up to pressures of 69 MPa agree with the data of Krichevskii and Sorina (2) at the lower temperature and with that of Berty $et \ al$. (1) at the higher temperature. Comparison of the data of Ipatiev and Levina (5) with that of Krichevskii and Sorina (2) and Berty $et \ al.$ (1) indicates that Ipatiev and Levina (5) data are slightly too low (as has been observed elsewhere; see, for example, the evaluation of hydrogen + 1,3-dimethylbenzene). The data of Brainard and Williams (6) were determined as part of a study of the quaternary system, hydrogen + benzene + cyclohexane + hexane. While it appears that their data are slightly high at 366 K the extent of their data is too limited for a meaningful comparison in view of the interpolation needed in both pressure and temperature. Frolich et al. (7) presented their data in graphical form and the mole fraction solubilities calculated from their results are almost 10 per cent greater than those of Krichevskii and Sorina (2).

The data of Ipatiev and Levina (5) and Frolich *et al*. (7) are classified as doubtful whereas those of Berty *et al*. (1), Krichevskii and Sorina (2), Sattler (3) and Thompson and Edmister (4) are classified as tentative.

References:

1.	Berty, T. E.; Reamer, H. H.; Sage, B. H. J. Chem. Engng. Data
	<u>1966</u> , <i>11</i> , 25.
2.	Krichevskii, I. R.; Sorina, G. A. Zh. Fiz. Khim. 1958, 32,
	2080.
3.	Sattler, H. Z. Tech. Physik. <u>1940</u> , 21, 410.
4.	Thompson, R. E.; Edmister, W. C. Am. Inst. Chem. Engnrs. J.
	<u>1965</u> , <i>11</i> , 457.
5.	Ipatiev, V. V.; Levina, M. I. Zh. Fiz. Khim. <u>1935</u> , 6, 632.

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Cyclohexane; C₆H₁₂; [110-82-7]</pre>	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052,
	Australia.
CRITICAL EVALUATION:	August 1980
ONLITCAL EVALUATION:	
References (cont.)	
6. Brainard, A. J.; Williams, G. H <u>1967</u> , <i>13</i> , 60.	3. Am. Inst. Chem. Engnrs. J.
7. Frolich, P. K.; Trauch, E. J.; Ind. Eng. Chem. <u>1931</u> , 23, 5	

COMPONENTS:		ORIGINAL MEASUREMENTS:		
 Hydrogen; H₂; [1333-74-0] Cyclohexane; C₆H₁₂; [110-82-7] 		Frolich, P. K.; Tauch, E. J.; Hogan, J. J.; Peer, A. A.		
		Ind. Eng. Chem. <u>1931</u> , 23, 548-550.		
VARIABLES:		PREPARED BY:		
Pressure		C. L. Young		
EXPERIMENTAL VALUES:				
т/к Р/МРа	Solubilit	* Mole fraction of hydrogen ty,S in liquid,+ ^x H ₂		
gas measured at 10)1.325 kPa p liquid meas	0.0088 0.013 0.017 0.021 0.025 0.030 0.034 0.034 0.042 0.055 0.055 0.059 0.059 0.067 0.067		
	AUXILIARY	INFORMATION		
METHOD APPARATUS/PROCEDURE:	<u> </u>	SOURCE AND PURITY OF MATERIALS:		
Static equilibrium cell. saturated with gas and after equilibrium established saturated and analysed by volumethod. Allowance was may vapor pressure of liquid a solubility of the gas at a pressure. Details in som	ter amples olumetric ade for and the atmospheric	Stated that the materials were the highest purity available. Purity of cyclohexane 98 to 99 mole per cent. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 5\%.$ REFERENCES:		

	Сусис пуа		383
COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]		Ipatiev, V.V.; Levina, M.	.I.
2. Cyclohexane; C ₆ H ₁₂ ; [110-82-7]		Zhur. Fiz. Khim. <u>1935</u> , 6,	632-9.
VARIABLES:		PREPARED BY:	
Temperature, pressur	e	C.L. Young	
EXPERIMENTAL VALUES:			
т/к	P/bar	Mole fraction of hydrogen in liquid, ^x H ₂	
298.15	44.1 91.2 196.1 294.2	0.01801 0.03401 0.06813 0.09889	
423.15	44.1 91.2 196.1	0.03236 0.06836 0.1400	
513.15	294.2	0.3668	
METHOD ADDADATHS (DROGEDHDD)		INFORMATION	
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Hydrocarbon added to cell then pressurized at temperature of measurement. After 1-2 hours liquid samples removed. Analysed by stripping out hydrogen at low pressure.		 SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. Prepared by high pressource 200 atm) hydrogenatic at 280°C in presence catalyst. Boiling pt Density at 15°C = 0.7 	sure (150- n of benzene of nickel . 80.6°C
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 2$ (estimated by compiler REFERENCES:	

COMPONENTS:		ORIGINAL MEASUR	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H	12; [1333-74-0]	Sattler, H	•;		
2. Cyclohexane	; C ₆ H ₁₂ ; [110-82-7	7] Z. Tech. Pi	hysik, <u>1940,</u> 21,410-413		
VARIABLES:		PREPARED BY:			
Pres	sure	C.L. Young			
EXPERIMENTAL VALUE	S:				
т/к	P/bar K	Kuenen Coefficient S	Mole fraction of hydrogen in liquid ^x H ₂		
308.35	54.9 95.6 96.1 146.8 147.1 147.1	6.21 10.73 10.84 16.53 16.51 16.42	0.02280 0.03875 0.03913 0.05848 0.05841 0.05811		
		ILIARY INFORMATION			
attachment. So charged into ev of solvent in J gravimetrically	th liquid sampling plvent and hydroger vacuated cell. Amo liquid sample estin v and hydrogen in 1 nd estimated volume	n Dunt No de Mated Liquid	TY OF MATERIALS; tails given.		
			: δP/bar = ±0.2; (estimated by compiler).		

COMPONENTS	:		ORIGINAL	MEASUREMENT	
 Hydrogen; H₂; [1333-74-0] Cyclohexane; C₆H₁₂; [110-82-7] 			Krichevskii, I.R. and Sorina, G.A.		
			Zhur.	Fiz. Khim	a. <u>1958</u> , <i>32</i> ,2080-6
VARIABLES		re, pressure	PREPARED	BY: C.L. Y	Zoung
Pupp					
T/K	TAL VALUES:		m /17	7) /h a m	Mole frection
17K	P/bar	Mole fraction of hydrogen in liquid, ^x H ₂	т/к	P/bar	Mole fraction of hydrogen in liquid, x _{H2}
293.15	$\begin{array}{r} 49.6\\ 59.9\\ 77.5\\ 109.4\\ 119.6\\ 144.9\\ 187.5\\ 188.5\\ 272.6\\ 300.9\\ 318.2\\ 334.4\\ 379.0\\ 382.0\\ 403.3\\ 424.6\\ 448.9\\ 479.3\\ 512.7\\ 547.2\\ 601.9\\ 609.0\\ 643.4\\ 658.6\end{array}$	0.0215 0.0257 0.0307 0.0438 0.0478 0.0526 0.0718 0.0691 0.0945 0.103 0.102 0.114 0.102 0.114 0.129 0.130 0.129 0.130 0.136 0.149 0.151 0.162 0.176 0.177 0.184 0.188	313 . 15	50.6 59.8 68.7 75.1 94.2 99.1 119.6 150.0 158.1 188.5 198.6 233.0 280.7 296.9 359.7 379.0 389.1 436.7 457.0 462.0 491.4 539.0 565.4 601.9	0.0216 0.0259 0.0299 0.0322 0.0407 0.0435 0.0510 0.0602 0.0651 0.0731 0.0796 0.0910 0.105 0.112 0.133 0.139 0.141 0.152 0.155 0.165 0.171 0.177 0.186 0.196
			INFORMATIC	DN	
METHOD:/A	PPARATUS/	PROCEDURE:	SOURCE AN	D PURITY OF	F MATERIALS:
Bourdon Vapor ph	Pressur gauge. S ases anal	um cell fitted with e measured with amples of liquid and ysed by stripping out mating volumetrically	and d	calcium cl	
			bar), ±5 or 1% (w	0.l;δP/ba (above 3 hichever red by cor	ar = ± 1 (up to 300 300 bar); $\delta x_{H_2} = \pm 0.0003$ is greater ^{H2}) mpiler).

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Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS			ORIGIN	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]		Krich	Krichevskii, I.R. and Sorina, G.A.				
2. Cycl	lohexane;	C ₆ H ₁₂ ; [110-82-7]	Zhur.	Fiz. Khin	. <u>1958</u> , <i>32</i> ,2080-6		
EXPERIM	ENTAL VAL	UES:					
т/к	P/bar	Mole fraction of hydrogen in liquid, ^x H ₂	т/к	P/bar	Mole fraction of hydrogen in liquid, ^x H ₂		
313.15 333.15	677.9 50.1 71.1 92.2 117.5 154.0 181.4 207.7 229.0 245.2 251.3 260.4 290.8 329.3	0.217 0.0262 0.0367 0.0462 0.0571 0.0746 0.0841 0.0941 0.0983 0.108 0.110 0.114 0.125 0.141	333.15	363.8 400.2 417.5 434.7 445.8 474.2 486.4 513.7 545.1 576.5 603.9 653.5 667.7	0.156 0.164 0.170 0.170 0.178 0.189 0.192 0.202 0.214 0.217 0.266 0.241 0.246		
т/к	P/bar	Mole fraction of hydrogen in vapor, $y_{\rm F.2}$	Т/К		Mole fraction of hydrogen in vapor, ${}^{\mathcal{Y}}_{H_2}$		
293.15	50.2 99.1 99.1 197.6 299.9 379.0 379.0 558.3 662.7 49.0 50.1 124.6 196.6 198.6 277.6 279.7 352.6 434.7 436.7 491.4	0.99738 0.99728 0.99830 0.99830 0.99821 0.99858 0.99864 0.99867 0.99834 0.99803 0.99133 0.99236 0.99559 0.99559 0.99555 0.99655 0.99681 0.99691 0.99713 0.99713 0.99713 0.99702 0.99665	313.15	491.4 599.8 603.9 688.0 50.1 50.1 102.3 104.4 193.5 193.5 289.8 290.8 388.1 388.1 484.3 486.4 574.5 576.5 688.0 688.0	0.99666 0.99653 0.99654 0.99621 0.99584 0.9858 0.99203 0.99192 0.99402 0.99402 0.99465 0.99465 0.99466 0.994651 0.99451 0.99441 0.99429 0.99321 0.99296		

COMPONENTS:	OPTOTNAL WEACUPENERS
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Thompson, R. E.; Edmister, W. C.
-• nyurugen, ny, [ruus-74-0]	
	Am. Inst. Chem. Engnrs. J.
 Cyclohexane; C₆H₁₂; [110-82-7] 	<u>1965</u> , <i>11</i> , 457-461.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
-mperaeure, pressure	c. h. foung
EXPERIMENTAL VALUES:	
Mole fraction of hydro	ogen
T/K P/bar in liquid, in v.	apor,
	H ₂
	- 2
^{338.7} 6.88 0.00362 0.90	
13.78 0.00710 0.95	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
68.66 0.0345 0.98	
116.8 0.0563 0.99	
207.0 0.102 0.99 413.4 0.178 0.99	
690.4 0.262 0.99	
690.4 - 0.993 394.3 - 0.00317 - 0.453	
³⁹⁴ .3 6.98 0.00317 0.45 13.78 0.00802 0.23	
34.47 0.0225 0.10	
68.94 0.0456 0.050	
206.8 0.131 0.026 413.4 0.236 0.021	
689.4 0.350 0.018	
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	·
	SOURCE AND PURITY OF MATERIALS:
Equilibrium cell fitted with glass	1. Purity 99.8 mole per cent.
fiber packing and grooved cone to assist equilibrium being established.	2 Phillips Patralaus
1 ~~ Soure measured with dead weight	2. Phillips Petroleum sample, purity 99.94 mole per cent or
-ster and temperature with thermo-	better.
1 TANLE. Sample analyzed by freezing	
but hydrocarbon and gas measured Volumetrically. Details in source.	
becaris in source.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.5; \delta P/bar = \pm 0.18,$
	δx_{H_2} , $\delta y_{H_2} = \pm 3$ % (estimated by
	compiler).
	INT AVENUED :

COMPONENTS:			ORIGINAL	MEASUREMEN	rs:	
 Hydrogen; H₂; [1333-74-0] Cyclohexane; C₆H₁₂; [110-82-7] 			Sage,	в. н.	Reamer, H. H Data <u>1966</u> ,	
VARIABLES:		······	PREPARED	BY:		
Temperature,	pressure		С. L.	Young		
EXPERIMENTAL VA			I			
T/K P/ba	Mole fra of hydr r in liquid, ^x H ₂	ogen	T/K	P/bar	Mole fra of hydr in liquid, ^x H ₂	ogen
310.9 34. 68. 103. 137. 172. 206. 241. 375. 310. 344. 413. 482. 551. 344.3 34.3 103. 137. 172. 206. 241. 275. 310. 344.3	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.9921 0.9949 0.9964 0.9969 0.9970 0.9971 0.0072 0.9973 0.9973 0.9973 0.9972 0.9970 0.9967 0.9960 0.9734 0.9851 0.9888 0.9903 0.9912 0.9915 0.9915 0.9919 0.9920 0.9920	344.3 377.6 407.6	$\begin{array}{c} 413.7\\ 482.6\\ 551.6\\ 620.5\\ 34.5\\ 68.9\\ 103.4\\ 137.9\\ 172.4\\ 206.8\\ 241.3\\ 275.8\\ 310.3\\ 344.7\\ 413.7\\ 482.6\\ 551.6\\ 34.5\\ 68.9\\ 103.4\\ 137.9\\ 172.4\\ 206.8 \end{array}$	0.1760 0.2030 0.2273 0.2520 0.0189 0.0384 0.0574 0.0760 0.0941 0.1119 0.1281 0.1446 0.1599 0.1758 0.2058 0.2362 0.2644 0.0244 0.0244 0.0244 0.0244 0.0466 0.0697 0.0914 0.1118 0.1340 (con	0.9920 0.9919 0.9918 0.9917 0.9350 0.9622 0.9716 0.9763 0.9763 0.9789 0.9804 0.9815 0.9822 0.9827 0.9830 0.9832 0.9832 0.9834 0.9835 0.9835 0.9835 0.9835 0.9835 0.9835 0.99196 0.9402 0.9503 0.9564 0.9603
		AUXILIARY	INFORMATI	ON		
METHOD/APPARATUS/PROCEDURE: Static PVT cell fitted with dead weight pressure balance and platinum resistance thermometer. Bubble point determined from discontinuity in slope of pv isotherm. Gas phase compositions determined by analysis using partial condensation techniques. Details in source and ref. 1.			 SOURCE AND PURITY OF MATERIALS: 1. Electrolytic hydrogen passed over hot platinum wire. Final purity better than 99.86 mole per cent. 2. Phillips Petroleum research grade sample. Purity 99.94 mole 			
			Eng	gnrs. <u>194</u>	<u>10</u> , <i>136</i> , 136	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>	Berty, T. E.; Reamer, H. H.;
2. Cyclohexane; C ₆ H ₁₂ ; [110-82-7]	Sage, B. H. J. Chem. Engng. Data <u>1966</u> , 11, 25-30.

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EXPERIMENTAL VALUES:

r.

т/к	<i>P/</i> bar	Mole fra of hydro in liquid, ^x H ₂	ogen
407.6	241.3	0.1505	0.9630
	275.8	0.1673	0.9651
	310.3	0.1858	0.9664
	344.7	0.2020	0.9673
	413.7	0.2343	0.9681
	482.6	0.2652	0.9681
	551.6	0.2919	0.9683

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Cyclohexane; C₆H₁₂; [110-82-7] 	Brainard, A. J.; Williams, G. B. Am. Inst. Chem. Engnrs. J. <u>1967</u> , 13, 60-69.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
	rogen vapor, ⁴ H ₂
366.48 146.86 0.0853 0.98	25
37.92 0.0231 0.95	59
422.04 139.07 0.1097 0.94 37.78 0.0300 0.85	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stirred equilibrium cell. Pressure measured with Bourdon gauge. Analysis of samples carried out by expanding into an expansion cylinder and freezing out the hydrocarbon; hydrogen measured volumetrically and then hydrocarbon estimated volumetri- cally. Details in source.	 Matheson ultrapure sample, purity better than 99.998 mole per cent. Phillips Petroleum sample, purity 99.99 mole per cent; 2,4-dimethylpentane and 2,2- dimethylpentane major impurities
}	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3; \delta P/bar = \pm 0.15;$ $\delta r = \delta y = \pm 1.0$ (estimated by
	δx_{H_2} , $\delta y_{H_2} = \pm 1.0$ % (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Ipatiev, V.V.; Levina, M.I.
2. Methylcyclohexane; C ₇ H ₁₄ ; [108-87-2]	Zhur. Fiz. Khim. <u>1935</u> , 6, 632-9.
VARIABLES:	PREPARED BY:
Pressure.	C.L. Young
EXPERIMENTAL VALUES:	
T/K P/bar	Mole fraction of hydrogen in liquid, $x_{\rm H_2}$
298.15 44.1 91.2 196.1 294.2	0.02250 0.04400 0.08264 0.1398
	IARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Hydrocar added to cell then pressurized at temperature of measurement. After 1-2 hours liquid samples removed. Analysed by stripping out hydrogen low pressure.	bon 1. No details given. 2. Prepared by high pressure (150- 200 atm) hydrogenation of toluene
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 2\%.$ (estimated by compiler). REFERENCES:

COMPONENTS:				ORIGINAL MEASUREMENTS:			
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Methylcyclohexane; C₇H₁₄; [108-87-2]</pre>		Peter, S.; Reinhartz, K. Z. <i>Phys. Chem</i> . <u>1960</u> , 24, 103-18.					
5:		· · · · · · · · · · · · · · · · · · ·	PREPARED	BY:			
iture, pre	essure		С. L. Y	oung			
TAL VALUES	:						
P/bar i	of hydr	ogen	т/к	P/bar	Mole fra of hydr in liquid, ^{°°} H ₂	rogen	
49.0 98.1 147.1 196.1 294.2 490.3 686.5 882.6	0.022 0.044 0.085 0.124 0.161 0.226 0.335 0.421 0.492 0.023 0.055 0.112 0.163 0.209	0.925 0.955 0.965 0.970 0.972 0.974 0.977 0.978 0.707 0.858 0.912 0.925 0.931	471.65	49.0 98.1 147.1 196.1 294.2 392.3 588.4	0.054 0.121 0.180 0.233 0.329 0.411 0.543	0.938 0.941 0.938 0.935 0.464 0.735 0.855 0.885 0.893 0.899 0.900 0.899 0.882	
		AUXILIARY	INFORMATIC	DN			
APPARATUS	/PROCEDURE		SOURCE AN	D PURITY	OF MATERIALS:		
gnetic st Tempera m resista withdraw shed. T frozen ou ydrogen e	irrer and ture measu nce thermo n after eq he hydroca t in a dry	sampling red with a meter. uilibrium rbon com- ice/aceton	mole meth 2. Phili pure	per cen ane. lips Per grade,	nt, 0.05 mol troleum Co. minimum pur	e per cent sample;	
			δT/K = ±3%; δ;	$\pm 0.1; $ $y_{H_2} = \pm ($ er).		п2	
	APPARATUS steel equ gnetic st miture, president	APPARATUS/PROCEDURE steel equilibrium c gnetic stirrer and Temperature measu	hylcyclohexane; C_7H_{14} ; [108-87-2] Mole fraction of hydrogen P/bar in liquid, in gas, x_{H_2} 24.5 0.022 0.925 49.0 0.044 0.955 98.1 0.085 0.965 147.1 0.124 0.970 196.1 0.161 0.972 294.2 0.226 0.974 490.3 0.335 0.977 686.5 0.421 0.978 24.5 0.023 0.707 49.0 0.055 0.858 98.1 0.112 0.912 147.1 0.163 0.925 196.1 0.209 0.931 AUXILIARY APPARATUS/PROCEDURE: steel equilibrium cell fitted gnetic stirrer and sampling Temperature measured with a m resistance thermometer. withdrawn after equilibrium shed. The hydrocarbon com- frozen out in a dry ice/aceton ydrogen estimated volu-	$2. Phys$ $2. C. L. Y$ P/bar $11iquid, in gas, T/K$ x_{H_2} y_{H_2} $24.5 0.022 0.925$ 471.65 $49.1 0.161 0.972$ 498.85 $24.5 0.023 0.707$ 498.85 $24.5 0.023 0.707$ $490. 0.055 0.858$ $98.1 0.112 0.912$ $147.1 0.163 0.925$ $196.1 0.209 0.931$ $1. Elec$ $2. Phillibrium cell fitted$ meth m resistance thermometer. $mithar am after equilibrium shed. The hydrocarbon com- folden out in a dry ice/acetone ydrogen estimated volu-$	$y_1 cyclohexane; C_7H_{1*};$ 2. Phys. Chem. $y_1 cyclohexane; C_7H_{1*};$ $y_1 cyclohexane; Pressure y_1 cyclohexane; C_7H_{1*}; y_1 cyclohexane; Pressure y_1 cyclohexane; Pressure y_1 cyclohe$	xylcyclohexane; C ₇ H ₁₄ ; 2. Phys. Chem. <u>1960</u> , 24, 1 ylcyclohexane; C ₇ H ₁₄ ; [108-87-2] xture, pressure C. L. Young xTAL VALUES: Mole fraction of hydrogen p'/bar in liquid, in gas, T/K P/bar in liquid, in liquid, in gas, T/K P/bar in liquid, in liquid, in gas, T/K P/bar in liquid, i	

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Decahydronaphthalene, (Decalin); C₁₀H₁₆; [91-17-8] 	Sokolov, B. I.; Polyakov, A. A. 2h. Prikl. Khim. <u>1977</u> , 50, 1403-5.
VARIABLES:	
	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hyd T/K P/bar in liquid, ^x H ₂	lrogen
338.15 40.5 0.014 101.3 0.038 202.6 0.076 304.0 0.123	
398.15 40.5 0.020 101.3 0.054 202.6 0.105 304.0 0.158	
473.15 40.5 0.025 101.3 0.069 202.6 0.136 304.0 0.195	-
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell with stirrer Solvent placed in cell then pres- surized with hydrogen at room tem- perature, heated to experimental temperature and equilibrated. Liquid samples removed and cooled; analysed by stripping out gas and measuring volume evolved. Remaining liquid estimated gravimetrically.	l and 2 "Pure" grade samples.
	ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$ $\delta x_{H_2} = \pm 3$ % (estimated by compiler).
	REFERENCES:

1. Hydrogen; H ₂ ; [1333-74-0] 2. 1,1'-Bicyclohexyl; C ₁ ,H ₂ ; [92-51-3] VARIANLES: Temperature, pressure EXTERIMENTAL VALUES: Nole fraction of hydrogen T/K F/bar in liquid, in vapor, x_{H_2} y_{H_2} 462.15 20.3 0.0181 0.9842 50.7 0.0443 0.9229 50.7 0.0211 0.6117 462.15 20.3 0.0181 0.9842 50.7 0.0443 0.9229 50.7 0.0686 0.6226 101.0 0.0180 0.9849 102.7 0.1237 0.9445 102.7 0.1218 0.9977 2253.3 0.0121 0.6117 541.85 20.3 0.0212 0.9888 701.65 20.3 0.0024 0.0660 152.0 0.103 0.9558 102.3 0.0227 0.2465 101.3 0.1031 0.9748 100.3 0.0184 0.0269 0.2463 50.7 0.0543 0.9558 50.7 0.0646 0.6226 152.0 0.1480 0.9842 50.7 0.0646 0.6226 102.7 0.1289 0.9845 20.3 0.0124 0.9688 701.65 20.3 0.0054 0.6602 152.0 0.1480 0.9613 152.0 0.2660 0.7467 152.0 0.1480 0.9845 102.3 0.4239 0.8050 EXENTION/APPARATUS/PROCEDURE: Flow apparatus with both liquid and parting mount of solute solution of ganges. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: Flow apparatus with both detailmot a day pressure with Bourdon gauge. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: Flow apparatus with both hermocouple and pressure with Bourdon gauge. AUXILIARY INFORMATION METHORY APPARATUS/PROCEDURE: FINMED ERROR: dT/K = :0.7; 67/bar = :0.3; 6T/bar = :0.3; 6T/K = :0.7; 67/bar = :0.3; 6T/K = :0.7; 67/ba	COMPONENTS:	ORIGINAL MEASUREMENTS:
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-	HM.; Chao, KC.
Intermediation of hydrogen of hydr		J. Chem. Engng. Data <u>1978</u> , 23, 167.
EXPERIMENTAL VALUES: Mole fraction of hydrogen T/K P/bar in liquid, in vapor, x_{H_2} y_{H_2} z_{H_2} z_{H_2} z_{H_2} y_{H_2} 462.15 20.3 0.0181 0.9842 621.75 20.3 0.0211 0.6117 30.4 0.0262 0.9889 101.3 0.0382 0.7322 50.7 0.0433 0.9929 50.7 0.0686 0.8296 152.0 0.1158 0.9974 202.7 0.1418 0.9977 541.85 20.3 0.0212 0.8988 701.65 20.3 0.0312 0.9435 541.85 20.3 0.0212 0.8988 701.65 20.4 0.0342 0.6022 30.4 0.0229 0.9312 50.7 0.0543 0.9588 50.7 0.0249 0.2463 50.7 0.0543 0.9588 50.7 0.0249 0.2463 50.7 0.0543 0.9588 50.7 0.0793 0.4885 101.3 0.1031 0.9748 101.3 0.1018 0.6720 152.0 0.1460 0.9313 122.0 2.463 0.7667 253.3 0.2268 0.9866 233.3 0.4239 0.8050 METHOU/APPARATUS/PROCEDURE: Flow apparatus with both liquid and gas components continually passing into a ming tube and then into a cell in which phases separated under partity. Liquid sample removed from bottom of cell and vapor sample from bottom of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumerically. and pressure with Bourdon gauge. AUXILIARY INFORMATION METHOU/APPARATUS/PROCEDURE: FILMATED ERROR: $\delta_{T/K} = 10.7; \delta_{F/bar} = ±0.3; \delta_{xH_2}, \delta_{yH_2} = ±1% (estimated by compiler).REFERENCES:1. Simmick, J. J.; Lawson, C. C.;Lin, HM.; Chao, KC.Am. Inst. Chem. Engnrs. J. 1977,$	VARIABLES:	PREPARED BY:
Mole fraction of hydrogen T/K Mole fraction of hydrogen F/A Mole fraction of hydrogen F/A 7/K F/bar in liquid, in vapor, π_{H_2} Y_{H_2} Y_{H_2} 462.15 20.3 0.0181 0.9842 621.75 20.3 0.0211 0.6117 462.15 20.3 0.0181 0.9842 621.75 20.3 0.0211 0.6117 462.15 20.3 0.0210 0.6117 0.0322 0.7322 50.7 0.0443 0.9929 50.7 0.686 0.8296 122.0 0.1158 0.9977 253.3 0.3112 0.9533 541.85 20.3 0.0212 0.9312 30.4 0.0289 0.2463 50.7 0.1630 0.9913 152.0 0.1480 0.602 30.4 0.0329 0.9312 30.4 0.0289 0.2463 51.0 0.1480 0.9813 152.0 0.7467 202.7 0.1899 0.9845 202.7 0.3494 0.7857 253.3 <td< td=""><td>Temperature, pressure</td><td>C. L. Young</td></td<>	Temperature, pressure	C. L. Young
of hydrogenof hydrogenT/KP/barin liquid, in vapor, m_H_2 m_H_2 m_H_2 m_H_2 m_H_2 462.1520.30.01810.9842621.7520.30.02110.611730.40.02620.988930.40.03820.7322101.30.06100.9958101.30.13980.9060152.00.11580.9974202.70.25780.9445202.70.14180.9974202.70.25780.9445541.8520.30.01210.9988701.6520.30.00540.602250.70.05430.955850.70.07930.488510.30.10310.9748101.30.18180.6720152.00.14800.9813152.00.24630.7467202.70.18990.9865202.70.34940.7857253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.8050253.30.22680.9866253.30.42390.805026004by tripping out gas and estination and gauge.50/K e = 0.7; 6P/bar = ±0.3; 6T/K e = 0.7; 6P/ba	EXPERIMENTAL VALUES:	
$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $	of hydrogen T/K P/bar in liquid, in vapor,	of hydrogen T/K P/bar in liquid, in vapor,
METHOD/APPARATUS/PROCEDURE: Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetrically and solvent gravimetrically. Tem- perature measured with thermocouple and pressure with Bourdon gauge. ESTIMATED ERROR: $\delta T/K = \pm 0.7; \ \delta P/bar = \pm 0.3; \ \delta x_{H_2}, \ \delta y_{H_2} = \pm 1$ % (estimated by compiler). REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetrically and solvent gravimetrically. Tem- perature measured with thermocouple and pressure with Bourdon gauge. ESTIMATED ERROR: $\delta T/K = \pm 0.7; \delta P/bar = \pm 0.3; \delta x_{H_2}, \delta y_{H_2} = \pm 1 % (estimated by compiler).REFERENCES:1. Simnick, J. J.; Lawson, C. C.;Lin, HM.; Chao, KC.Am. Inst. Chem. Engnrs. J. 1977,$	AUXILIARY	INFORMATION
<pre>gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetrically and solvent gravimetrically. Tem- perature measured with thermocouple and pressure with Bourdon gauge.</pre> ESTIMATED ERROR: $\delta T/K = \pm 0.7; \ \delta P/bar = \pm 0.3; \ \delta x_{H_2}, \ \delta y_{H_2} = \pm 1$ % (estimated by compiler). REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
<pre>cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetrically and solvent gravimetrically. Tem- perature measured with thermocouple and pressure with Bourdon gauge.</pre> 2. Fischer Scientific Co. sample; purity about 99 mole per cent. 2. Fischer Scientific Co. sample; purity about 99 mole per cent. 5. Strimated Prove Strimated Prove Strimat	gas components continually passing	
$\delta T/K = \pm 0.7; \delta P/bar = \pm 0.3;$ $\delta x_{H_2}, \delta y_{H_2} = \pm 1\% \text{ (estimated by compiler).}$ REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,	cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetrically and solvent gravimetrically. Tem- perature measured with thermocouple	purity about 99 mole per cent.
δx _{H2} , δy _{H2} = ±1% (estimated by compiler). REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,		
compiler). REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,		· · · · · · · · · · · · · · · · · · ·
<pre>1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u>,</pre>		compiler).
Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. <u>1977</u> ,		
Am. Inst. Chem. Engnrs. J. <u>1977</u> ,		
		23, 469.

COMPONENTS:		EVALUATOR:
 Hydrogen; H₂; [] Ethene; C₂H₄; [7 	-	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
		August 1980

This system has been investigated by four groups. The early data of Likhter and Tikhonovich (1) are of limited accuracy; the mole fraction of hydrogen in the liquid was found to be proportional to the fugacity of hydrogen, f, up to 8 MPa. The constants, k, in the equation

f = kx

were 1450, 1607, 1845 and 2152 atm at 188, 178, 168 and 158 K, respectively. It appears that the mole fraction solubilities from these equations are higher than more recent data. The mole fraction solubility data of Hiza $et \ al$. (2) which cover the temperature range 121 to 170 K and pressures between 2 and 15 MPa are consistently a few per cent higher than those given by Sagara $et \ al$. (3) which cover the temperature range 123 to 248 K and pressures between 2 and 8 MPa. Both sets of data are classified as tentative.

The data of Williams and Katz (4) are mostly reported as K-values (K = gas phase mole fraction/liquid phase mole fraction) or in graphical form. K-values calculated from the data of Sagara*et al.*(3) are in agreement with those quoted by Williams and Katz (4).

References:

- 1. Likhter, A. I.; Tikhonovich, N. P. Zh. Tekh. Fiz. <u>1939</u>, 9, 1916.
- Hiza, M. J.; Heck, C. K.; Kidnay, A. J. Chem. Eng. Progr. Symp. Ser. 1968, 64, no. 88, 57.
- 3. Sagara, H.; Arai, Y.; Saito, S. J. Chem. Engng. Japan <u>1972</u>, 5, 339.
- 4. Williams, R. B.; Katz, D. L. Ind. Eng. Chem. <u>1954</u>, 46, 2512.

COMPONENTS :			ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂	; [1333-74-	0]	Williams, R.B.; Katz, D.L.
<pre>2. Ethene, (Ethylene); C₂H₄; [74-85-1]</pre>		4;	Ind. Eng. Chem. <u>1954</u> , 46, 2512-20.
VARIABLES:			DEEDADED DV.
	re, pressur	e	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:			
T/K	p/psi	p/10⁵Pa	K value of hydrogen
255.37	500 1000 2000	34.47 68.95 137.90	17.1 8.10 3.94
241.48	500 1000 2000 4000	34.47 68.95 137.90 275.79	23.1 11.25 5.50 2.43
227.59	250 500 1000 2000 4000	17.24 14.47 68.95 137.90 275.79	56.0 28.2 14.4 7.35 3.51
199.82	250 500 1000 2000 4000	17.24 34.47 68.95 137.90 275.79	84.2 41.3 21.2 10.8 5.75
172.04	250 500 1000 2000	17.24 34.47 68.95 137.90	123.6 62.0 31.8 16.5
		AUXILIARY	INFORMATION
METHOD / APPARATUS / PRO	CEDURE :		SOURCE AND PURITY OF MATERIALS:
Flow system desc Temperature meas couple. Pressur Bourdon gauge. by high pressure Cell charged und Samples of each room temperature analysed by gas K-values for eth	ured with th e measured v Vapor recirc magnetic pu er pressure phase expand and pressure density meas	hermo- with culated ump. ded to re; surements.	 Purity 99.9 mole %. Dried. 99.6% pure as estimated by mass spectrometry.
			ESTIMATED ERROR: δT/K = ±0.6; δp/psi = ±0.5%; δK < 1%. REFERENCES: 1. Aroyan, H.J.; Katz, D.L. Ind. Eng. Chem., <u>1951</u> , 43, 185.

COMPONENTS:			ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]			Williams, R.B.; Katz, D.L.
2. Ethene, (Ethylene); C ₂ H ₄ ; [74-85-1]			Ind. Eng. Chem. <u>1954</u> , 46, 2512-20
EXPERIMENTAL VALUE	S:		
т/к	p/psi	<i>p/</i> 10⁵Pa	K value of hydrogen
172.04	4000 8000	275.79 551.58	
158.15	250 500 2000 4000 8000	17.24 34.47 68.95 137.90 275.79 551.58	75.1 38.6 20.2 10.9
144.26	250 500 1000 2000 4000 8000	17.24 34.47 68.95 137.90 275.79 551.58	96.4 50.3 26.6 14.60
116.48	250 500 2000 4000 8000	17.24 34.47 68.95 137.90 275.79 551.58	159 82.7 44.8 28.5

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Ethene; C ₂ H ₄ ; [74-85-1]			ORIGINAL MEASUREMENTS: Hiza, M. J.; Heck, C. K.; Kidnay, A. J. Chem. Eng. Progr. Symp. Ser. No. 88 1968, 64, 57-65.				
							VARIABLES
Tempera	ture, pres	ssure		С. L. Y	oung		
EXPERIMEN	TAL VALUES:					Mole fra	
T/K	P/bar i	of hydı in liquid, ^x H ₂	in vapor, ^y H ₂	Т/К	P/bar	of hydı in liquid, ^x H ₂	
		0.0235 0.0303 	0.9460 0.9696 0.9733 0.9764 0.9784 0.9796 0.9884 0.99177 		33.9 43.8 61.0 76.4 80.4 92.8 105.7 129.5 131.2 10.76 25.58 37.0 39.28 61.10 71.33 90.69 100.1 120.6 131.7 159.1	- 0.00800 0.0133	0.99811 0.99831 0.99831 0.99818 0.99813 0.99896 0.999142 0.9999142 0.9999166 0.9999166
				INFORMATIO	N		
Closed ambient measured thermome gauge.	loop flow temperatu d with pla eter and p Samples	atinum resi	berature Istance Ith Bourdon Nases	 Purigiva Resample Resample ESTIMATED 	ified (no en). earch gra e per cen		99.98
				100 bar); ±0.3 ±2%; δ(<pre>P/bar = ±0.1 (above 100 1-y_{H2}) = ±39 </pre>	bar);

COMPONEN	TS:	·····	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>		[1333-74-0]	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Engng. Japan 1972, 5,
2. Et	hene; C_2H_4 ;	[74-85-1]	339-348.
VARIABLE			
			PREPARED BY:
Temper	ature, pressu	ire	C. L. Young
EXPERIME	NTAL VALUES:	Mole fraction of 1	nvðrogen
т/к	P/bar	in liquid, ^x H ₂	in gas, ^y H ₂
123.15	20.3	0.00531	0.996
123.13	40.5	0.00932	0.997
	60.8 81.1	0.0127 0.0146	0.998 0.998
148.15	20.3	0.00743	0.979
	40.5 60.8	0.0131 0.0185	0.985 0.988
172	81.1	0.0266	0.990
173.15	20.3 40.5	0.00865 0.0164	0.921 0.954
Ì	60.8 81.1	0.0281	0.964 0.968
198.15	20.3	0.0361 0.0100	0.747
	40.5 60.8	0.0207- 0.0370	0.863 . 0.890
222	81.1	0.0489	0.909
223.15	20.3 40.5	0.00843 0.0265	0.438 0.673
	60.8	0.0448	0.760
248.15	81.1 30.4	0.0603 0.00988	0.797 0.209
	81.1	0.0212	0.331
		AUXILIARY	INFORMATION
METHOD /	APPARATUS/PRC	CEDURE :	SOURCE AND PURITY OF MATERIALS;
Static capaci	stainless st tv 5 x 10^5 mm	eel cell of	 Nippon Sanso Co. Ltd. sample; purity 99.99 mole per cent.
l cert e	nclosed in cr	d sampling valves. yostat. Tempera-	2. Takachiho Chemical Co. Ltd.
l cure m	easured with	thermocouple. sing Bourdon	sample; purity 99.5 mole per cent.
l adade.	Gases adde	d to cell and	
yas wi	thdrawn and a	ples of liquid and nalysed using a	
l yas ch	romatograph w	ith thermal	
source	• aetect	or. Details in	
			ESTIMATED ERROR:
			$\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1;$
			δx_{H_2} , $\delta y_{H_2} = \pm 1$ %.
			REFERENCES:
l			
HAD - AA	-		

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Olefins</pre>	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
	August 1980

Apart from the ethene + hydrogen system, no hydrogen + olefin system has been studied at high pressures by more than one group. Therefore the evaluations are limited to inferring the reliability or otherwise of the data from the evaluation of solubility data on other systems by the same workers.

Hydrogen + Propene

This system has been studied by Williams and Katz (1) and their data are classified as tentative on the basis of the evaluation of these workers' results for the systems ethene, ethane and propane + hydrogen.

Hydrogen + 1-Hexene, + 1-Heptene, + 1-Octene

Sokolov and Polyakov's data (2) on hydrogen + decane appears to be reliable (see evaluation), therefore their data on 1-hexene, 1-heptene and 1-octene + hydrogen are expected to be fairly reliable and are classified as tentative.

References:

1. Williams, R. B.; Katz, D. L. Ind. Eng. Chem. 1954, 46, 2512.

2. Sokolov, B. I.; Polyakov, A. A. 2h. Prikl. Khim. 1977, 50, 1403.

Unsaturated	Hydrocarbons 401
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Williams, R.B.; Katz, D.L.
2. 1-Propene, (Propylene); C ₃ H ₆ ; [115-07-1]	Ind. Eng. Chem. <u>1954</u> , 46, 2512-20
VARIABLES:	PREPARED BY:
Temperature, pressure	C.L. Young
EXPERIMENTAL VALUES:	
1	Pa K value of hydrogen
297.04 250 17.2 500 34.4 1000 68.9 2000 137.9 4000 275.7 8000 551.5	7 24.9 5 13.4 0 7.12 9 3.67
283.15 500 17.2 500 34.4 1000 68.9 2000 137.9 4000 275.7 8000 551.5	7 30.9 5 16.1 0 8.39 9 4.38
255.37 500 34.4 1000 68.8 2000 137.9 4000 275.7 8000 551.5	7 40.4 5 21.1 0 11.0 9 5.82
277.59 500 17.2 500 34.4 1000 68.9 2000 137.9	7 57.6 5 29.2
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Flow system described in ref. (1).	1. Purity 99.9 mole %. Dried.
Temperature measured with thermo- couple. Pressure measured with Bourdon gauge. Vapor recirculated by high pressure magnetic pump. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed by gas density measurements. K-values for propene given in source.	 Stated purity better than 99 mole %.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.6; \ \delta p/psi = \pm 0.5\%; \ \delta K < 1\%.$
	REFERENCES:
	1. Aroyan, H.J.; Katz, D.L. Ind. Eng. Chem. <u>1951</u> , 43, 185.

COMPONENTS:			GINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]			Williams, R.B.; Katz, D.L.			
2. 1-Propene, (Pro [115-07-1]	pylene); C₃I	H ₆ ; Ind	. Eng. Chem. <u>1954</u> , 46, 2512-20.			
EXPERIMENTAL VALUES	:					
Т/К	p/psi	p/10⁵Pa	K value of hydrogen			
277.59	4000	275.79	7.65			
	8000	551.58	4.31			
199.82	250	17.24	156			
	500	34.47	79.6			
	1000	68.95	40.2			
	2000	137.90	20.3			
	4000 8000	275.79 551.58	10.4 5.93			
	8000	221.20	5.95			
172.04	250	17.24	201			
	500	34.47	103			
	1000	68.95	52.9			
	2000	137.90	27.1			
	4000	275.79	14.7			
	8000	551.58	8.63			
158.15	250	17.24	306			
190.19	500	34.47	159			
	1000	68.95	82.8			
	2000	137.90	43.2			
	4000	275.79	23.2			
	8000	551.58	13.8			
144.26	250	17.24	596			
144.20	500	34.47	318			
	1000	68.95	165			
	2000	137.90	89.0			
	4000	275.79	48.5			
	8000	551.58	28.6			

COMPONENTS:	ORIGINAL MEASUREMENTS:				
1. Hydrogen; H_2 ; [1333-74-0]	Sokolov, B. I.; Polyakov, A. A.				
	Zhur. Prikl. Khim. 1977, 50, 1403-5.				
2. 1-Hexene; C ₆ H ₁₂ ; [592-41-6]					
VARIABLES:	PREPARED BY:				
	PREPARED BI:				
Temperature, pressure	C. L. Young				
EXPERIMENTAL VALUES:					
Mole fraction of hyd	lrogen				
T/K P/bar in liquid,					
^{<i>x</i>} H ₂					
333.15 40.5 0.040					
101.3 0.086 202.6 0.159					
304.0 0.228					
403.15 40.5 0.047 101.3 0.114					
202.6 0.215					
304.0 0.303 443.15 40.5 0.050					
101.3 0.141					
202.6 0.263 304.0 0.380					
304.0 0.380					
	INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
Static equilibrium cell with stirrer.	1 and 2 "Pure" grade samples.				
^{Solvent} placed in cell then pres-					
surized with hydrogen at room tem- perature, heated to experimental tem-					
Perature and equilibrated. Liquid					
samples removed and cooled:					
analysed by stripping gas out and measuring volume evolved.					
Semaining liquid estimated					
gravimetrically.					
	ESTIMATED ERROR:				
	$\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$				
	$\delta x_{\rm H_2} = \pm 3$ % (estimated by compiler).				
	REFERENCES :				
)				

COMPONENTS :		ORIGINAL MEASUREMENTS:				
1. Hydrogen; H ₂ ; [1333-74-0]		Sokolov, B. I.; Polyakov, A. A. Zhur. Prikl. Khim. <u>1977</u> , 50, 1403-5.				
2. 1-Heptene; C ₇ H	H ₁₄ ; [592-76-7]	<u> </u>				
VARIABLES:		PREPARED BY:				
Temperature, pressure		C. L. Young				
EXPERIMENTAL VALUES:						
Mo T/K P/bar	ole fraction of hyd in liquid, ^x H ₂	lrogen				
333.15 40.5 101.3 202.6 304.0	0.028 0.073 0.137 0.201					
403.15 40.5 101.3 202.6 304.0	0.041 0.108 0.190 0.261					
473.15 101.3 202.6 304.0	0.049 0.146 0.255 0.353					
	AUXTLIARY	INFORMATION				
METHOD/APPARATUS/PROC		SOURCE AND PURITY OF MATERIALS:				
Static equilibrium Solvent placed in c surized with hydrog perature, heated to temperature and equ Liquid samples remo analysed by strippi measuring volume ev Remaining liquid es	cell then pres- gen at room tem- o experimental milibrated. oved and cooled; .ng gas out and rolved.	l and 2 "Pure" grade samples.				
gravimetrically.						
		ESTIMATED ERROR:				
		$\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$				
		$\delta x_{\rm H_2} = \pm 3$ % (estimated by compiler).				
		REFERENCES:				

,

COMPONENTS:	ORIGINAL MEASUREMENTS:					
<pre>1. Hydrogen; H₂; [1333-74-0] 2. 1-Octene; C₈H₁₆; [111-66-0]</pre>	Sokolov, B. I.; Polyakov, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 1403-5.					
VARIABLES:	PREPARED BY:					
Temperature, pressure	C. L. Young					
EXPERIMENTAL VALUES:						
Mole fraction of hyd T/K P/bar in liquid, ^x H ₂	lrogen					
328.15 40.5 0.024 101.3 0.070 202.6 0.120 304.0 0.186						
393.15 40.5 0.038 101.3 0.094 202.6 0.179 304.0 0.243 463.15 40.5 0.049						
101.3 0.131 202.6 0.255 304.0 0.318						
AUXILIARY	INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Static equilibrium cell with stirrer. Solvent placed in cell then pres- surized with hydrogen at room tem- perature, heated to experimental temperature and equilibrated. Liquid samples removed and cooled; analysed by stripping gas out and measuring volume evolved. Remaining liquid estimated gravimetrically.	l and 2 "Pure" grade samples.					
	ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$ $\delta r = \pm 20, (astimated by compiler)$					
	$\delta x_{H_2} = \pm 3$ % (estimated by compiler). REFERENCES:					

COMPONENTS :	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Benzene; C₆H₆; [71-43-2]</pre>	Colin Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia. August 1980

This system has been studied fairly extensively under a wide range of conditions. The data of Brainard and Williams (1) were determined as part of a study of the quaternary system hydrogen + benzene + cyclohexane + hexane. While it appears that their data are consistent with those of Connolly (2) and Thompson and Edmister (3) the data are too limited for a meaningful comparison in view of the interpolation in pressure and temperature needed for such a comparison. Hence the Brainard and Williams (1) results are not considered further.

The data of Connolly (2) cover the temperature range 433 K to 533 K and pressures up to 18 MPa. These data are in reasonable agreement with those of Thompson and Edmister (3) at the common temperature of 433 K. The latter data cover the temperature range 339 K to 433 K and when interpolated to 345.75 K are in fair agreement with the data of Sattler (4).

The data of Ipatiev and Levina (5) cover the temperature range from 298 K to 513 K and the mole fractions in the liquid are smaller than the values given by Connolly (2) and Thompson and Edmister (3). It appears, in general, that Ipatiev and Levina (5) data are slightly too small (see, for example, evaluation of hydrogen + 1,3-dimethylbenzene). Therefore, in the present evaluation the data of Ipatiev and Levina (5) are classified as doubtful.

The higher pressure data of Ipatiev and coworkers (6) are more or less consistent with the work of Ipatiev and Levina (5).

The data of Krichevskii and Efremova (7) are limited to the temperature of 288.15 K and are slightly smaller than values obtained by extrapolation of the data of either Ipatiev and Levina (5) or Thompson and Edmister (3). The data of Krichevskii and Efremova (7) are classified as doubtful.

This system was also studied by Frolich $et \ al$. (8) but no table or graph of result was given. It was stated that the curve of solubility of hydrogen in benzene coincided with that of hydrogen in isopropyl alcohol. (The curve was a plot of Ostwald coefficient x pressure against pressure.) The data are not considered further in the present context.

The data of Connolly (2), Thompson and Edmister (3) and Sattler (4) are classified as tentative.

References:

- Brainard, A. J.; Williams, G. B. Am. Inst. Chem. Engnrs. J. <u>1967</u>, 13, 60.
- 2. Connolly, J. F. J. Chem. Phys. 1962, 36, 2897.
- Thompson, R. E.; Edmister, W. C. Am. Inst. Chem. Engnrs. J. <u>1965</u>, 11, 457.

COMPONENTS:	EVALUATOR:				
 Hydrogen; H₂; [1333-74-0] Benzene; C₆H₆; [71-43-2] 	Colin Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.				
	August 1980				
CRITICAL EVALUATION:					
References (cont.)					
4. Sattler, H. Z. Tech. Physik. 1940	<u>)</u> , <i>21</i> , 410.				
5. Ipatiev, V. V.; Levina, M. I. Zh	. Fiz. Khim. <u>1935</u> , 6, 632.				
6. Ipatiev, V. V.; Teodorovich, V. P.; Brestkin, A. P.; Artemovich,					
V. S. Zh. Fiz. Khim. <u>1948</u> , 2	2, 834.				
7. Krichevskii, I. R.; Efremova, G.	D. Zh. Fiz. Khim. <u>1948</u> , 22, 1116.				
8. Frolich, P. K.; Trauch, E. J.; Hogan, J. J.; Peer, A. A.					
Ind. Eng. Chem. <u>1931</u> , 23, 54	8.				

Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS:	ORIGINAL MEASUREMENTS:			
COMPONENTS :	ONIGINAL MEADUREMENID:			
1. Hydrogen; H ₂ ; [1333-74-0]	Ipatiev, V.V.; Levina, M.I.			
2. Benzene; C_6H_6 ; [71-43-2]	Zhur. Fiz. Khim. 1935, 6, 632-9.			
2. Benzene; C ₆ n ₆ ; [/1-43-2]	Zhur. Flz. Khlm. <u>1955</u> , 0, 052-9.			
VARIABLES:	PREPARED BY:			
Temperature, pressure.	C.L. Young			
EXPERIMENTAL VALUES:	Mole fraction $*$ of hydrogen			
T/K P/bar	in liquid, $x_{\rm H_2}$			
298.15 49.0	0.01253			
98.1 294.2	0.02516 0.07140			
373.15 49.0	0.01842			
98.1 294.2	0.03694 0.1063			
423.15 49.0	0.02496			
98.1	0.05497			
196.1 294.2	0.1058 0.1563			
473.15 49.0	0.02760			
98.1 196.1	0.06327 0.1313			
294.2	0.1313			
513.15 49.0	0.04553			
98.1 196.1	0.07320 0.1682			
294.2	0.2455			
* calculated by compile	er.			
	····			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Static equilibrium cell.	 No details given. 			
Hydrocarbon added to cell then	 Fractionally crystalised, distilled. Boiling pt. 80.2°C, 			
pressurized at temperature of measurement. After 1-2 hours liquid	Melting pt. 5.3°C, Density			
samples removed. Analysed by stripp-	$(at 15^{\delta}C) = 0.8803.$			
ing out hydrogen at low pressure.				
	ESTIMATED ERROR:			
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 2\%.$			
	(estimated by compiler).			
	(cottinuccu by compiler).			
	REFERENCES:			

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0	0]	Sattler, H.;
2. Benzene, C ₆ H ₆ ; [71-43-2]		Z. Tech. Physik, <u>1940</u> , 21,410-413.
VARIABLES:		PREPARED BY:
Temperature, pressure		C.L. Young
EXPERIMENTAL VALUES:		
T/K P/bar	Kuenen c S	
		Highlin / H ₂
		15 0.01407
308.15 50.5 54.9	4	.15 0.01427 .33 0.01487
98.8 99.7	•	.88 0.02674 .06 0.02734
100.2 147.3		.19 0.02777 .77 0.03943
147.8		.55 0.03872
345.75 51.0	-	.28 0.01808
54.4 104.9		.78 0.01976 .97 0.03684
106.9 145.1		.25 0.03775 .11 0.05005
151.0		.73 0.05200
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Rocking bomb with liquid sa attachment. Solvent and hyd charged into evacuated cell Amount of solvent in liquid estimated gravimetrically. of hydrogen in liquid strip and estimated volumetricall Details in source.	rogen sample Amount ped out	No details given.
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta P/bar = \pm 0.2; \ \delta x_{H_2} =$
		±2%. (estimated by compiler).
		REFERENCES:

-

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen, H ₂ ; [1333-74-0]	Krichevskii, I. R.; Efremova,
2. Benzene, C ₆ H ₆ ; [71-43-2]	G. D. Zhur. Fiz. Khim. <u>1948</u> , 22, 1116-25.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
Flessure	c. i. foung
EXPERIMENTAL VALUES:	
	tion of hydrogen n liquid, ^x H ₂
99.1 0 199 0 235 0 242 0 285 0 298 0 393 0 435 0 460 0	.0114 .0228 .0436 .0509 .0520 .0608 .0642 .0851 .0904 .0969 .102
AUXILIARY	INFORMATION
	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell fitted with magnetic stirrer. Pressure measured with Bourdon gauge. Sample of liquid analysed by separating the two components, weighing the benzene and estimating the hydrogen volumetri- cally. Details in source.	 Dried. Dried and purified by fractional
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.35\%;$ $\delta x_{H_2} = \pm 0.5\%$
	REFERENCES :

COMPONENTS	:			ORIGINAL ME	ASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]				Ipat'ev, V.V.; Teodorovich, V.P.;				
-			Brestkin,	A.P.; Art	emovich, V.S.			
2. Benzene; C ₆ H ₆ ; [71-43-2]			Zh. Fiz. Khim. <u>1948</u> , 22, 834-845.					
VARIABLES				PREPARED BY	•			
	ure, pressure				. Young			
	problare							
EXPERIMENT	TAL VALUES:							
т/к	P/atm	P/MPa	Sc	lubility,	Mole fract	tion of hydrogen		
1			5	/ cm ³ g ⁻¹		in vapour,		
298	250	25.3]	.8.3	^{<i>x</i>} н ₂ 0.060	y _{H2} 0.9984		
	500	50.7	-	36.9	0.114	0.9982		
323	1000	101.3		75.0	0.207	0.9976		
	250 500	25.3 50.7		20.8 12.0	0.067 0.127	0.9980 0.9964		
	1000	101.3	8	35.0	0.229	0.9948		
	2000	202.7		/2.0	0.375	0.9920		
343	3000 250	304.0 25.3		52.5 23.5	0.461 0.076	0.9888 0.9929		
	500	50.7		7.5	0.142	0.9939		
	1000	101.3		6.5	0.252	0.9921		
	2000 3000	202.7 304.0		95.0 90.0	0.406 0.511	0.9878 0.9830		
373	250	25.3		28.5	0.090	0.9844		
	500	50.7	5	59.0	0.170	0.9861		
	1000	101.3		25.0	0.303	0.9858		
	2000 3000	202.7 304.0		54.0 20.0	0.480 0.594	0.9764 0.9668		
423	250	25.3		2.5	0.129	0.9505		
	500	50.7		7.5	0.234	0.9588		
	1000	101.3 202.7		30.0	0.385	0.9528		
	2000			2.0	0.571	0.9230		
volum benze	ne of hydrogen ne.	, reduced to	o 273k	and 101.3	kPa, dissol	ved unit mass of		
		AUX	ILIARY	INFORMATION				
METHOD/AP1	PARATUS/PROCEDUR	E:		SOURCE AND	PURITY OF MAT	ERIALS:		
Single p	ass flow meth	od		No detail	s available.	2		
	,							
				ESTIMATED E	ERROR:			
				$\delta T/K = \frac{+}{-}0$.2; δx _{H2} ,	$\delta y_{H_2} = \frac{+}{4} 4 \%$		
				estimated	by compile			
				REFERENCES	:			
				L				

COMPONENTS:				ORIGINAL MEASUREMENTS:				
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Benzene; C₆H₆; [71-43-2]</pre>		Connolly, J. F. J. Chem. Phys. <u>1962</u> , 36, 2897-2904.						
							VARIABLES	:
Temperature, pressure		С. L. Yo	oung					
EXPERIMEN	TAL VALUES:	Mole frac		Mole fraction of hydrogen				
Т/К	P/bar in	liquid, ^x H ₂		т/к	<i>P/</i> bar	in liquid, ^x H ₂		
433.15	20.94 32.38 52.12 90.18 115.11 19.00 25.88 40.30	0.00890 0.01615 0.02846 0.05145 0.06601 0.00715 0.01182 0.02149	0.6147 0.7376 0.8285 0.8897 0.9081 0.4921 0.6147 0.7376	483.15 493.15	32.42 40.97 57.99 95.77 178.03 38.72 49.37 70.95	0.01387 0.02136 0.03605 0.06764 0.13175 0.01825 0.02824 0.04811	0.3902 0.4921 0.6147 0.7376 0.8285 0.3902 0.4921 0.6147	
453.15	65.79 117.13 152.19 23.13 31.80 49.99 83.15	0.03822 0.07053 0.09159 0.00938 0.01562 0.02853 0.05139	0.8285 0.8897 0.9081 0.4921 0.6147 0.7376 0.8285	503.15 513.15	120.78 46.24 59.70 87.49 155.94 37.21 55.51	0.09212 0.02425 0.03779 0.06510 0.12863 0.01253 0.03282	0.7376 0.3902 0.4921 0.6147 0.7376 0.2027 0.3902	
463.15	153.71 22.47 28.07 38.89 61.91	0.09734 0.00801 0.01233 0.02061 0.03787	0.8897 0.3902 0.4921 0.6147 0.7376	523.15	72.67 109.53 35.83 43.80 86.66	0.05147 0.09030 0.00741 0.01725 0.06839	0.4921 0.6147 0.0998 0.2027 0.4921	
473.15	105.58 33.94 47.46 76.80 135.78	0.06937 0.01621 0.02718 0.05042 0.09478	0.8285 0.4921 0.6147 0.7376 0.8285	533.15	141.96 41.58 82.67 114.70	0.13163 0.01041 0.06602 0.10802	0.6147 0.0998 0.3902 0.4921	
			AUXILIARY	INFORMATIO	N			
Lime-gl could b Details	APPARATUS/PI ass capilla be pressuriz s in refs. 1 and bubble p y.	ary in whi zed over m 1 and 2.	ercury. Dew	No Bot	details h substa	F MATERIALS: given. nces thought 99.9 mole p		
				$\delta x_{H_2} = \pm$ REFERENCE: 1. Conno <i>Phys</i> . 2. Conno	0.05; 0.00005; (estimat 5: 11y, J. Fluids	$P/bar = \pm 0.1$ $\delta y_{H_2} = \pm 0.1$ ed by compil F.; Kandali <u>1960</u> , 3, 46 F. Phys. F.	0005 .er). .c, G. A. 3.	

irogen; H ₂ ;	[1222-7		1			
 Hydrogen; H₂; [1333-74-0] Benzene; C₆H₆; [71-43-2] 		Thompson, R. E.; Edmister, W. C. Am. Inst. Chem. Engnrs. J. 1965, 11, 457-461.				
VARIABLES: Temperature, pressure			PREPARED B	Y:		
			С. L. Y	oung		
NTAL VALUES:	Mole fra	ction	•		Mole fra	
P/bar in	of hydr	ogen	т/к	P/bar i	of hydr	ogen
5.25 13.40 34.69 34.68 70.74 70.74 117.7 117.7 172.9 275.8 482.5 689.3 689.3	0.0812 0.131 0.176	0.99425 0.99503 0.99494	394.3 433.1	13.86 34.43 69.15 69.15 117.3 117.3 206.8 206.8 413.3 688.3 29.45 41.49 53.64	0.0153 0.0321 0.0541 0.0937 - 0.167 0.243 0.0144 0.0214	0.753 0.897 0.9443 0.9429 0.9621 0.9617 0.9732 0.9736 0.9792 0.9820 0.708 0.794 0.833
		AUXILIARY	INFORMATION	I		
rium cell f acking and equilibrium e measured and tempera Sample a rocarbon an	itted with grooved co being est with dead ture with nalysed by d cas meas	one to tablished. weight thermo- y freezing	1. Pur 2. Phi pur	ity 99.8 m llips Petr ity 99.94	ole per ce oleum samp	le,
			$\delta T/K = \delta x_{H_2}, \delta t$	$\pm 0.5; \delta P / \\ \theta_{\rm H_2} = \pm 3\%$	(estimated	ьу
	S: ture, press TAL VALUES: P/bar ir 5.25 13.40 34.69 34.68 70.74 70.74 17.7 17.7 17.7 17.7 17.7 17.7 17.7 17.7 17.7 17.7 17.7 17.9 275.8 482.5 689.3 6.69 PPARATUS/PR rium cell f acking and equilibrium e measured and tempera Sample a rocarbon an	S: Mure, pressure MTAL VALUES: Mole fra of hydr P/bar in liquid, ^x H ₂ 5.25 0.00166 13.40 - 34.69 0.0117 34.68 - 70.74 0.0238 70.74 - 17.7 0.0389 117.7 - 172.9 0.0536 275.8 0.0812 482.5 0.131 689.3 0.176 689.3 0.180 6.69 0.00186 PPARATUS/PROCEDURE: rium cell fitted with acking and grooved co equilibrium being est e measured with dead and temperature with Sample analysed by	S: ture, pressure Mole fraction of hydrogen P/bar in liquid, in vapor, x_{H_2} y_{H_2} 5.25 0.00166 0.875 13.40 - 0.9500 34.69 0.0117 0.9797 34.68 - 0.9802 70.74 0.0238 0.9889 70.74 - 0.9887 117.7 0.0389 0.99150 117.7 - 0.99157 172.9 0.0536 0.99321 275.8 0.0812 0.99425 482.5 0.131 0.99503 689.3 0.176 0.99494 689.3 0.180 0.99557 6.69 0.00186 0.514 AUXILIARY PPARATUS/PROCEDURE: rium cell fitted with glass acking and grooved cone to equilibrium being established. e measured with dead weight and temperature with thermo-	Image: C_6H_6; [71-43-2] Image:	Image: C_6H_6; [71-43-2] Image:	Image: Signature and the set of th

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Benzene; C₆H₆; [71-43-2] 	Brainard, A. J.; Williams, G. B. Am. Inst. Chem. Engnrs. J. <u>1967</u> , 13, 60-69.
W1.DT 4.DT D2	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hydr T/K P/bar in liquid, in v	ogen apor, H ₂
366.48 77.91 0.0332 0.97 33.16 0.0142 0.95 422.04 139.89 0.0785 0.94 36.68 0.0200 0.85	6 9
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell. Pressure measured with Bourdon gauge. Analysis of samples carried out by expanding into an expansion cylinder and freezing out the hydrocarbon; hydrogen measured volumetrically and then hydrocarbon estimated volumetri- cally. Details in source.	 Matheson ultrapure sample, purity better than 99.998 mole per cent. Phillips Petroleum sample, purity 99.89 mole per cent; major impurity toluene.
	ESTIMATED ERROR: $\delta T/K = \pm 0.3; \delta P/bar = \pm 0.15;$ $\delta x_{H_2}, \delta y_{H_2} = \pm 1.0$ % (estimated by compiler). REFERENCES:

COMPONENTS :	-	EVALUATOR:
 Hydrogen; H₂; Methylbenzene; 		Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
		August 1980

This system has been studied at elevated pressures by Ipatiev and Levina (1) and more recently by Simnick *et al.* (2). The data of Ipatiev and Levina (1) cover the temperature range 208 K to 573 K and pressures up to 29 MPa (although the data at any one temperature are not extensive) whereas that of Simnick *et al.* (2) cover the temperature range range 461 K to 575 K and pressures up to 25 MPa. There is broad agreement between these two sets of data although Ipatiev and Levina (1) mole fraction solubility data are, in general, slightly smaller than those of Simnick *et al.* (2).

The gas-liquid critical temperature of methylbenzene is 591.8 K (3) and it is probable that this system exhibits the phenomenon of gas-gas immiscibility (4) above this temperature. Furthermore, methylbenzene may thermal decompose (5) or react with hydrogen at temperatures above 550 K and workers investigating this system should be aware of these possibilities.

The data of Simnick $et \ all$. (2) are classified as tentative.

References:

1. Ipatiev, V. V.; Levina, M. I. Zhur. Fiz. Khim. 1935, 6, 632.

- Simnick, J. J.; Sebastian, H. M.; Lin, H. M.; Chao, K.-C. J. Chem. Engng. Data 1978, 23, 339.
- Ambrose, D. "Vapour-Liquid Critical Properties", <u>1980</u>, N.P.L. Rep. 107. Teddington, U.K.
- Schneider, G. M. Chem. Soc. Spec. Per. Report No. 22, Vol. 2, ed. McGlashan, M. L., Chapter 4, <u>1978</u>.
- 5. Johns, I. B.; McElhill, E. A.; Smith, J. O. J. Chem. Engng. Data <u>1962</u>, 7, 277.

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]		Ipatiev, V.V.; Levina, M.I.
<pre>2. Methylbenzene, (toluene); C₇H₈; [108-88-3]</pre>		Zhur. Fiz. Khim. <u>1935</u> , 6,632-9.
VARIABLES:		PREPARED BY:
Temperature, pressure	•	C.L. Young
EXPERIMENTAL VALUES:		I
T/K	P/bar	Mole fraction of hydrogen in liquid, x _{H2}
208.15	49.0	0.00629
217.15	98.1	0.01251 0.01435
217.15 248.15	98.1 49.0	0.01010
240.13	98.1	0.01984
273.15	49.0	0.01259
208 15	98.1	0.02456
298.15	49.0 98.1	0.01539 0.02911
	294.2	0.08077
373.15	49.0	0.02094
423,15	98.1 49.0	0.04140 0.02651
423.15	98.1	0.05265
	196.1	0.1076
	294.2	0.1579
473.15	49.0 98.1	0.02977 0.06643
	196.1	0.1382
	294.2	0.1964
513.15	49.0	0.03155
	98.1 196.1	0.07717 0.1661
	294.2	0.2388
573.15	98.1	0.09311
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	·····	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell.	Hvdrocarbon	1. No details given.
added to cell then press	urized at	2. Washed with water and sodium
temperature of measureme		hydroxide solution. Dried and
1-2 hours liquid samples Analysed by stripping ou		distilled. Boiling pt. 110.0°C.;
at low pressure.	e ngazogen	Density at $15^{\circ}C = 0.8655$.
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.1$ up to 250°C, ±1.0 at
		$300^{\circ}C; \delta x_{H_2} = \pm 2\%.$ (estimated by
		compiler).
		REFERENCES :
		ABTERENCES:
		1

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	Aromatic	Hydrocarbons	41
COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Hydrogen; H ₂ ;	[1333-74-0]	Simnick, J.J.; Sebastian, H.M.; Lin, H.M.; Chao, KC.	
2. Methylbenzene, C _{7H8} ; [108-88		J. Chem. Engng. Data. <u>1978</u> , 23, 339-340.	
VARIABLES:			
Temperature	, pressure	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES:	······		
T/K	P/bar in li	Mole fraction of hydrogen quid, x_{H_2} in gas, y_{H_2}	
461.83	30.3 0.	0113 0.6674 0187 0.7678 0242 0.8425	
502.15	101.1 0. 151.9 0. 202.9 0. 253.7 0.	0342 0.8425 0704 0.9064 1023 0.9284 1331 0.9374 1645 0.9430 0082 0.3491	
	30.3 0. 50.7 0. 100.6 0. 152.2 0. 203.0 0.	0181 0.5356 0375 0.6863 0812 0.8182 1227 0.8645 1649 0.8831 2015 0.8905	
542.15	30.4 0. 51.1 0. 100.8 0. 151.6 0.	0120 0.2100 ⁻ 0385 0.4555 0977 0.6668 1545 0.7357	
575.15	253.1 0. 50.2 0. 101.2 0. 151.7 0. 205.1 0.	2088 0.7789 2581 0.7986 0332 0.2410 1196 0.4824 2005 0.5527 2844 0.5890 3935 0.6145	
		INFORMATION	
METHOD: /APPARATUS/P	*	SOURCE AND PURITY OF MATERIALS:	
Flow apparatus wit gas components cor	h both liquid and	 Air Products, minimum purity 99.9 mole per cent.)5
top of cell and top of cell. Comp found by stripping estimating amount ically and solvent Temperature measur couple and program	es separate under ample removed from vapor sample from osition of samples out gas and of solute volumetr- gravimetrically. ed with thermo-		! .
gauge.		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta P/bar = \pm 0.5\%; \ \delta x_{H_2}, \ \delta y_{H_2} = \pm 0.001 \ (\text{estimated by compiler}).$	
		REFERENCES:	

[
COMPONENTS: 1. Hydrogen;	H ₂ ; [1333-74-0]		GINAL MEASUREMENTS: Jaugier, S.; Richon, D.; Renon, H.
	zene, (Toluene);		. Chem. Engng. Data. <u>1980</u> ,25, 274-276.
	-		
VARIABLES:			
		PRE	PARED BY:
Tempera	ature, pressure		C.L. Young
EXPERIMENTAL VALU	ES:	Mole	fraction of Hydrogen
T/K	P/MPa in	liquid	^x _{H2} in vapor, y _{H2}
269.0	3.46	0.019	
	6.23 7.60	- 0.070	0.521
	10.30	-	0.668
	12.90 14.05	0.128	0.718
	15.35	-	0.733
	16.20	0.172	
	22.25 22.30	- 0.232	0.789
	28.10	-	0.796
	28.40	0.289	-
	32.30 32.70	0.327	0.792
295.0	6.45	-	0.385
	7.40	0.074	<u> </u>
	10.10 13.00	-	0.527
	18.05	0.162	-
	18.40	-	0.648
	20.00	-	0.665
	22.95 23.00	0.311	0.673
	23.90	-	0.686
	25.70	-	0.689
	28.45 28.90	0.415	0.675
	30.80	0.514	0.075
		ARY INFO	ORMATION
METHOD APPARATUS/	PROCEDURE :	sou	RCE AND PURITY OF MATERIALS:
Static equil	ibrium cell fitted	1.	L'Air Liquide sample, purity better than 99.95 mole per cent.
-	g valves which remove	d 2.	Merck sample, guaranteed purity
samples of 1	0 ⁻⁹ m ³ . Samples	- '	99.5 mole per cent or better.
analysed by	gas chromatography.		
Temperature	measured using thermo	_	
-	pressure measured usi		
	nsducer calibrated		
-			
against a de	ad weight gauge.	EST	IMATED ERROR:
			$\delta T/K = \pm 0.2; \ \delta P/MPa = \pm 0.04; \\ \delta x_{H_2} = \pm 0.009; \ \delta y_{H_2} = \pm 0.012.$
		REI	FERENCES :

r,

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] 1,3-Dimethylbenzene; C₈H₁₀; 	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
[108-38-3]	August 1980

CRITICAL EVALUATION:

This system has been investigated at elevated pressures by Ipatiev and Levina (1), Sattler (2) and more recently by Simnick *et al*. (3). The data of Ipatiev and Levina (1) cover the temperature range 298 K to 513 K at pressures up to 20 MPa. The data of Sattler (2) are restricted to 308 K and pressures near 15 MPa whereas the data of Simnick *et al*. (3) are estensive and cover the temperature range 462 K to 582 K and pressures up to 25 MPa. The data of Simnick *et al*. (3) are considered the most reliable and are classified as tentative. The mole fraction solubility data of Ipatiev and Levina are, in general, smaller than those inter-Polated from the data of Simnick *et al*. (3).

The gas-liquid critical temperature of 1,3-dimethylbenzene is 617 K (4) and above this temperature this system may exhibit the phenomenon of gas-gas immiscibility (5). 1,3-Dimethylbenzene also probably decomposes slowly above about 550 K and/or reacts with hydrogen. Workers investigating this system at high temperatures should be aware of the existence of possible reactions of "unusual" phase behaviour.

References:

- 1. Ipatiev, V. V.; Levina, M. I. Zhur. Fiz. Khim. 1935, 6, 632.
- 2. Sattler, H. Z. Tech. Physik. 1940, 21, 410.
- Simnick, J. J.; Sebastian, H. M.; Lin, H. M.; Chao, K.-C.
 J. Chem. Thermodyn. 1979, 11, 531.
- Ambrose, D. "Vapour-Liquid Critical Properties", <u>1980</u>, N.P.L. Rep. 107. Teddington, U.K.
- Schneider, G. M. Chem. Soc. Spec. Per. Report No. 22, Vol. 2, ed. McGlashan, M. L., Chapter 4, <u>1978</u>.

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74	-01	Ipatiev, V.V.; Levina, M.I.
 1,3 - Dimethylbenzene, (m-xylene) C₈H₁₀; [108-38-3] 		Zhur. Fiz. Khim. <u>1935</u> , 6, 632-9
C 811 0, [100-30-3]		
VARIABLES:		PREPARED BY:
Temperature, pressu	re	C.L. Young
EXPERIMENTAL VALUES:		
T/K	P/bar	Mole fraction of hydrogen in liquid, ^x H ₂
298.15	49.0 98.1 294.2	0.01678 0.03322 0.08950
373.15	49.0 98.1	0.02360 0.04439
423.15	49.0 98.1 196.1	0.02451 0.05593 0.1116
473.15	49.0 98.1 196.1	0.03300 0.06926 0.1360
513.15	49.0 98.1 196.1	0.03917 0.08500 0.1673
		INFORMATION
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. added to cell then pressur temperature of measurement 1-2 hours liquid samples r Analysed by stripping out	ized at . After emoved.	 SOURCE AND PURITY OF MATERIALS: No details given. Meta isomer distilled from mixture of isomers, sulfonated and steam distilled. Dried and then fractionally distilled.
at low pressure.		Boiling pt. 138.5°C. Density at 15°C = 0.8590.
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 2$ %.
		(estimated by compiler).
		REFERENCES:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Sattler, H.;
2. 1,3-Dimethylbenzene, (m-Xylene); C ₈ H ₁₀ ; [108-38-3]	Z. Tech. Physik, <u>1940</u> , 21,410-413
VARIABLES:	PREPARED BY:
Temperature, pressure	C.L. Young
EXPERIMENTAL VALUES:	1
T/K P/bar Kuenen	Coefficient Mole fraction of S Hydrogen in liquid, ^x H ₂
148.3 1 149.7 1	1.52 0.05178 1.61 0.05216 1.65 0.05233 1.87 0.05326
	INFORMATION
METHOD: /APPARATUS/PROCEDURE: Rocking bomb with liquid sampling attachment. Solvent and hydrogen charged into evacuated cell. Amount of solvent in liquid sample estimated gravimetrically and hydrogen in liquid stripped out and estimated volumetrically. Details in source.	SOURCE AND PURITY OF MATERIALS: No details given.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \ \delta P/bar = \pm 0.2;$ $\delta x_{H_2} = \pm 2$ % (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Simnick, J. J.; Sebastian, H. M.; Lin, H. M.; Chao KC.
<pre>2. 1,3-Dimethylbenzene, (m-xylene); C₈H₁₀; [108-38-3]</pre>	J. Chem. Thermodyn.,
	<u>1979</u> , <i>11</i> , 531-7.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
T/K P/MPa	Mole fraction of hydrogen in liquid, x_{H_2} in vapor, y_{H_2}
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and estimating amount of solute volumetrically and solvent gravimetrically. Details in ref. (1).	 Air Products sample, purity 99.95 mole per cent. Aldrich Chemical Co. gold label grade, purity 99 mole per cent. ESTIMATED ERROR: δT/K = ±0.5; δP/MPa = ±0.02; δx_{H2}, δy_{H2} = ±1% (estimated by compiler) REFERENCES: Sebastian, H. M.; Simnick, J. J.; Lin H-M.; Chao KC. J. Chem. Engng. Data, <u>1978</u>, 23, 305-8.

<pre>COMPONENTS: 1. Hydrogen; H₂; [1333-74-0] 2. 1,3-Dimethylbenzene, (m-xylene); C₈H₁₀; [108-38-3]</pre>		ORIGINAL MEASUREMENTS: Simnick, J. J.; Sebastian, H. M.; Lin H. M.; Chao KC. J. Chem. Thermodyn., <u>1979</u> , 11, 531-7.	
VARIABLES: Temperature, pressure		PREPARED BY: C. L. Young	
EXPERIMENTAL VAL	UES:		
Т∕К	P/MPa	Mole fraction of hydrogen in liquid, $x_{\rm H_2}$ in vapor, $y_{\rm H_2}$	
582.1	2.269* 3.04 5.01 10.09 15.13 20.33 25.44	0 0 0.0142 0.1741 0.0470 0.3901 0.1257 0.6147 0.1959 0.7077 0.2560 0.7545 0.3241 0.7851	

* Vapor pressure of *m*-xylene.

ORIGINAL MEASUREMENTS:
Ipatiev, V.V.; Levina, M.I.
Zhur, Fiz. Khim. <u>1935</u> , 6, 632-9.
PREPARED BY:
C.L. Young
Mole fraction [*] of hydrogen in liquid, ^x H ₂
0.01508 0.03390 0.08968
0.06002
0.07403
0.08808
ler
INFORMATION
<pre>SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. Sample made from acetone using catalyst and hydrochloric acid at high pressure. Purified. Boiling pt. 135.0°C, density = 0.7783 at 15°C. ESTIMATED ERROR:</pre>
2

COMPONENTS:	<u> </u>		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]		33-74-0]	Sokolov, B. I.; Polyakov, A. A.
(thylethylbenzene <i>Iso</i> propylbenzene 98-82-8]		2h. Prikl. Khim. <u>1977</u> , 50, 1403-5.
VARIABLES:	<u> </u>	·	PREPARED BY:
Temperat	ure, pressure		C. L. Young
EXPERIMENTAL	. VALUES:		· · · · · · · · · · · · · · · · · · ·
T/K	Mole f P/bar	raction of h in liquid, ^x H ₂	ydrogen
343.15	40.5 101.3 202.6 304.0	0.020 0.047 0.089 0.131	
413.15	40.5 101.3 202.6 304.0	0.025 0.062 0.119 0.174	
488.15	40.5 101.3 202.6 304.0	0.033 0.094 0.180 0.287	
		AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell with stirrer. Solvent placed in cell then pres- surized with hydrogen at room temperature, heated to experimental temperature and equilibrated. Liquid samples removed and cooled; analysed by stripping out gas and measuring volume evolved. Remaining liquid estimated gravimetrically.		with stirrer. hen pres- room xperimental ated. nd cooled; t gas and	
			ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$ $\delta x_{H_2} = \pm 3$ % (estimated by compiler). REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. 1,2,3,4-Tetrahydronaphthalene,</pre>	Simnick, J. J.; Lawson, C. C.; Lin, H. M.; Chao, K. C. Am. Inst. Chem. Engnrs. J. <u>1977</u> , 23, 469-476.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES: Mole fraction of h T/K P/bar in liquid, i ^x H ₂	ydrogen n vapor, ^y H ₂
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9652 9748 9828 9897 9997 99927 9990 9948 8028 8676 9155 9538 9657 9714 9748 7066 8346 8827 9038 9167 4810 7008 7808 88174
	INFORMATION
METHODYAPPARATUS/PROCEDURE: Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and estimating amount of solute volu- metrically and solvent gravimetri- cally. Temperature measured with thermocouple and pressure with Bourdon gauge.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0] 2. 1-Methylnaphthalene; $C_{11}H_{10}$;	Sokolov, B. I.; Polyakov, A. A. Zhur. Prikl. Khim. <u>1977</u> , 50, 1403-5.
[90-12-0]	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hy T/K ^p /bar in liquid, ^x H ₂	drogen
328.15 40.5 0.010 101.3 0.023 202.6 0.046 304.0 0.071	-
393.15 40.5 0.014 101.3 0.029 202.6 0.057 304.0 0.089	
473.15 40.5 101.3 202.6 0.090 304.0 0.132	
AUXILIARY	INFORMATION
METROD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell with stirrer Solvent placed in cell then pres- surized with hydrogen at room tem- perature, heated to experimental temperature and equilibrated. Liquid samples removed and cooled; analysed by stripping out gas and measuring volume evolved. Remaining liquid estimated gravimetrically.	
	ESTIMATED ERROR: $\delta T/K = \pm 1.0; \delta P/bar = \pm 0.5;$ $\delta x_{H_2} = \pm 3$ % (estimated by compiler). REFERENCES:

420	nyuru	gen and Deutenum		a a			
COMPONENTS :			ORIGINAL MEASUREMENTS:				
l. Hydroge	en; H ₂ ; [1333	-74-0]	Yao, J.; Sebastian, H.M.; Lin, H.M.; Chao, K.C.				
	2. 1-Methylnaphthalene; C ₁₁ H ₁₀ ; [90-12-0]						
(30 12	0]		Fluid Phase Equilbria, <u>1978</u> , 1, 293- 304.				
VARIABLES:	ARIABLES: Temperature, pressure			PREPARED BY:			
Tempera				. Young			
EXPERIMENTAL V	ALUES:		I				
			Mole fraction c	of hydrogen			
т/К	P/atm	P/MPa	in liquid, $x_{\rm H_2}$	in gas, y _{H₂}			
462.15	0.250	0.0253	0.0	0.0			
	20	2.03	0.0103	0.9863			
	30	3.04	0.0153	0.9906			
	50	5.07	0.0250	0.9939 0.9965			
	100 150	10.13 15.20	0.0479 0.0692	0.9974			
	200	20.27	0.0887	0.9978			
	250	25.33	0.1060	0.9980			
541.85	1.68	0.170	0.0	0.0			
	20	2.03	0.0127	0.9007			
	30	3.04	0.0202	0.9360			
	50 100	5.07 10.13	0.0342 0.0641	0.9596 0.9778			
	150	15.20	0.0931	0.9838			
	200	20.27	0.1191	0.9867			
	250	25.33	0.1452	0.9883			
621.75	6.34	0.642	0.0	0.0			
	20	2.03	0.0132	0.6153			
	30 50	3.04 5.07	0.0225 0.0406	0.7384 0.8368			
	100	10.13	0.0400	0.9113			
	150	15.20	0.1180	0.9350			
	an a	AUXILIARY	INFORMATION				
METHOD/APPARAT	US/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:				
		.					
gaseous com	ponents cont			sts sample, 95 mole per cent or			
		ube and then ases separat-	better.				
	avity. Liqu		2. Distilled,	purity 98 mole per			
removed fro	m bottom of	cell and	cent.	1			
	e from top o						
	of samples						
stripping c	out gas and e colute gravim	stimating	1				
	measured wi			_			
	pressure wit		ESTIMATED ERROR:				
gauge.			$\delta T/K = \pm 0.0$	5°C; $\delta P/MPa = \pm 1\%$ or			
			±0.02 (whic	hever is greater);			
			$\delta x_{H_2}, \delta y_{H_2}$	= ±0.5%			
			REFERENCES :				
1							

COMPONENTS:			ORIGINAL MEASUREMENTS:		
 Hydrogen; H₂; [1333-74-0] 1-Methylnaphthalene; C₁₁H₁₀; [90-12-0] 			Yao, J.; Sebastian, H.M.; Lin, H.M.; Chao, K.C. Fluid Phase Equilibrium, <u>1978</u> , 1, 293-304		
EXPERIMENTAL	VALUES:				
T/K P/atm P/MPa		Mole fraction of hydrogen in liquid, x_{H_2} in gas, y_{H_2}			
621.75	150 250	20.27 25.33	0.1564 0.1923	0.9481 0.9541	
701.65	17.33 30 50 100 150 200 250	1.756 3.04 5.07 10.13 15.20 20.27 25.33	0.0 0.0184 0.0459 0.1051 0.1615 0.2126 0.2590	0.0 0.3084 0.5169 0.7111 0.7881 0.8263 0.8500	

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COMPONENTS :	·····		ORIGINAL MEASUREMENTS:			
	I. · [] 333-74-1	01				
			Lin, H.M.; Sebastian, H.M.; Chao, K.C.			
2. l-Methylnar C11H10; [90			Fluid Phase Equilibria, <u>1980</u> , 4, 321			
VARIABLES:			PREPARED BY:			
Pressure				Young		
EXPERIMENTAL VALUES:				- f. h		
T/K	T/K P/atm P/MPa		Mole fraction of hydrogen in liquid, in vapor,			
			<i>ж</i> _{Н 2}	^у н ₂		
730.05	50.2 76.2 96.4 126.5 151.0 176.2 199.8 248.7	5.09 7.72 9.77 12.82 15.30 17.85 20.24 25.20	0.0431 0.0842 0.1149 0.1593 0.1916 0.2252 0.2604 0.3070	0.3717 0.5350 0.6103 0.6806 0.7229 0.7478 0.7703 0.7850		
		AUXILIARY	INFORMATION			
METHOD APPARATUS/PI	ROCEDURE:		SOURCE AND PURITY OF MA	TERIALS:		
Flow apparatus gas components into a mixing t cell in which p gravity. Liqui from bottom of from top of cel samples found b and estimating volumetrically metrically. Te	continually p ube and then hases separat d sample remo cell and vapo l. Compositi y stripping o amount of sol and solvent g mperature mea	assing into a ed under oved or sample on of out gas ute ravi- sured	No details g	iven.		
with thermocoup Bourdon gauge.			ESTIMATED ERROR: $\delta T/K = \pm 0.3; \ \delta P/$ $\delta x_{H_2}, \ \delta y_{H_2} < 1.0$ (estimated by co REFERENCES: 1. Simnick, J.J.; Lin, H.M.; Chao	<pre>% mpiler). Lawson, C.C.;</pre>		
			Am. Inst. Chem. 23, 469.	Engnrs. J. <u>1977</u> ,		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Simnick, J. J.; Liu, K. D.; Lin, HM.; Chao, KC.			
<pre>2. l,l'-Methylenebisbenzene, (Diphenylmethane); C₁₃H₁₂; [101-81-5]</pre>	Ind. Eng. Chem., Process. Des. Dev. <u>1978</u> , 17, 204. PREPARED BY:			
VARIABLES:				
Temperature, pressure	C. L. Young			
EXPERIMENTAL VALUES: Mole fraction	Mole fraction			
T/K P/bar in liquid, in vapor, x_{H_2} y_{H_2}	of hydrogen			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
	INFORMATION			
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and esti- mating amount of solute volumetri- ally and solvent gravimetrically. Temperature measured with thermo- couple and pressure with Bourdon gauge.	 Air Products sample with minimum purity of 99.95 mole per cent. Aldrich Chemical Co. sample puri- fied by vacuum distillation, purity better than 99 mole per cent. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.7; \delta P/bar = \pm 0.3;$ $\delta x_{H_2}, \delta y_{H_2} = \pm 1$ % (estimated by compiler). REFERENCES: 1. Simnick, J. J.; Lawson, C. C.; Lin, HM.; Chao, KC. Am. Inst. Chem. Engnrs. J. 1977. 23, 469.			

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COMPONENTS :		OPTOTNAL MEACURE				
	[1222-74-0]	ORIGINAL MEASUREMENTS:				
 Hydrogen; H₂; 	[1333-/4-0]	Sebastian, H.M.; Simnick, J.J. Lin, H.M.; Chao, K-C.				
2. 9,10-Dihydroph						
C ₁₄ H ₁₂ ; [776-3	5-2]	J. Chem. Eng. Data. 1979, 24,343-5.				
VARIABLES:		PREPARED BY:				
Temperature, pre	ssure	C.L	. Young			
		<u> </u>	······			
EXPERIMENTAL VALUES:		Mole fraction	of hydrogen			
T/K	P/MPa	Mole fraction of hydrogen in liquid, in vapor,				
		<i>x</i> _{H₂}	y_{H_2}			
			·····			
461.45	1.968	0.0093	0.99776			
	3.071 5.022	0.0141	0.99860 0.99920			
	10.11	0.0231 0.0446	0.99920			
	15.23	0.0649	0.99964			
	20.37 25.54	0.0843 0.1032	0.99973 0.99971			
542.15	2.038	0.0100	0.9796			
542.15	3.037	0.0126 0.0191	0.9798			
	5.030	0.0308	0.9916			
	10.06 15.21	0.0595 0.0868	0.9953 0.9967			
	20.28	0.1139	0.9971			
	25.16	0.1374	0.9974			
622.85	2.044	0.0156	0.8992			
	3.027 4.774	0.0233 0.0375	0.9306 0.9548			
	10.18	0.0769	0.9769			
	15.21 20.54	0.1121 0.1462	0.9834 0.9867			
	25.40	0.1720	0.9888			
	AUXILIARY	INFORMATION				
METHOD/APPARATUS/PROCED	URE:	SOURCE AND PURITY OF MATERIALS:				
Flow apparatus with gas components cont into a mixing tube	tinually passing	 Airco sample, purity 99.95 mole per cent or better. Sample prepared by zone refining of Aldrich sample. Further purified by distillation under nitrogen at reduced pressure. Final purity better 				
cell in which phase gravity. Liquid sa	es separated under ample removed from					
bottom of cell and top of cell. Compo						
samples found by st	tripping out gas					
and estimating amou volumetrically and			ole per cent.			
metrically. Detail	ls in ref. (1).					
		ESTIMATED ERROR:				
		$\delta T / K = +0$	$5: \delta P / MPa = \pm 0.02;$			
			$= \pm 1\%$ (at 3 lower temp			
			±2%(at 703.05K) 1 by compiler).			
		REFERENCES :				
		Lin, H.M.	, H.M.; Simnick, J.J. ; Chao, K-C.			
		J. Chem. 1 305-8.	Engng. Data. <u>1978</u> , 23,			

Aromatic Hydrocarbons

MPONENTS		ORIGINAL MEASUREMENTS:		
Hydrogen; H ₂ ; []	1338-74-0]	Sebastian, H.M.; Simnick, J.		
9,10- Dihydrophenanthrene; C ₁₄ H ₁₂ ; [776-35-2]		Lin, H-M.; Chao, K-C. J. Chem. Eng. Data. <u>1979</u> , 2 343-5.		
PERIMENTAL VALUES	CRIMENTAL VALUES.			
Т/К	P/MPa	Mole fraction in liquid, ^x H ₂	n of hydrogen in vapor, ^Y H2	
703.05+	2.021 3.024 5.037 10.15 15.27 20.34 25.27	0.0161 0.0280 0.0492 0.0984 0.1446 0.1815 0.2184	0.6500 0.7597 0.8497 0.9191 0.9443 0.9575 0.9629	
was about not to alt	4-5 per cent and ter the results fr	this amount was th	conversion nought to ibrium cond-	
not to al	4-5 per cent and ter the results fr ostantially.	this amount was the om the true equili	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	
not to al	ter the results fr	this amount was th	nought to	

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COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; Carbon monoxide; CO; Hydrocarbons 	Colin L. Young, Department of Physical Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia.
	November 1980

CRITICAL EVALUATION:

The only study of gas solubility for these systems for which numerical details have been published is that of Trust and Kurata (1) whose data are classified as tentative.

Tyvina and coworkers (2-5) have made extensive measurements for some hydrogen + carbon monoxide + hydrocarbon systems but, in general, report numerical values for gas-liquid critical properties and graphs for gas-liquid equilibria data. These data are not considered further here except for inclusion of the reference and title of papers.

- Trust, D. B.; Kurata, F. Am. Inst. Chem. Engnrs. J. <u>1971</u>, 17, 86-91.
- 2. Tyvina, T. N.; Kharchenko, A. A.; Pryanikova, R. O. Phase-volume relations in the toluene-carbon monoxide-hydrogen system. Zh. Prikl. Khim. <u>1976</u>, 49, 1638-1640 (J. Appl. Chem. USSR <u>1976</u>, 49, 1665-1667).
- 3. Tyvina, T. N.; Kharchenko, A. A.; Pryanikova, R. O. Phase and volume relations in the propylene-carbon monoxide-hydrogen system. Zh. Prikl. Khim. <u>1976</u>, 49, 1640-1642 (J. Appl. Chem. USSR 1976, 49, 1667-1669).
- 4. Tyvina, T. N.; Kharchenko, A. A.; Pryanikova, R. O. Phase and volume relations in the toluene-propylene-carbon monoxidehydrogen mixture. Zh. Prikl. Khim. <u>1977</u>, 50, 186-188 (J. Appl. Chem. USSR 1977, 50, 186-188).
- 5. Naumova, A. A.; Tyvina, T. N.; Kharchenko, A. A. Phase and volume relations in the system isobutylene-carbon monoxide-hydrogen. Zh. Prikl. Khim. <u>1979</u>, 52, 1416-1419 (J. Appl. Chem. USSR 1979, 52, 1347-1349).

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Methanol; CH₄O; [67-56-1]</pre>	Colin L. Young, Department of Physical Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia. October 1980
	OCLODET 1980

CRITICAL EVALUATION:

The high pressure solubility of hydrogen in methanol has been studied by a number of workers but it is not possible to recommend any particular set of data. Measurements at 25 °C (298.15 K) have been carried out by Frolich et al. (1) at pressures up to 19 MPa, by Ipat'ev et al. (2) at the Pressure of 10.1 MPa and by Krichevskii and Efremova (3) at pressures up to 60 MPa. The isolated value of Ipat'ev $et \ all$. (2) is in reasonable agree-Ment with the values of Krichevskii and Efremova (3) but is not considered further in view of its isolated nature. The data of Krichevskii and Efremova (3) are 10-15 per cent higher than those of Frolich $et \ al$. (1) but are in reasonable agreement but slightly lower than values given by Michels et al. (4) at 297.55 K. Therefore the values of Frolich et al. (1) are classified as doubtful.

The data of Michels *et al*. (4) over the temperature range 297 K to 373 K and pressures up to 8.1 MPa are in reasonable agreement with the data of Krichevskii *et al*. (5) at the temperature of 294 K, 363 K and 413 K and pressures up to 30 MPa and therefore both sets of data and those of Krichevskii and Efremova (3) are classified as tentative.

The data of Yorizane *et al*. are of low precision and the mole fractions appear to be too large when compared with the data of Michels *et al*. (4) and the low pressure data of Katayama and Nitta (7).

References

 Frolich, K.; Tauch, E. J.; Hogan, J. J.; Peer, A. A. Ind. Eng. Chem. <u>1931</u>, 23, 548.

2. Ipat'ev, V. V.; Druzhina-Artemovich, S. I.; Tikhomirova, V. I. Zh. Obshchei Khim. <u>1931</u>, 1, 594.

- Krichevskii, I. R.; Efremova, G. D. Zh. Fiz. Khim. <u>1951</u>, 25, 577.
- Michels, A.; de Graaff, W.; van der Somme, J. Appl. Sci. Res. 1953, A4, 105-8.
- Krichevskii, I. R.; Zhavoronokov, N. M.; Tsiklis, D. S.
 Zh. Fiz. Khim. <u>1937</u>, 9, 317.
- Yorizane, M.; Sadamoto, S.; Masuoka, H.; Eto, Y. Kogyo Kagaku Zasshi <u>1969</u>, 72, 2174-7.
- 7. Katayama, T.; Nitta, T. J. Chem. Engng. Data 1976, 21, 194-6.

COMPONENTS: 1. Hydrogen; H	H ₂ ; [1333-74	4-0]	ORIGINAL MEASUREMENTS: Frolich, P.K.; Tauch, E.J.; Hogan, J.J.; Peer, A.A.		
 Methanol, (N CH₄O; [67-5] 		nol);	Ind. Eng. Chem. <u>1931</u> , 23, 548-550.		
VARIABLES:			PREPARED BY:		
Pressure	9		C.L. Young		
EXPERIMENTAL VALUES	3:		Mole fraction of		
T/K	P/MPa	Solubili			
			[∞] CH₄O		
298.15	1.0	0.9	0.0015		
	2.0	1.8	0.0030		
	3.0	2.55	0.0042		
	4.0 5.0	3.35 4.15	0.0055 0.0069		
	6.0	4.9	0.0081		
	7.0	5.8	0.0096		
	8.0	6.7	0.0110		
	9.0	7.5	0.0123		
	10.0	8.3	0.0136		
	11.0 12.0	9.1 9.9	0.0149 0.0162		
	13.0	10.55	0.0172		
	14.0	11.45	0.0187		
	15.0	12.25	0.0200		
	16.0	13.0	0.0212		
	17.0 18.0	13.8 14.5	0.0225 0.0236		
	19.0	15.3	0.0248		
measure of liqu	ed at 101.32	25 kPa and 2 l under the	inal article. Volume of gas 98.15 K dissolved by unit volume same conditions.		
		AUXILIARY	INFORMATION		
METHOD / APPARATUS / PI	ROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Static equilib	rium cell.	Liquid			
saturated with equilibrium est removed and and method. Allowa vapor pressure the solubility atmospheric pre source.	gas and af- tablished sa alysed by vo ance was mad of the liqu of the gas	ter amples olumetric de for the uid and at	Stated that materials were the highest purity available.		
			ESTIMATED ERROR:		
			$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 5\%$		
			REFERENCES:		

COMPONENTS:	· · · · · · · · · · · · · · · · · · ·		ORIGINAL MEASUREMENTS:	
1. Hydrog	jen; H ₂ ; [1	333-74-0]	Krichevskii, I. R N. M.; Tsiklis,	
2. Methar	nol; CH40;	[67-56-1]	Zh. Fiz. Khim. <u>19</u>	
VARIABLES:			PREPARED BY:	
Тє	emperature, p	ressure	C. L	. Young
EXPERIMENTAL	VALUES:		- <u></u>	<u> </u>
Т/К	P/atm	P/MPa	Solubility [#] , S /cm ³ g ⁻¹	Mole fraction [*] of hydrogen, ^x H ₂
294 294 294	76 178 179	7.7 18.0 18.1	8.1 19.5 19.7	0.0114 0.0271 0.0274 0.0274
294 363	272 71	27.6 7.2	29.7 11.1	0.0407 0.0157
363 363	74 134	7.5 13.6	11.7 20.6	0.0165 0.0286
363 363	186	18.8	29.2	0.0401
413	300 78	30.4 7.9	46.5 16.0	0.0624 0.0186
413 413	196 281	19.9 28.5	39.9 57.7	0.0540
	* calcul	ated by compiler	· .	
			INFORMATION	
METHOD/APPAR	ATUS/PROCEDURE:		SOURCE AND PURITY OF M	ATERIALS:
		Numerical an and Stephan	No deta	ils given.
1			ESTIMATED ERROR:	
			Organic Compou	f Inorganic and

COMPONENTS :			ORIGINAL MEASUREMENTS:
1. Hydrogen;	H ₂ ; [1333-74-0]		Krichevskii, I. R.; Efremova,
			G. D.
2. Methanol;	CH ₄ O; [67-56-1]		Zh. Fiz. Khim.
,			1951, <i>25</i> , 577-583.
VARIABLES:			PREPARED BY:
Press	ure		C. L. Young
			-
EXPERIMENTAL VALU	JES:		
T/K	<i>P</i> /atm	<i>P/</i> MPa	Mole fraction of hydrogen, $x_{_{\mathrm{H}_2}}$
1710	- / 4 0	,	1 5 H ₂
298.2	48.2	4.88	
	91.7 113	9.29 11.4	0.0142
	129	13.1	0.0198
	147	14.9	0.0227
	168 183	17.0 18.5	0.0255 0.0275
	212	21.5	0.0316
	246	24.9	0.0362
	260 292	26.3 29.6	0.0374 0.0411
	424	43.0	0.0555
	437	44.3	0.0581
	493 507	50.0 51.4	0.0640 0.0656
	582	59.0	0.0747
	AU	XILIARY	INFORMATION
METHOD 'APPARATUS,	/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
No details av			
	a taken from Steph	an	
and Stephan (ref. (1)).		
			ESTIMATED ERROR:
			REFERENCES :
			1. Stephan, H.; Stephan, T.
			Solubilities of Inorganic and
			Organic Compounds, Vol. 1,
			Pergamon, Oxford, <u>1963</u> , p.541.

		Olga	nic compound		ig Oxygen		439
COMPONENT	S:			ORIGINAL MEASUREMENTS:			
l. Hyd	rogen;	H ₂ ; [1333-74	4-0]	Michels, A.; de Graaff, W.; van der Somme, J.			
2. Met	hanol;	CH ₃ OH; [67-5	56-1]			<u>1953</u> , <i>A4</i> , 1	.05-8.
VARIABLES:				PREPARED	BY:		
Temperature, pressure				C. L. Young			
EXPERIMEN	NTAL VALU	ES:					
T/K	P/bar	of hyd	raction drogen in vapor, ^Y H ₂	Т/К	P/bar	of hy	raction drogen in vapor, ^y H ₂
297.55	152 304 405	0.0253 0.0475 0.0594		348.15	405 507 608	0.0917	0.9931
322.55	507 608 811 304 507	0.0726 0.0831 0.1058 0.0519 0.0798	- - - -	372.45	811 101 122 152 203	0.1386 - - -	0.9939 0.9604 0.9646 0.9734 0.9763
348.15	811 85 123 152	0.1224 0.0184 0.0256	- 0.9801 0.9845 0.9869		253 304 405 507	0.0635	0.9790 0.9821 0.9847
	253 304	0.0587	0.9905		608 811	0.1566	0.9871 0.9892
One pas passed hours. analysed gel and brated from in	s flow r through Sample d by pas collec flask. crease	JS/PROCEDURE: method. Hydr methanol for es of both pha ssing through ting hydrogen Methanol det in weight of s vessel. Det . 1.	several ases silica in cali- cermined silica	SOURCE AN		OF MATERIALS:	
				$\delta y_{H_2} =$ REFERENCI 1. Mich Dumo	±0.1; ð ±2% (est ES: els, A.; ulin, E.	<pre>P/bar = ±0.5 imated by co Skelton, G , 16, 831.</pre>	mpiler).

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Yorizane, M.; Sadamoto, S.;		
2. Methanol; CH₃OH; [67-56-1]	Masuoka, H.; Eto, Y. Kogyo Kagaku Zasshi 1969, 72,		
2. Methanol; Chigon; $[07-50-1]$	2174-7.		
	21/3//.		
VARIABLES:	PREPARED BY:		
Temperature, pressure	C. L. Young		
	0		
EXPERIMENTAL VALUES:			
Т/К <i>Р</i> /МРа	Mole fraction of hydrogen in liquid,		
,	x _{H₂}		
273.15 1.11 3.14	0.005 0.011		
5.17 258.15 1.01	0.015 0.005		
2.03	0.007		
3.04 5.07	0.009 0.013		
243.15 1.01	0.003		
2.03	0.005 0.006		
4.05	0.007 0.008		
AUXILIA	RY INFORMATION		
METHOD 'APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Vapor-liquid equilibrium cell.	1. Purity 99.9 mole per cent.		
Details given in source.			
(Original in Japanese.)			
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 0.001$		
	H ₂		
	H_2 (estimated by compiler).		
	-		
	(estimated by compiler).		

COMPONENTS:

- 1. Hydrogen; H ; [1333-74-0]
- C₂ to C₁₆Alcohols, ethers and esters

EVALUATOR:

Colin L. Young. Department of Chemistry, University of Melbourne Parkville, Victoria, 3052 AUSTRALIA:

The most extensive study of the solubility of hydrogen in alcohols at high pressures is that of Brunner (1). Androsov and Loktev (2) studied the solubility of hydrogen, carbon monoxide and ethyne (acetylene) in several aliphatic alcohols and hydrocarbons. However, even in the deposited article the data were presented in unclear graphs and therefore the data are not considered further. Frolich $et \ all$ (3) have studied the solubility of hydrogen in 1-propanol, 2-propanol and 1-butanol. The data for 1-butanol are in fair agreement with those of Brunner (1) whereas the hydrogen solubilities for the other two alcohols are about 10 per cent smaller than those of Brunner (1). The solubility of hydrogen in 1-butanol and 2-methyl - 1-propanol have also been studied by Tyvina et al (4). The latter data cover the temperature range 313 K to 473 K and pressures up to 30 MPa whereas those of Brunner (1) are restricted to a temperature range of 298 K to 373 K and pressures below 10 MPa. The interpolated values in overlapping ranges of temperatures and pressures from these two sets of data are only in fair agreement, the mole fraction of hydrogen in the liquid given by Tyvina et al (4) being about 5 per cent smaller than those of Brunner (1). Schroder (5) investigated the solubility of hydrogen in 1-butanol at 323.15 K at pressures up to 5 MPa and his results are in good agreement with those of Brunner (1). However, the numerical data of Schroder were not available to us and are not considered further. Brunner (1) quoted partial molar volumes of hydrogen at infinite dilution, V^{∞} and partial molar heats of solution, Δh , where these were calculated

from the equation.

 $\ln (p_{H_2}/bar) / x_{H_2} = \ln H/bar + V^{\infty} p_{H_2}/RT$

 $\frac{\partial \ln x_{\rm H_2}}{\partial (1/T)} = \frac{-\Delta h}{R}$

where H is Henry's law constant at zero partial pressures of hydrogen.

Values of $H/10^5$ Pa, $V^{\infty}/cm^3 \text{ mol}^{-1}$ and $\Delta h/J \text{ mol}^{-1}$ are given below for Brunner data. Values in parentheses are those calculated from other Worker's data as indicated in the footnotes of the table.

Alcohol	т/к	<i>H/</i> 10 ⁵ Pa	$V^{\infty}/cm^3 mol^{-1}$	∆h/J mol ⁻¹
l,2-Ethanediol	298.15 323.15	24700 20750	31	5050
	373.15	15390	35 36	5850
l-Propanol	298.15 323.15 373.15 298.15 253.15 273.15 298.15	4125 3681 2783 (4403) a (5550) b (4970) b (4270) b	36 35 35	4920
2-Propanol	298.15 323.15 373.15 298.15 298.15	3693 3160 2324 (4300) a (3760) e	34 37 48	5750

Alcohol	T/K	<i>H/</i> 10 ⁵ Pa	V∞∕cm³ mol-1	∆h/J mol ⁻¹
2-Methoxyethanol	298.15 323.15 373.15	6941 5620 4006	18 23 23	6780
l-Butanol	298.15 323.15 373.15 298.15 253.15 273.15 298.15 323.15 323.15 373.15 298.15	3609 3154 2470 (3597) a (4770) b (4320) b (3750) b (3090) c (3670) d (2740) d (3800) f	36 41 43	4695
2-Methyl-l-propanol	298.15 323.15 373.15 323.15 373.15	3545 2921 2257 (3100) d (2500) d	26 48 50	6200
2-Butanol	298.15 323.15 373.15	3729 3178 2212	17 23 37	6510
2-Ethoxyethanol	298.15 323.15 373.15	4448 3735 2785	42 50 51	5780
l-Pentanol	298.15 323.15 373.15 298.15	3375 2881 2269 (3730) f	24 36 36	4880
l-Hexanol	298.15 323.15 373.15 298.15	2948 2536 2080 (3320) f	37 40 26	4270
2-Butoxyethanol	298.15 323.15 373.15	3169 2754 2070	36 41 38	5290
2-Ethyl-l-hexanol	298.15 323.15 373.15 393.15	2529 2146 1708 1512	35 40 42 55	5110
1,3-Propanediol	298.15 323.15 373.15	1558 1360 1038	19 20 25	5045
1,4-Butanediol	298.15 323.15 373.15	1167 1009 777.3	13 19 22	5030
1,2-Dimethoxyethane	298.15 323.15 373.15	272.6 224.9 161.4	32 38 59	6480

Organic Compounds Containing Oxygen

Alcohol	т/к	<i>H/</i> 10 ⁵ Pa	$V^{\infty}/cm^3 mol^{-1}$	∆h/J mol ⁻¹
2,2'-Oxybisethanol	298.15 323.15 373.15	1312 1099 808.8	23 25 30	5980
2-(2-Methoxyethoxy) ethanol	298.15 323.15 373.15	580.8 473.9 334.8	23 26 32	6805
2,2'-[1,2-ethanediylbis- (oxy)]bisethanol	298.15 323.15 373.15	971.2 796.0 555.7	19 24 31	6910
2-[2-(2-methoxyethoxy)- ethoxy]ethanol	298.15 323.15 373.15	500.7 406.8 286.2	21 25 32	6910

a) values for data of Frolich *et al* (3) quoted by Brunner (1)

 b) values for low pressure data of Katayama and Nitta (6) quoted by Brunner (1)

c) values for data of Schröder (5) quoted by Brunner (1)

d) values for data of Tyvina et al(4) quoted by Brunner (1).

e) Values for low pressure data of Puri and Ruether (6) calculated by evaluator.

f) values for low pressure data of Makranczy $et \ al$ (7) calculated by evaluator.

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There are some discrepancies between Henry's law constants calculated
from the data of Brunner and from low pressure measurements. However,
some of the discrepancy arises from the extrapolation of Brunner data
to low pressures. The data of Brunner are classified as tentative.
REFERENCES:
    Brunner, E. J. Chem. Thermodynamics, 1980, 12, 993.;
1.
    Brunner, E. Ber Bunsenges. Phys. Chem. 1979, 83, 715.
   Androsov, D.I.; Loktev, S.M. Zh. Fiz. Khim. <u>1978</u>, 52, 1348.
Complete article VINITI No. 4463-77.
2.
3.
    Frolich, K.; Tauch, E.J.; Hogan, J.J.; Peer, A.A.; Ind. Eng. Chem.
    1931, 23, 548.
    Tyvina, T.N.; Valuev, K.I.; Vasileva, I.I.; Sokolov, B.I.;
4.
    Kharchenko, A.A.; Zhur. Prikl. Khim. 1977, 50, 2578.
   Schröder, W. Z. Naturforsch. 1969, 24B, 500.
5.
   Puri, P.S.; Ruether, J.A. Can. J. Chem. Eng. 1974, 7, 41.
6.
7.
   Makranczy, J.; Rusz, L. Balog-Megyery, K.; Hung. J. Ind. Chem. 1979,
    7, 41.
```

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.
<pre>2. 1,2-Ethanediol; C₂H₆O₂; [107-21-1]</pre>	Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.
VARIABLES:	PREPARED BY:
Temperature, pressure	C.L. Young
EXPERIMENTAL VALUES:	
Т/К p [*] /10 ⁵ Ра]	$10^{4}x$ Mole fraction of hydrogen, $10^{4}x_{H_{2}}$
298.15 25.3 51.5 69.6 85.9	10.03 20.26 26.95 32.73
323.15 26.8 48.3 62.6 89.7	12.69 22.30 28.78 40.40
373.15 39.4 55.4 75.0 87.4	25.02 34.71 46.85 53.88
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source and ref. (1).	 No details given. Merck AG sample purity better than 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01; \ \delta x_{H_2} = \pm 2.08.$ (estimated by compiler) REFERENCES: 1. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82,798.

COMPONENTS: 1. Hydrogen; H ₂ ;	[1333-74-0]	1	EASUREMENTS:		
2. 1-Propanol; C₃H₀O; [71-23-8]		Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.			
VARIABLES:		PREPARED BY	· · · · · · · · · · · · · · · · · · ·		
Temperature	, pressure		C.L. Young.		
EXPERIMENTAL VALUES:		1			
T/K	p ⁺ /10 ⁵ Pa p	*/10⁵Pa	10 ⁴ x Mole fraction of hydrogen, $10^4 x_{H_2}$		
298.15	0.03 24.6 49.8 77.4 99.3	0 24.5 49.8 77.3 99.3	0 58.24 115.3 176.0 220.0		
323.15	0.11 23.7 36.0 51.8 74.7 106.0	0 23.6 35.9 51.7 74.6 105.9	0 62.96 94.90 135.7 191.5 266.0		
373.15	1.11 22.9 47.5 86.2 97.7	0 21.8 46.4 85.1 96.4	0 74.41 162.0 289.1 327.0		
+ total pr	essure				
* partial	pressure				
· · · · · · · · · · · · · · · · · · ·	AUXILIARY	INFORMATION			
METHOD APPARATUS/PROCE Static cell fitte After equilibrium liquid sample wit analysed by strip Details in source	d with stirrer. established hdrawn and ping out hydrogen.	1. No d 2. Merc	PURITY OF MATERIALS: etails given. k AG sample, purity er than 99 mole per		
		δx _{H2} REFERENCES 1. Brun Ber.	<pre>= ±0.1; δp/MPa = ±0.01; = ±2.0% (estimated by compiler).</pre>		

COMPONENTS:			ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]		-74-01	Frolich, P. K.; Tauch, E. J.;		
1. hydrogen, hz, [1000 /4 0]		-74-0]	Hogan, J. J.; Peer, A. A.		
2. 2-Propanol; C ₃ H ₈ O; [67-63-0]					
2. 2-Propanol	L; C ₃ H ₈ O;	[67-63-0]	Ind. Eng. Chem. <u>1931</u> , 23, 548-550.		
L	·····	······			
VARIABLES:			PREPARED BY:		
I	Pressure		C. L. Young		
EXPERIMENTAL VAL	UES:		Mole fraction of hydrogen		
т/к Р/	/MPa	Solubilit	ry [°] , S in liquid, †		
			<i>x</i> _{H₂}		
298.15	1.0	0.7			
	2.0	1.5			
	3.0 4.0	2.2			
	5.0	3.7			
	6.0	4.4			
	7.0	5.2			
	8.0	5.9			
	9.0 10.0	6.6 7.4	-		
	11.0	8.1			
	12.0	8.9			
	13.0	9.6	· · · · · · · · · · · · · · · · · · ·		
	14.0	10.3			
	15.0 16.0	11.1	-		
	17.0	12.6			
	18.0	13.3	0.0401		
	19.0	14.0	0.0423		
† Calcu	lated by com	piler.			
* Data	taken from g	raph in origi	inal article. Volume of gas		
measured at 101.325 kPa and 29 of liquid measured under the s		d under the s	ame conditions.		
		AUXILIARY	INFORMATION		
METHOD /APPARATUS	/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
_					
Static equil:	ibrium cell.	Liquid			
saturated wit	th gas and a	fter	Stated that the materials		
equilibrium e	established	samples	were the highest purity		
removed and a			available.		
1					
	lowance was				
vapor pressu	re of liquid	and the			
solubility of	f the gas at	atmospheric			
	Details in s		ESTIMATED ERROR:		
			$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 5\%.$		
			REFERENCES :		
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COMPONENTS:		1	NAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [13	33-74-0]	Br	unner, E.
	. [67 62-0]	De	Purchase Plane Cham
2. 2-Propanol; C ₃ H ₈ O	; [6/-63-0]	ве	r. Bunsenges. Phys. Chem.
		1 19	79, 83, 715-721.
		1	<u>, , , , , , , , , , , , , , , , , , , </u>
		1	
VARIABLES:		PREPA	ARED BY:
m - m - i -			
Temperature, pro	essure		C.L. Young
EXPERIMENTAL VALUES:			10 ⁴ x Mole fraction
T/K p^+	/10 ⁵ Pa p [*] ,	/10 ⁵ ₽	a of hydrogen, $10^4 x_{H_2}$
			11 2
298.15	0.057	0	0
		7.45	
		10.1	27.71
		10.7	29.33
		15.8	42.40
		20.1	53.85
		21.2 36.4	56.58 96.26
	45.1	36.4 45.0	116.5
	45.2	45.0	117.4
		63.4	163.4
		74.1	188.6
		97.2	245.4
323.15	0.234	0	0
	-	6.74	
		11.9	37.14
		24.1 26.8	74.67 84.69
		40.1	121.1
		53.1	160.8
		73.1	219.3
		82.8	245.3
	92.4	92.1	245.5
		.	uticl muccounc
+ total pressu:	re	- ра	rtial pressure
	· · · · · · · · · · · · · · · · · · ·		
	AUXILIARY	INFOR	MATION
METHOD /APPARATUS / PROCEDURE		SOUR	CE AND PURITY OF MATERIALS:
Static cell fitted w	ith stirrer.	1.	No details given.
After equilibrium est		2.	Merck AG sample, purity
liquid sample withdra		2.	99.7 mole per cent.
analysed by stripping	g out hydrogen.		5517 more por conce
	1 £ (1)		
Details in source and	d ref. (1).		
		1	
		FSTI	MATED ERROR:
			$\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$
		1	$\delta x_{H_2} = \pm 2.0\%$.
			(estimated by compiler).
		REFE	RENCES :
		1.	Brunner, E.
			Ber. Bunsenges. Phys. Chem.
			<u>1978</u> , 82, 798.
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COMPONENTS:			ORIGINAL MEASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] 2-Propanol; C₃H₈O; [67-63-0] 			Brunner, E.			
		Ber. 1979	Bunsenges. Phys. Chem. , 83, 715-721.			
EXPERIMENTAL VALU		* - ``				
т/к	p ⁺ /10⁵Pa	p [*] /10 ⁵ Pa	10^{4} x Mole fraction of hydrogen, $10^{4}x_{H_{2}}$			
373.15	1.98 9.35 12.0 26.1 30.9 36.7 61.7 89.2	0 7.37 10.0 24.1 28.9 34.7 59.8 87.3	$ \begin{array}{r} 0 \\ 31.98 \\ 42.89 \\ 102.1 \\ 120.1 \\ 142.9 \\ 240.3 \\ 344.6 \\ \end{array} $			
+ total p	pressure					
* partial	. pressure					
		••••••••••••••••••••••••••••••••••••••				
		-				

COMPONENTS :		ORIGINAL MEAS	UREMENTS:	
<pre>L. Hydrogen; H₂; [1333-74-0] 2. 2-Methoxyethanol; C₃H₈O₂; [109-86-4]</pre>		Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
VARIABLES: Temperature,	pressure	PREPARED BY:	C. L. Young	
EXPERIMENTAL VALUES:		<u> </u>		
Т/К	p ⁺ /10⁵Pa	p [*] /10⁵Pa	10^{4} x Mole fraction of hydrogen, $10^{4}x_{H_{2}}$	
298.15	0.02 34.2 56.9 101.0	0 34.2 56.9 101.0	0 49.00 82.00 143.0	
323.15	0.06 33.6 56.5 71.6 81.0	0 33.6 56.5 71.6 80.9	0 59.11 98.65 125.3 139.9	
373.15	0.46 27.5 45.4 87.8	0 27.0 44.9 87.4	0 67.00 110.0 211.7	
+ total p	ressure	*	partial pressure	
	AUXILIARY	INFORMATION		
METHOD APPARATUS/PROG Static cell fitt After equilibriu liquid sample wi analysed by stri Details in sourc	ed with stirrer. m established thdrawn and pping out hydrogen.	1. No deta 2. BASF AN	JRITY OF MATERIALS; ails given. ktiengesellschaft , purity 99.8 mole nt.	
		$\delta x_{H_2} = (estime REFERENCES:$ 1. Brunnes	<pre>±0.1; δp/MPa = ±0.01; ±2.0% ated by compiler) r, E. unsenges. Phys. Chem. <u>1978</u>,</pre>	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.		
[1. nyurogen, n ₂ , [1555-74-0]	J. Chem. Thermodyn. <u>1980</u> , 12,		
2. 1,3-Propanediol; $C_{3}H_{8}O_{2}$;	993-1002.		
	995-1002 .		
[504-63-2]			
1/177-00-00			
VARIABLES:	PREPARED BY:		
Temperature, pressure	C. L. Young		
EXPERIMENTAL VALUES:			
*.			
T/K p [*] /MPa	Mole fraction of hydrogen in liquid,		
	²⁰ H ₂		
	0.001020		
298.15 1.93 4.507	0.001238 0.002868		
4.674	0.002960		
7.26	0.004621 0.006502		
323.15 1.706	0.001250		
4.519	0.003281		
7.53	0.005486 0.007404		
373.15 1.877	0.001808		
4.607	0.004343 0.007135		
10.22	0.009577		
total pressu	re.		
AUXILIAR	/ INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
	SOURCE AND FURTH OF PATERIALS.		
	l Magnan Criachairl-		
Static cell fitted with stirrer.	1. Messer-Griesheim sample, purity		
	99.997 mass per cent.		
After equilibrium established	2. Riedel-de-Haem sample, purity		
liquid sample withdrawn and	99.5 mass per cent.		
analysed by stripping out hydrogen.			
Details in source and ref. (1).			
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2$;		
	$\delta x_{\rm H_2} = \pm 2 \text{s.}$		
	DEFEDENCING .		
	REFERENCES:		
	1. Brunner, E.		
	Ber. Bunsenges. Phys. Chem.		
	<u>1978</u> , 82, 798.		

COMPONENTS:	<u> </u>		ORIGINAL MEASUREMENTS:		
	ogen; H ₂ ; [] nol; C ₄ H ₁₀ O;		Tyvina, T. N.; Valuev, K. I.; Vasil'eva, I. I.; Sokolov, B. I.; Kharchenko, A. A. 2h. Prikl. Khim. <u>1977</u> , 50, 2578- 2581; J. Appl. Chem. USSR <u>1977</u> , 50, 2446- 2449.		
VARIABLES:	Temperature,	pressure	PREPARED BY: C. L	. Young	
EXPERIMENTA	L VALUES:		- I		
T/K	P/atm	P/MPa	Mole fraction o in liquid, ^x H ₂	of hydrogen in gas, ^y H ₂	
313.2	300 200 100 50 25	30.4 20.3 10.1 5.07 2.53	0.0750 0.0512 0.0268 0.0135 0.0065	0.9992 0.9991 0.9989 0.9985 0.9985	
353.2	10 300 200 100 50 25 10 4	1.01 30.4 20.3 10.1 5.07 2.53 1.01 0.405	0.0013 0.0889 0.0614 0.0320 0.0162 0.0082 0.0032 0.0013	0.9942 0.9959 0.9955 0.9941 0.9925 0.9899 0.9763 0.9386	
393.2	300 200 100 50 25 10 4	30.4 20.3 10.1 5.07 2.53 1.01 0.405	0.1090 0.0752 0.0387 0.0194 0.0098 0.0032 0.0009	0.9895 0.9884 0.9839 0.9778 0.9561 0.8902 -	
			(cont.)		
		AUXILIARY	INFORMATION		
METHOD/APPA	RATUS/PROCEDURE	:	SOURCE AND PURITY OF MAT	ERIALS:	
The compositions of coexisting phases were determined by analysis and a static apparatus was employed. However, other details			 Purity 99.8 mole Analytical grade 		
and refe are ambi		in the source			
			ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta x_{H_2}$ $\delta (1-y_{H_2}) = \pm 6\%$ (est	= ±4% timated by compiler).	
			REFERENCES :		

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COMPONEN	TS:		ORIGINAL MEASUREMENTS	5:	
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Butanol; C₄H₁₀O; [71-36-3]</pre>			Tyvina, T. N.; Valuev, K. I.; Vasil'eva, I. I.; Sokolov, B. I.; Kharchenko, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 2578- 2581; J. Appl. Chem. USSR <u>1977</u> , 50, 2446- 2449.		
EXPERIME	NTAL VALUES:				
T/K	P/atm	Р/МРа	Mole fraction c in liquid, ^{\$\mathfrac{x}{H_2}\$}	of hydrogen in gas, ^y H ₂	
433.2 473.2	300 200 100 50 25 10 300 200 100 50 25	30.4 20.3 10.1 5.07 2.53 1.01 30.4 20.3 10.1 5.07 2.53	0.1419 0.0984 0.0503 0.0251 0.0117 0.0032 0.1769 0.1230 0.0620 0.0282 0.0107	0.9761 0.9744 0.9622 0.9253 0.8642 0.7371 0.9595 0.9566 0.9068 0.8213 0.7056	
				-	
!					
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COMPONENTS:			ORIGINAL	MEASUREMENTS:	
 Hydrogen; H₂; 	[1333-74-0]		Brunner, E.		
2. 1-Butanol; C ₄ H ₁₀ 0; [71-36-3]			Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
VARIABLES:			PREPARED	RV ·	
	e, pressure			C.L. Young	
EXPERIMENTAL VALUES:			I	10 ⁴ x Mole fraction	
Т/К	p ⁺ /10⁵Pa	p*/1	L0 ⁵ Pa	of hydrogen, $10^4 x_{\rm H_2}$	
298.15 323.15 + total pr	0.01 5.79 9.08 13.41 13.42 28.5 77.1 80.7 97.3 0.04 4.92 8.33 11.71 15.61 21.7 25.4 30.4 43.5 68.2 99.3 essure	5 13 28 77 80 97 0 48 11 15 21 25 30 43 68	. 88 3. 29 5. 57 5. 57 5. 3 9. 4 3. 5 3. 2 9. 7	0 15.95 24.92 36.87 36.97 76.00 199.0 209.6 248.8 0 15.61 25.99 36.69 48.44 67.34 78.02 92.93 130.5 200.6 288.0 * partial pressure	
		XILIARY	INFORMAT	ION	
METHOD /APPARATUS / PRO	CEDURE :		SOURCE A	ND PURITY OF MATERIALS:	
Static cell fitt After equilibriu liquid sample wi by stripping out Details in sourc	m established thdrawn and ana hydrogen.		1. No 2. Me:	details given. rck AG sample, purity .5 mole per cent.	
			δΤ, δx _I (e: REFERENC 1. Brt Bet	ED ERROR: $/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $= \pm 2.0$ %. stimated by compiler). CES: unner, E. r. Bunsenges. Phys. Chem. 78, 82, 798.	

Components:				ORIGINAL MEASUREMENTS:		
1.	<pre>1. Hydrogen; H₂; [1333-74-0] 2. 1-Butanol; C₄H₁₀O; [71-36-3]</pre>			Brunner, E.		
2.				Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
EXI	PERIMENTAL VALU	JES:				
	т/к	p ⁺ /10 ⁵ Pa	p [*] /10⁵Pa	$10^{4}x$ Mole fraction of hydrogen, $10^{4}x_{H_{2}}$		
	373.15	0.51 9.82 12.83 18.8 21.7 22.3 28.9 30.4 33.8 78.0	0 9.28 12.29 18.23 21.1 21.8 28.4 29.9 33.3 77.5	0 37.93 50.24 71.39 82.43 85.04 111.0 120.2 129.4 287.4		
	+ total p	pressure				
	* partial	pressure				

:		ORIGINAL MEASUREMENTS: Tyvina, T. N.; Valuev, K. I.; Vasil'eva, I. I.; Sokolov, B. I.; Kharchenko, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 2578- 2581; J. Appl. Chem. USSR <u>1977</u> , 50, 2446- 2449.		
hyl-l-propan	ol,(<i>iso</i> butane);			
		PREPARED BY:		
Temperature	e, pressure	С. L. Y	oung	
AL VALUES:				
P/atm	P/MPa	Mole fraction c in liquid, [#] H ₂	f hydrogen in gas, ^y H ₂	
200	20.4	0.0820	0.0097	
200 100 50 25 10	20.3 10.1 5.07 2.53 1.01	0.0830 0.0572 0.0300 0.0155 0.0080	0.9987 0.9983 0.9978 0.9968 0.9954 0.9913 0.9800	
300 200 100 50 25 10	30.4 20.3 10.1 5.07 2.53 1.01	0.0965 0.0680 0.0345 0.0175 0.0085 0.0030	0.9938 0.9932 0.9912 0.9887 0.9850 0.9645	
300 200 100 50 25 10	30.4 20.3 10.1 5.07 2.53 1.01	0.1194 0.0820 0.0427 0.0217 0.0105 0.0036 0.0007	0.9080 0.9842 0.9831 0.9767 0.9678 0.9324 0.8574 0.7148	
······		(CONT	•)	
ARATUS/PROCEDUR		SOURCE AND PURITY OF MATERIALS:		
ere determine atic apparatu other detail	ed by analysis as was employed. .s and references			
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta x_{H_2}$ $\delta (1-y_{H_2}) = \pm 6$ (es REFERENCES:	<pre>= ±4%; timated by compiler).</pre>	
	gen; H_2 ; [: hyl-l-propand O; [78-83-1] Temperature AL VALUES: P/atm 300 200 100 50 25 10 4 4 300 200 100 50 25 10 4 4 300 200 100 50 25 10 4 4 300 200 100 50 25 10 4 4 300 20 10 4 4 300 20 10 4 4 300 20 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 4 4 25 10 10 25 10 10 25 10 25 10 25 10 25 10 10 25 10 25 10 10 25 10 20 25 10 20 25 10 25 10 20 25 10 20 25 10 25 10 20 25 10 20 25 10 25 10 25 10 20 25 10 25 10 20 25 10 20 25 10 25 10 20 25 10 20 25 10 20 20 25 10 20 25 10 20 25 10 20 25 10 20 25 10 20 25 10 20 20 20 20 25 10 20 20 20 20 20 20 20 20 20 20 20 20 20	gen; H ₂ ; $[1333-74-0]$ hyl-1-propanol,(<i>iso</i> butane); O; $[78-83-1]$ Temperature, pressure AL VALUES: P/atm $P/MPa300$ 30.4 200 20.3 100 10.1 50 5.07 25 2.53 10 1.01 4 0.405 300 30.4 200 20.3 100 10.1 50 5.07 25 2.53 10 1.01 4 0.405 300 30.4 200 20.3 100 10.1 50 5.07 25 2.53 10 1.01 4 0.405 300 30.4 200 20.3 100 10.1 50 5.07 25 2.53 10 1.01 4 0.405	gen; H ₂ ; [1333-74-0] Tyvina, T. N.; Val hyl-1-propanol, (isobutane); Tyvina, T. N.; Val (isobutane); $Priki. Khim. 19$ (if a - 83 - 1) $Priki. Khim. 19$ Temperature, pressure $Appl. Chem. USSR$ 2449. PREPARED BY: Temperature, pressure C. L. Y Nole fraction of in liquid, x_{H_2} 300 30.4 200 20.3 200 20.3 100 10.1 0.01 0.0300 50 5.07 100 10.1 4 0.405 - - 300 30.4 0.0304 0.0680 100 10.1 4 0.405 50 5.07 101 0.0300 4 0.405 50 5.07 101 0.0427 25 2.53 0.011 0.0427 200 20.3 0.0014 0.0021 10 1.01 10	

Components:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. 2-Methyl-1-propanol, (<i>iso</i>butane); C₄H₁₀O; [78-83-1]</pre>	Tyvina, T. N.; Valuev, K. I.; Vasil'eva, I. I.; Sokolov, B. I.; Kharchenko, A. A. Zh. Prikl. Khim. <u>1977</u> , 50, 2578- 2581; J. Appl. Chem. USSR <u>1977</u> , 50, 2446- 2449.

EXPERIMENTAL VALUES:

T/K P/atm P/MPa	P/MPa	Mole fraction of hydrog in liquid, in		
			**************************************	y_{H_2}
433.2	300	30.4	0.1579	0.9650
	200	20.3	0.1096	0.9622
	100	10.1	0.0565	0.9430
	50	5.07	0.0270	0.8921
	25	2.53	0.0118	0.8013
	10	1.01	0.0026	0.6476
	4	0.405	0.0007	0.4572
473.2	300	30.4	0.2015	0.9350
	200	20.3	0.1407	0.9245
	100	10.1	0.0698	0.8641
	50	5.07	0.0302	0.7454
	25	2.53	0.0089	0.5775

	ENTS:		ORIG	INAL MEASUREMENTS:		
1.	Hydrogen; H	2; [1333-74-0]	Bru	nner, E.		
<pre>2. 2-Methyl-l-propanol, (iso- butanol); C₄H₁₀O; [78-83-1]</pre>				Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
VARIABI		re, pressure	PREP	ARED BY: C.L. Young		
EXPERIN	MENTAL VALUES:	<u> </u>	1			
	т/к	p ⁺ /10 ⁵ Pa	p*/10 ⁵ 1	a 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H₂}		
	298.15	0.02 26.5 52.8 97.2	0 26.5 52.8 97.2	0 74 145 263		
	323.15	0.07 34.5 82.5	0 34.4 82.4	0 113 255		
	373.15	0.75 26.5 88.9	0 25.8 88.2	0 111 354		
	+ total pr * partial					
		pressure	 ILIARY INFO	RMATION		
		pressure		RMATION CE AND PURITY OF MATERIALS:		
METHOD Stat Afte liqu anal	* partial	pressure	. . 2.	CE AND PURITY OF MATERIALS: No details given.		

COMPONENTS:			ORIGI	NAL MEASUREMENTS:	
1. Hydroge	n; H ₂ ; [1333-74-0)]	Brunner, E.		
2. 2-Butanol; C ₄ H ₁₀ O; [78-92-2]			Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
VARIABLES:			PREPA	RED BY:	
Tempe	rature, pressure			C.L. Young	
EXPERIMENTAL	VALUES:				
т/к	p ⁺ /10⁵Pa	p*/1	0 ⁵ Pa	10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2}	
298.15	0.02 28.1 52.1 76.8 98.6	52 76	.1 .1 .8 .6	0 75 139 205 261	
323.15	0.11 30.0 50.7 98.6	50	.1 .6 .5	0 93 158 300	
373.15	0.75 19.8 52.6 100.0	51	.1	0 85.1 226.6 419.0	
+ tot	al pressure				
* pai	tial pressure				
		AUXILIARY	INFOR	MATION	
	TUS/PROCEDURE:		SOURC	E AND PURITY OF MATERIALS:	
After equi liquid sam	1 fitted with st: librium establish ple withdrawn and .ng out hydrogen.	hed	1. 2.	No details given. Merck AG sample, purity	
		(1).		better than 99 mole per cent.	
Details in source and ref. (1).				MATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01; \ \delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler). RENCES: Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.	

COMPONENTS:		ORIGINAL MEASUREMENTS:		
<pre>1. Hydrogen; H₂;</pre>	[1333-74-0]	Brunner, E.		
2. 1,2-Dimethoxy (ethylene glyc C ₄ H ₁₀ O ₂ ; [110]	col dimethyl ether);	J. Chem. Thermodyn. <u>1980</u> , 12, 993-1002.		
ARIABLES:		PREPARED BY:		
Tempera	ture, pressure	C. L. Young		
EXPERIMENTAL VALUES:		I		
т/к	p [*] /MPa	Mole fraction of hydrogen in liquid, ${x_{\rm H_2}}$		
298.15	0.009 1.159 4.582 7.43	0.0 0.004189 0.01623 0.02570		
323.15	9.53 0.0288 1.707 1.782 4.479 4.916	0.03272 0.0 0.007352 0.007757 0.01880 0.02085		
373.15	7.08 9.82 0.165 2.127 2.219 4.516 7.96 9.73	0.02947 0.04028 0.0 0.01183 0.01280 0.02583 0.04501 0.05473		
	* total pressur	e.		
	AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCI	EDURE :	SOURCE AND PURITY OF MATERIALS:		
Static cell fitte After equilibrium liquid sample wit analysed by strip Details in source	established hdrawn and ping out hydrogen.	 Messer-Griesheim sample, purity 99.997 mass per cent. BASF Akteingesellschaft sample, purity 99.7 mass per cent. 		
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\%;$ $\delta x_{H_2} = \pm 2\%.$ REFERENCES:		
		 Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u>, 82, 798. 		

COMPONE	NTS:			ORIGINAL	MEASUREMENTS:	
		: [1333-74-0]				
2. 2-				Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.		
VARIABL		ure, pressure		PREPARED	BY: C.L. Young.	
EXPERIM	ENTAL VALUES:			<u> </u>		
	т/к	p ⁺ /10 ⁵ Pa	p*/1	.0 ⁵ Pa	10^4 x Mole fraction of hydrogen, $10^4 x_{H_2}$	
2	298.15	0.007 23.9 40.4 59.3 108.2	40	.9 .4 .3	0 52.41 86.61 124.7 216.0	
3	323.15	0.03 26.2 41.4 66.0 75.6 103.0	41 66	.2 .4 .0 .6	0 67.92 104.9 160.1 184.8 240.10	
3	73.15	0.31 56.1 101.7 102.0	0 55 101 101	.8	0 188.0 326.0 323.0	
1			ILIARY	INFORMAT	ION	
Static After sample stripp	equilibrium withdrawn ying out hyd	ed with stirrer. n established lig and analysed by	uid	1. No 2. BAS	ND PURITY OF MATERIALS: details given. F Aktiengesellschaft sample ity 99.8 mole per cent.	
				}		

COMPONENTS -	······································	ORIGINAL MEASUREMENTS:
COMPONENTS:	[1222-74-0]	Brunner, E.
 Hydrogen; H₂; 1,4-Butanediol; [110-63-4] 		J. Chem. Thermodyn. <u>1980</u> , 12, 993-1002.
VARIABLES:		PREPARED BY:
Temperature, pressure		C. L. Young
EXPERIMENTAL VALUES:		
T/K	p [*] /MPa	Mole fraction of hydrogen in liquid, ${x_{\rm H_2}}$
298.15	1.542 4.46 7.58 7.86	0.001320 0.003827 0.006535 0.006794
323.15	9.89 2.169 3.608 4.648 5.080 6.27 6.41	0.008470 0.002149 0.003559 0.004535 0.005000 0.006155 0.006221
373.15	9.60 2.529 5.25 5.47 8.03 8.13 9.42	0.009300 0.003243 0.006668 0.006937 0.01014 0.01034 0.01187
	* total pressu	re.
······································	AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEI	DURE :	SOURCE AND PURITY OF MATERIALS:
METHOD APPARATOS / PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source and ref. (1).		 Messer-Griesheim sample, purity 99.997 mass per cent. BASF Akteingesellschaft sample, purity 99.7 mass per cent.
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\%;$ $\delta x_{H_2} = \pm 2\%.$ REFERENCES: 1. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Hydrogen; H_2 ; [1.	333-74-0]	Brunner, E.				
<pre>2. 2,2'-Oxybisethanol glycol); C₄H₁₀O₃; [111-46-6]</pre>						
VARIABLES:		PREPARED BY:				
Temperature	, pressure	C. L. Young				
EXPERIMENTAL VALUES:						
т/к	p [*] /MPa	Mole fraction of hydrogen in liquid, ${}^{x}_{\mathrm{H}_{2}}$				
298.15	1.916 4.547 7.29 8.91	0.001452 0.003411 0.005417 0.006557				
323.15	9.99 2.744 3.958 7.63	0.007358 0.002478 0.003533 0.006733				
373.15	9.96 2.41 6.60 8.07 9.99	0.008741 0.002932 0.007970 0.009687 0.01189				
	* total pressur	e.				
	AUXILIARY	INFORMATION				
METHOD /APPARATUS / PROCEDURE :		SOURCE AND PURITY OF MATERIALS:				
Static cell fitted wit After equilibrium esta	ablished	 Messer-Griesheim sample, purity 99.997 mass per cent. 				
liquid sample withdrav ^{analysed} by stripping ^{Details} in source and	out hydrogen.	 BASF Akteingesellschaft sample, purity 99.7 mass per cent. 				
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\$;$ $\delta x_{H_2} = \pm 2\$.$ REFERENCES: 1. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.				

COMPONENTS:			ORIGI	NAL MEASUREMENTS:			
<pre>1. Hydrogen; H₂; [</pre>	1333-74-0]		Brunner, E.				
 1-Pentanol, C₅H 	. l-Pentanol, C ₅ H ₁₂ O; [71-41-0]			Ber.Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.			
VARIABLES: Temperature,	pressure		PREPA	RED BY: C.L. Young			
EXPERIMENTAL VALUES:							
т/к р	⁺ /10⁵Pa	p*/1	0 ⁵ Pa	10^4 x Mole fraction of hydrogen, $10^4 x_{\rm H_2}$			
298.15	0.003 27.2 59.7 78.6 98.0	59 78	.2 .7 .6 .0	0 80 171 230 279			
323.15	0.02 25.4 55.3 88.4	55	.4	0 87 181 288			
373.15	0.25 33.4 60.5 79.7	60	.2	0 143 256 333			
	AUX	ILIARY	INFOR	MATION			
METHOD/APPARATUS/PROCED	JRE :		SOUR	CE AND PURITY OF MATERIALS:			
Static cell fitted w After equilibrium es		ruid	1.	No details given.			
sample withdrawn and stripping out hydrog	l analysed by	1	2.	Merck AG sample, purity 98.5 mole per cent.			
Details in source an	nd ref. (1).		ESTI	MATED ERROR:			
				$\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01; \ \delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler)			
			REFE 1.	RENCES. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.			

COMPONENTS:		
		ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ;	[1333-74-0]	Brunner, E.
2. 2-(2-Methoxyetho		J. Chem. Thermodyn. <u>1980</u> , 12,
(diethylene glyc	-	993-1002.
ether); $C_5H_{12}C$); [111-77-3]	
VARIABLES:		PREPARED BY:
Temperatu	re, pressure	C. L. Young
EXPERIMENTAL VALUES:		
- A DRIFENIAL VALUES:		
т/к	p [*] /MPa	Mole fraction of hydrogen in liquid, ${}^{x_{_{H_2}}}$
298.15	3.4×10^{-5}	0.0
290.15	1.441	0.002478 0.007176
	4.185 6.97	0.01176
323.15	10.19 2.0 × 10 ⁻⁺	0.01691 0.0
	1.486 4.32	0.003119 0.008947
	7.25 10.41	0.01489 0.02107
373.15	3.5×10^{-3}	0.0
	2.11 3.96	0.006214 - 0.01153
	7.27 10.63	0.02085 0.02991
	* total pressur	re.
	AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDU	RE:	SOURCE AND PURITY OF MATERIALS:
Static cell fitted w	with stirror	 Messer-Griesheim sample, purity 99.997 mass per cent.
After equilibrium es		
liquid sample withd	cawn and	2. BASF Akteingesellschaft sample,
analysed by strippin	ng out hydrogen.	purity 99.7 mass per cent.
Details in source an	nd ref. (1).	
		ESTIMATED ERROR: $\delta \pi / M R = \pm 0.28$
		$\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\%;$ $\delta x_{H_2} = \pm 2\%.$
		H ₂ -200
		REFERENCES :
		1. Brunner, E.
		Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.
		<u></u>

COMPONENTS:			ORIGI	NAL MEASUREMENTS:			
<pre>1. Hydrogen; H ;</pre>	[1333-74-0]		Br	unner, E.			
2. l-Hexanol; C ₆ H ₁₄ O; [111-27-3]			Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.				
VARIABLES: Temper	ature, pressure		PREPA	C.L. Young.			
EXPERIMENTAL VALUES: T/K	p ⁺ /10 ⁵ Pa	p*/	I ⁄10⁵P	a 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2}			
298.15	0.001 30.1 57.0 57.1 79.9 98.7		0 30.1 56.9 57.1 79.9 98.7	0 99.50 182.2 185.0 251.9 305.8			
323.15	0.01 34.0 44.3 66.6 83.1 103.4	3 4 6 8	0 4.0 4.2 56.6 33.0)3.4	0 113.5 164.6 250.4 296.4 374.1			
373.15	0.11 32.6 73.7 87.1 102.4		0 32.5 73.6 37.0)2.3	0 155.2 340.4 406.2 478.2			
+ total	pressure,						
* partia	l pressure.						
	AUX	ILIARY	INFOR	MATION			
METHOD / APPARATUS / PRO	CEDURE:		SOUR	CE AND PURITY OF MATERIALS:			
Static cell fitte After equilibrium liquid sample wit	established	vsed	1.	No details given. Merck AG sample, purity			
by stripping out				better than 98 mole per cent.			
Details in source	e and ref. (l).						
			ESTI	MATED ERROR: $\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0$ %.			
			REFE 1.	(estimated by compiler) RENCES: Brunner, E. Ber. Bunsenges. Phys. Chem.			
				<u>1978</u> , 82, 798.			

COMPONENTS :	1	ORIGI	NAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0		Brunner, E.				
<pre>2. 2-Butoxyethanol; C₆H₁,O₂; [111-76-2]</pre>			•. Bunsenges. Phys. Chem. <u>1979</u> , 715-721.			
VARIABLES: Temperature, pressure		PREPA	RED BY: C.L. Young			
EXPERIMENTAL VALUES: T/K p ⁺ /10 ⁵ Pa	p*	/1051	Pa 10^4 x Mole fraction of hydrogen, $10^4 x_{H_2}$			
298.15 44.1 63.8 70.7 84.4		0 44.1 63.8 70.7 84.4	0 134.1 191.1 208.6 248.4			
323.15 0.008 34.4 35.5 56.8 77.1 102.7		0 34.4 35.5 56.8 77.0 02.7	0 120.7 124.5 195.4 260.8 336.7			
373.15 0.09 36.2 65.9 84.0		0 36.2 65.8 83.9	0 170.1 303.1 381.5			
+ total pressure			* partial pressure			
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stir	AUXILIARY	SOURC	MATION E AND PURITY OF MATERIALS: No details given.			
After equilibrium establishe liquid sample withdrawn and analysed by stripping out hy Details in source and ref. (d drogen.		BASF Aktiengesellschaft sample, purity 99.5 mole per cent.			
			ATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0\%$ (estimated by compiler) EENCES: Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.			

COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333]		Brunner, E.
² • 2,2'-[1,2-Ethanediylb: ethanol, (triethy	is(oxy)]bis- lene glycol);	J. Chem. Thermodyn. <u>1980</u> , 12,
$C_{6}H_{14}O_{4}; [112-27-6]$	iene giycoi);	993-1002.
VARIABLES:		PREPARED BY:
Temperature, pre	essure	C. L. Young
EXPERIMENTAL VALUES:		
т/к р	/MPa	Mole fraction of hydrogen in liquid,
		x _{H2}
298.15 2.0	05	0.002096
4.6	517	0.004710
6.9 10.0		0.007076 0.01009
	994	0.002502 0.005517
7.6	57	0.009398
10.4 373.15 2.5		0.01261 0.004600
4.5	574	0.008050
7.4		0.01296 0.01705
*t	total pressur	e
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
		l. Messer-Griesheim sample, purity
Static cell fitted with s		99.997 mass per cent.
After equilibrium establi liquid sample withdrawn a		2. BASF Akteingesellschaft sample,
analysed by stripping out		purity 99.7 mass per cent.
Details in source and ref		parter sser mass per cente.
		ESTIMATED ERROR:
		$\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\%;$
		$\delta x_{\rm H_2} = \pm 2\%.$
		REFERENCES :
		1. Brunner, E.
		Ber. Bunsenges. Phys. Chem.
		<u>1978</u> , 82, 798.

COMPONENTS:	ORIGINAL MEASUREMENTS:
	Brunner, E.
<pre>1. Hydrogen; H₂; [1333-74-0] 2. 2-[2-(2-Methoxyethoxy)-ethox ethanol, (Triethylene glyco monomethyl ether); C₇H₁₆O₄; [112-35-6]</pre>	y]- J. Chem. Thermodyn. 1980, 12,
VARIABLES:	
	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Т/К р [*] /МРа	Mole fraction of hydrogen in liquid, ${}^{x}_{\mathrm{H}_{2}}$
298.15 1.759 4.649 6.83	0.003469 0.009193 0.01349
10.26 323.15 1.66 3.138 6.68 10.33	0.01993 0.004061 0.007623 0.01598 0.02447
373.15 373.15 3.76 6.81 10.30	0.006270 0.01280 0.02303 0.03399
* total p	ressure.
AUX	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static cell fitted with stirrer After equilibrium established liquid sample withdrawn and analysed by stripping out hydrog Details in source and ref. (1).	99.997 mass per cent. 2. BASF Akteingesellschaft sample,
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta p/MPa = \pm 0.2\$;$ $\delta x_{H_2} = \pm 2\$.$ REFERENCES: 1. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798.

1. Hydrogen; H ₂ ;	[1333-74-0]	ORIGINAL MEASUREMENTS: Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1979</u> , 83, 715-721.				
2. 2-Ethoxy-1-he: [104-76-7]	xanol; C ₈ H ₁₆ O;					
ARIABLES: Temperature	, pressure	PREPARED B	Y: C.L. Young.			
EXPERIMENTAL VALUES:			····			
Т/К	p ⁺ /10 ⁵ Pa p [*]	/10 ⁵ Pa	$10^{4}x$ Mole fraction of hydrogen, $10^{4}x_{H_{2}}$			
298.15	0.0002 19.72 34.3 44.2 77.4 94.6	0 19.72 34.3 44.2 77.4 94.6	0 75.80 132.1 170.8 289 343			
323.15	0.002 50.3 97.8	0 50.3 97.8	0 222 410			
373.15	0.04 62.6 96.5	0 62.6 96.5	0 349 524			
393.15	0.11 26.9 46.1	0 26.7 46.0	0 171.3 287.7			
	AUXILIARY	INFORMATION				
ÆTHOD /APPARATUS / PRO	CEDURE :	SOURCE AND	PURITY OF MATERIALS:			
After equilibrin liquid sample with		1. No 2. BAS sam	details given. F Aktiengesellschaft ple, purity better than mole per cent.			
Details in sourc	ce and ref. (1).					

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COMPONENTS:			ORIGINAL MEASUREMENTS:				
l. Hydro	gen; H ₂ ; [1333-74-0]		Loktev, S. M.; Androsov, D. I.;				
2. Carbo	n Monoxide; CO; [630-0	08-01	Zuev, A. A. Zh. Prikl. Khim. <u>1978</u> , 51, 2023-				
		• • •	2027; J. Appl. Chem. USSR 1978, 51, 1914-				
3. Alcoh	ols		J. Appl. C. 1917.	nem. USSK <u>1978</u> , 51	, 1914-		
VARIABLES:			PREPARED BY:				
Temperat	ure, pressure, gaseous			C. L. Young			
	composition			C. D. Toung			
EXPERIMENTA	L VALUES:						
	Mole fraction of hydrogen in gas				1		
T/K	before saturation		l pressure	Bunsen coeffic	ients		
		p/at	m p/MPa	^α H₂ ^α C	0		
315	0.690	20	2.03		73		
		40 60	4.05 6.08	1.62 l. 2.20 l.			
		80	8.11	2.85 2.	15		
	0.515	100 20	10.13 2.03	3.55 2. 0.55 1.			
	0.915	40	4.05	1.17 2.	00		
		60 80	6.08 8.11	1.63 2. 2.12 4.	97 00		
		100	10.13	2.87 4.	90		
	0.43	20 40	2.03 4.05		25 · 33		
		60	6.08	1.47 3.			
		80	8.11 10.13	1.91 4. 2.30 5.			
371	0.69	100 20	2.03	1.06 0.			
		40 60	4.05 6.08	2.06 1. 2.98 2.			
		80	8.11	3.99 2.			
		100	10.13	4.67 3.	55		
			((cont.)			
	AUX	ILIARY	INFORMATION				
METHOD /APPA	RATUS/PROCEDURE:		SOURCE AND PUR	RITY OF MATERIALS:			
Liquid s	aturated with gaseous		1, 2. Purity approximately 99				
	by bubbling gas through		mo	le per cent.			
	a stirred vessel.			-			
	of liquid analysed by		3. Mi:	xture of C ₁₂ to C ₁₆			
	ic technique and gas			iphatic alcohols			
chromato				- ndustrial product)			
			1				
			ESTIMATED ERRO	OR:			
			$\delta T/K = \pm 1.0$	0; $\delta p/p = \pm 0.01;$			
1			$\delta \alpha = \pm 3\%$ (e	estimated by compi	ler).		
			REFERENCES:				
1							
}			1				

COMPONE	ENTS:		ORIGINAL ME	ASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] Carbon Monoxide; CO; [630-08-0] Alcohols 			Loktev, S. M.; Androsov, D. I.; Zuev, A. A. Zh. Prikl. Khim. <u>1978</u> , 51, 2023- 2027; J. Appl. Chem. USSR <u>1978</u> , 51, 1914- 1917.				
EXPERIM	MENTAL VALUES:						
т/к	Mole fraction of hydrogen in gas before saturation	Total p/atm	pressure p/MPa	Bunsen coe ^α H ₂	fficients ^α CO		
371	0.485	20 40 60 80	2.03 4.05 6.08 8.11	0.80 1.60 2.38 2.91	1.25 2.30 3.42 4.54		
	0.57	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	3.49 0.68 1.34 2.02 2.60	1.43 2.74		
457	0.69	100 40 60 80	10.13 4.05 6.08 8.11	3.35 3.10 4.59 5.82	6.20 1.74 2.47 3.07		
	0.515	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	7.00 1.15 2.12 3.16 4.14	4.07 1.52 2.81 4.19 5.60		
	0.43	100 20 40 60 80 100	10.13 2.03 4.05 6.08 8.11 10.13	4.86 0.97 1.82 2.78 3.58 4.51	6.70 1.78 3.30 4.82 6.30 7.70		

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COMPONENTS	•	·	ORIGINAL MEAS	UDEMENTS .		·······
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Carbon monoxide; CO; [630-08-0] 3. Ethyne (acetylene); C₂H₂; [74-86-2] 4. Alcohols</pre>			Loktev, S. M.; Androsov, D. I.; Zuev, A. A. Zh. Prikl. Khim. <u>1978</u> , 51, 2023- 2027; J. Appl. Chem. USSR <u>1978</u> , 51, 1914- 1917.			
VARIABLES			PREPARED BY:			
	ture, pressure, gaseous composition			с. г.	Young	
CAPERIMENT	TAL VALUES:					
T/K	Mole fractions in gaseous phase before saturation	Tota	1 pressure	Bunse	n coeffi	cients
,	y'_{H_2} y'_{CO} $y'_{C_2H_2}$		m p/MPa	α _{H2}	^a co	^α C ₂ H ₂
315	0.56 0.435 0.0061	20 40 60 80	4.05 6.08 8.11	0.59 1.23 1.75 2.37	0.95 1.91 2.68 3.60	0.36 0.68 0.91 1.00
	0.80 0.190 0.0078	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	3.04 0.86 1.70 2.56 3.25 4.20	4.40 0.41 0.81 1.18 1.54 1.86	1.15 0.56 1.00 1.28 1.44 1.60
	0.245 0.745 0.0075	100 20 40 60 80 100	2.03 4.05 6.08 8.11	0.29 0.56 0.88	1.80 1.63 3.21 4.80 6.06 7.20 1.55	0.43 0.81 1.05 1.33 1.46
	0.25 0.74 0.0103	20 40 60 80 100	2.03 4.05 6.08 8.11 10.13	0.56 0.86 1.10 1.41	3.20 4.71 5.92 7.12	0.60 1.10 1.46 1.74 1.99
ļ				(cont.)	
1 m		LIARY	INFORMATION			
METHOD /APP	PARATUS/PROCEDURE:		SOURCE AND PU	RITY OF MAT	ERIALS:	
mixture liquid i Samples Volumetr	saturated with gaseous by bubbling gas through in a stirred vessel. of liquid analysed by fic technique and gas ography.		1, 2, 3. 4.	99 mole Mixture aliphati	per cent of C ₁₂ to	C ₁₆ ls
			ESTIMATED ERF $\delta T/K = \pm 1$. $\delta \alpha = \pm 3$ % (0; δp/p		
			REFERENCES :			

COMPONEN	COMPONENTS:			ORIGINAL MEASUREMENTS:			
2. Carbo		8-0]	Loktev, S. Zuev, A. A <i>Zh. Prikl.</i> 2027; <i>J. Appl. Ch</i> 1917.	Khim. <u>19</u>	78, 51,	2023-	
EXPERIME	ENTAL VALUES:						
T/K	Mole fractions in gaseous phase before saturation ^y 'H ₂ ^y 'CO ^y 'C ₂ H ₂		pressure p/MPa	Bunse ^a H2	n coeffi ^α CO	cients $\alpha_{C_2H_2}$	
315	0.516 0.485 0.0095	20 40	2.03	0.54	1.13	0.52 0.89	
371	0.56 0.435 0.0061	60 80 100 20 40 60	6.08 8.11 10.13 2.03 4.05 6.08	1.73 2.21 2.70 0.83 1.72 2.45	3.11 3.86 4.57 1.01 2.05 3.11	1.21 1.45 1.65 0.17 0.32 0.45	
	0.80 0.19 0.0078	80 100 20 40 60	8.11 10.13 2.03 4.05 6.08	3.30 3.85 1.16 2.26 3.37	4.00 5.22 0.45 0.90 1.45	0.56 0.66 0.25 0.47 0.64	
	0.245 0.745 0.0075	80 100 20 40 60 80	8.11 10.13 2.03 4.05 6.08 8.11	4.24 5.20 0.43 0.72 1.05 1.45	1.95 2.31 1.75 3.75 5.04 6.81	0.79 0.85 0.20 0.37 0.50 0.614	
-	0.250 0.740 1.03	100 40 60 80	10.13 4.05 6.08 8.11	1.43 1.86 0.79 1.17 1.54	7.90 3.55 5.10 6.86	0.73 0.45 0.63 0.80	
	0.516 0.485 0.95	100 20 40 60	10.13 2.03 4.05 6.08	1.75 0.84 1.59 2.25	7.70 1.15 2.31 3.39	0.87 0.27 0.50 0.67	
457	0.56 0.435 0.0061	80 100 20 40 60 80	8.11 10.13 2.03 4.05 6.08 8.11	2.82 3.50 1.17 2.32 3.25 4.48	4.08 5.40 1.37 2.73 4.02 5.12	0.79 0.87 0.09 0.18 0.25 0.32	
	0.80 0.19 0.0078	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	5.20 1.76 3.30 4.91 6.22	6.15 0.65 1.21 1.68 2.28	0.37 0.18 0.32 0.42 0.52	
	0.245 0.745 0.0075	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	7.36 0.57 1.12 1.57 2.07	2.80 2.31 4.48 6.28 8.18	0.59 0.14 0.26 0.35 0.45	
	0.25 0.74 0.0103	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	2.50 2.50 0.61 1.05 1.50 1.96	9.75 2.25 4.30 6.37 7.85	0.50 0.21 0.38 0.52 0.65	
	0.516 0.485 0.0095	100 20 40 60 80	10.13 2.03 4.05 6.08 8.11	2.43 1.13 2.21 3.27 4.04	9.60 1.43 2.84 4.00 5.50	0.72 0.18 0.35 0.46 0.54	
		100	10.13	4.75	6.75	0.64	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Simnick, J.J.; Sebastian, H.M., Lin, H.M.; Chao, K.C.
2. <i>m</i> -Cresol; C ₇ H ₈ O; [108-39-4]	J. Chem. Thermodyn., <u>1979</u> , 11, 531-7.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	Mole fraction of hydrogen
	quid, x_{H_2} in vapour, y_{H_2}
3.04 00 5.05 00 10.13 00 15.34 00	0 0 0.0076 0.9643 0.0115 0.9752 0.0188 0.9847 0.0370 0.9916 0.0546 0.9939 0.0698 0.9949
25.40 00 502.9 0.1842* 00 3.03 00 5.06 00 10.16 00 15.10 00 20.27 00	0.0877 0.9955
3.04 0 5.09 0 10.15 0 15.13 0 20.31 0	0 0.0094 0.7756 0.0154 0.8420 0.0266 0.8992 0.0538 0.9439 0.0800 0.9602 1.039 0.9671 1.255 0.9725
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Flow apparatus with both liquid and gas components continually passing into a mixing tube and then into a cell in which phases separated under gravity. Liquid sample removed from bottom of cell and vapor sample from top of cell. Composition of samples found by stripping out gas and ~ estimating amount of solute volumetrically and solvent gravimetrically. Details in ref. (1).	<pre>SOURCE AND PURITY OF MATERIALS: 1. Air Products sample, purity 99.95 mole per cent. 2. Aldrich Chemical Co., gold label grade, purity 99 mole per cent. ESTIMATED ERROR: ôT/K = ±0.6; ôp/MPa = ±0.02 ôx_{H2}, ôy_{H2} = ±1% (estimated by compiler) REFERENCES: 1. Sebastian, H.M.; Simnick, J.J.; Lin, H-M.; Chao, K-C. J. Chem. Engng. Data, <u>1978</u>, 23, 305-8.</pre>

Hydrogen and Deuterium Solubilities above 200kPa

. m-Cresol;	H ₂ ; [1333-74-0] C ₇ H ₈ O; [108-39-	-4] Lin, H.M.;	J.; Sebastian, H.M., Chao, K.C. <i>ermodyn</i> . <u>1979</u> , 11, 531-7
т/к		. <u></u>	
	p/MPa	Mole fractio in liquid, x _{H2}	on of hydrogen in vapour, y _{H2}
1 1 2	0.8759* 2.027 3.02 5.07 0.14 5.20 20.27 25.33	0 0.0081 0.0156 0.0295 0.0624 0.0939 0.1227 0.1509	0 0.5161 0.6671 0.7900 0.8846 0.9163 0.9318 0.9421
1 1 2	1.577* 2.027 3.06 5.06 0.11 5.17 20.23 25.26	0 0.0043 0.0137 0.0314 0.0751 0.1141 0.1522 0.1833	0 0.1840 0.4003 0.5960 0.7668 0.8298 0.8633 0.8849
1 1 2	2.681* 3.05 5.07 0.12 5.22 0.25 5.37	0 0.0046 0.0296 0.0875 0.1413 0.1935 0.2354	0 0.0734 0.3259 0.5742 0.6812 0.7374 0.7733

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] 4-Methyl-1,3-dioxolan-2-one or propylene carbonate; C₄H₆O₃; [108-32-7] 	Schmack, P; Bittrich, HJ. Wiss. Z. Tech. Hochsch. Chem. Leuna- Merseburg <u>1966</u> , 8 (2-3), 182 - 186. Chem. Abstr. <u>1967</u> , 66, 6095u.
VARIABLES: T/K: 278.15 - 333.15 P/kPa: 101.325, 892 - 1034 (1, 8.8 - 10.2 atm)	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Т/К	P/atm	Bunsen Coefficient α/cm³(STP) cm ⁻³ atm ⁻¹	P/atm	Bunsen Coefficient α/cm³(STP)cm ⁻³ atm ⁻¹
278.15	1.0	0.0258	9.3	0.0295
283.15	1.0	0.0290	9.3	0.0312
288.15	1.0	0.0308	9.5	0.0319
293.15	1.0	0.0284	8.8	0.0340
298.15	1.0	0.0320	9.6	0.0342
303.15	1.0	0.0314	9.1	0.0367
308.15	1.0	0.0314	10.1	0.0378
313.15	1.0	0.0341	10.2	0.0388
318.15	1.0	0.0405	9.3	0.0425
323.15	1.0	0.0368	9.0	0.0427
328.15	1.0	0.0382	9.1	0.0438
333.15	1.0	0.0431	9.2	0.0472

The authors give the enthalpy of solution of hydrogen in propylene carbonate as ($6200~\pm~2500)~\rm{J}~mol^{-1}$.

At 298.15 K and 1 atm partial pressure hydrogen the mole fraction solubility is 1.2 x $10^{-4}\,.$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Two methods were used. The apparatus used for the solubility measurements	(1) Hydrogen. No information.
aratus of Schay <i>et al.</i> (1). It con- sists of an absorption flask with mag- netic stirrer that is connected to a Hg manometer, a gas buret with Hg leveling bulb, and a water jet vacuum Pump. Gas volume changes in the apparatus are calibrated with res- pect to pressure and temperature. The solubility can be determined at	Ulbricht". Boiling point/ $^{0}C = 235$, $n_{D}^{25} = 1.4196$, ρ_{4}^{25}/g cm ⁻³ = 1.206, and $\epsilon^{25} = 65$.
several temperature with one charging of gas and solvent.	ESTIMATED ERROR: $\delta T/K = \pm 0.2$
For the measurements near 10 atm a rocking autoclave apparatus similar to that of Dean and Tooke (2) is used.	$\delta \alpha / \alpha = 0.12 \text{ at l atm}$ 0.08 at 10 atm
Saturatod liquid in transforred	REFERENCES:
to a buret system at one atm for analysis.	<pre>1. Schay, G.; Székely, Gy.; Rácz, Gy.; Traply, G. Periodica Polytech. (Budapest) <u>1958</u>, 2, 1 - 24.</pre>
	 Dean, A. R.; Tooke, J. W. Ind. Eng. Chem. <u>1946</u>, 38, 389.

COMPONENTS:	······································	ORIGINAL MEASUREMENTS:	
			ъ.
1. Hydrog	gen; H ₂ ; [1333-74-0]	Shakhova, S. F.; Zubchenko, Yu	
2. 4-Meth	hyl-1,3-dioxolan-2-one,	Kaplan, L. K. Khim. Prom. <u>19</u>	<u>/3</u> ,
(Prop	ylene carbonate); C ₄ H ₆ O ₃ ;	49, 108-110.	
[108-3	32-71		
VARIABLES:		PREPARED BY:	
Temperatu	re, pressure	C. L. Young	
EXPERIMENTAL			
т/к		tion of hydrogen a [†] n liquid, vol/vol	
	-	^x _{H₂} 001/001	
		_	
283.15		0.00661 1.75 0.00808 2.14	
		0.00808 2.14 0.00800 2.12	
	99.6	0.00796 2.11	
		0.00897 2.38 0.00965 2.56	
298.15		0.00673 1.78	
		0.00789 2.09	
		0.00912 2.42 0.01043 2.77	
		0.01021 2.71	
		0.01154 3.07	
323.15		0.00852 2.26 0.00961 2.55	
		0.01073 2.85	
		0.01084 2.88	
		0.01203 3.20 0.01351 3.60	
		0.01532 4.09	
	1 atmosphere adsorbed by un	o be volume of gas at T/K = 273.1 it volume of liquid at room	5
	AUXILIARY	INFORMATION	
METHOD /APPA	ARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Mixture st	tirred by ball in rocking	1. Dried and oxygen removed;	
autoclave	. Sample of liquid	purity 99.8 mole per cent.	
Details in		 Distilled; purity 99.9 mole cent determined by gas chrom. graphy. 	per ato-
		ESTIMATED ERROR:	
		$\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1;$	
		$\delta x_{\rm H_2} = \pm 5$ (estimated by compile	r).
		REFERENCES:	

	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Pentanedioic acid, dimethyl ester, 	
(Dimethyl glutarate); C ₇ H ₁₂ O ₄ ; [1119-40-0]	
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hydrogen in liquid, ^x H ₂	a [†] vol/vol
313.15 43.7 0.0123 71.4 0.0194 98.6 0.0264 126.3 0.0339 128.5 0.0354	1.89 3.01 4.12 5.33 5.59
	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE: Mixture stirred by ball in rocking autoclave. Sample of liquid analysed by a volumetric method. Details in source.	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Dried and oxygen removed, purity 99.8 mole per cent. 2. Analytical grade sample.

HAD . FF

COMPONENTS:			ORIGINAL MEASUREM	ENTS:
2. 1,2,3-	Propaneti	<pre>[1333-74-0] riol, triacetate, retate); C9H14O6;</pre>	1	F.; Zubchenko, Yu. P.; Ahim. Prom. <u>1973</u> ,
[102-7		cetate); C ₉ n ₁₄ U ₆ ;		
VARIABLES:			PREPARED BY:	
Temperatur	e, pressu	1re	C. L. Young	3
EXPERIMENTAL T/K		Mole fraction of hydrogen in liquid, ^x H ₂	α [†] vol/vol	
	70.1 85.8 87.3 104.0 118.1 139.7	0.0177 0.0214 0.0218 0.0268 0.0291 0.0340	2.14 2.59 2.64 3.26 3.55 4.17	
323.15	85.3 106.9 115.7 140.2 141.8	0.0259 0.0320 0.0345 0.0412 0.0427	3.15 3.91 4.23 5.09 5.28	
	89.8 111.8 145.2 155.9	0.0311 0.0383 0.0500 0.0527	3.80 4.72 6.23 6.59	
of gas a	at T/K = d by unit	tal paper, appears 4 273.15 and $P = 1$ at volume of liquid a	mosphere	
		AUXILIARY	INFORMATION	
METHOD / APPA	RATUS/PRC	OCEDURE :	SOURCE AND PURITY	OF MATERIALS;
autoclave.	Sample y a volum	ball in rocking of liquid etric method.	purity 99.	oxygen removed; 8 mole per cent. and dried; purity per cent.
			ESTIMATED ERROR:	
				δ^P /bar = ±0.1;
			$\delta x_{\rm H_2} = \pm 5\%$ (es	stimated by compiler).
			REFERENCES:	

СОМ	PONENTS:	EVALUATOR:
1.	Hydrogen; H ₂ ; [1333-74-0]	Colin L. Young Department of Chemistry,
2.	Amines	University of Melbourne, Parkville, 3052, Victoria, Australia: June, 1980

CRITICAL EVALUATION:

The solubility of hydrogen in amines at elevate pressures has been studied by Moore and Otto (1) and by Brunner (2). The former workers (1) only worked up to 2 MPa and found that, within experimental error, mole fraction solubility was linear with pressure and quoted equations for Henry's law constants. Brunner (2) on the other hand studied solubilities up to 10 MPa and found a slightly non-linear relationship between pressure and mole fraction solubility. He evaluated the limiting slope of pressure-mole fraction solubility graphs as pressure tends to zero to obtain Henry's law constants which can be compared with those of Moore and Otto (1). There is only fair agreement between the two groups for the systems studied by both i.e. ethanamine, 1,2-ethanediamine and 1- propanamine. The Henry's law values of Moore and Otto (1) are 5-10% larger than those of Brunner (2). This could be partly due to Moore and Otto's assumption that there is a linear relationship between pressure and mole fraction solubility. From Brunners data it appears that this assumption could lead to Henry's law constant being 2-5% larger than when estimated allowing for the small non-linearity of mole fraction solubility as a function of pressure.

Brunner (2) also quoted partial molar volumes of hydrogen at infinite dilution, V^{∞} and partial molar heats of solution Δh where these were calculated from the equations.

$$\ln p_{\rm H_2} / x_{\rm H_2} = \ln H + V^{\infty} p_{\rm H_2} / RT$$
 (1)

$$\frac{\partial \ln x_{H_2}}{\partial (1/T)} \bigg|_p = -\frac{\Delta h}{R}$$
(2)

where H is Henry's law constant at zero partial pressure of hydrogen.

Values of $H/10^{5}$ Pa, $V^{\infty}/cm^{3}mol^{-1}$ and $\Delta h/J$ mol⁻¹ are given below for hydrogen in amines. The values calculated from the data of Moore and Otto (1) are given in parentheses.

Amine	т/к	<i>H/</i> 10 ⁵ Pa	V [∞] /cm ³ mol ⁻¹	∆h/J mol-1
Methanamine	203.2 213.2 223.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2	(13647) (12028) (10609) (9373) (8305) (7380) (6580) (5891) (5294) (4775) (4322)		
Ethanamine	203.2 213.2 223.2 233.2 243.2 253.2 263.2	(9063) (8191) (7348) (6499) (5751) (5151) (4676)		

Hydrogen and Deuterium Solubilities above 200kPa

Amine	т/к	<i>H/</i> 10 ⁵ Pa	V∞/cm ³ mol ⁻¹	∆h/J mol ⁻¹
Ethanamine	273.2 283.2 293.2 303.2 298.15 323.15 373.15	(4293) (3946) (3585) (3174) 3020 2420 1540	35 41 50	8140
1,2-Ethanediamine	293.2 303.2 298.15 323.15 373.15	(15430) (13500) 13820 10540 6280	17 22 33	9770
1-Propanamine	203.2 213.2 223.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2 298.15 323.15 373.15	<pre>(7800) (6931) (6193) (5561) (5016) (4548) (4142) (3788) (3480) (3209) (2970) 2930 2400 1680</pre>	22 26 34	8860
2-Propanamine	298.15 323.15 373.15	2585 2117 1368	20 21 24	
1,2-Propanediamine	243.2 253.2 263.2 273.2 283.2 293.2 303.2	(13539) (10267) (10658) (9577) (8675) (7916) (7263)		
1,3-Propanediamine	298.15 323.15 373.15	9400 9370 4680	35 39 47	8650
Pyrrolidine	298.15 323.15 373.15	4616 3815 2585	31 35 42	7200
Piperidine	298.15 323.15 373.15	3890 3170 2280	38 42 50	6580
l-Methylpyrrolidine	298.15 323.15 373.15	2400 2080 1555	36 39 45	5390
N,N-dimethyl-1,3- propanediamine	298.15 323.15 373.15	3120 2600 1840	32 37 48	6520
1-Methylpiperidine	298.15 323.15 373.15	2390 2090 1590	40 42 47	5080
N,N-Diethylethan- amine	298.15 323.15 373.15	1675 1370 1085	28 33 42	5285

Organic Compounds Containing Nitrogen

Amine	Т/К	<i>H/</i> 10 ⁵ Pa	V [∞] /cm ³ mol ⁻¹	∆h/J mol-1
l,6-Hexanediamine	298.15 323.15 373.15	4027 3354 2860	23 25 27	6860
N-(3-aminopropyl)- l,3-propanediamine	298.15 323.15 373.15	6530 5010 3357	28 34 46	8180
N,N-Dimethylcyclo- hexanamine	298.15 323.15 373.15	2413 2090 1605	39 44 52	5055
N-Butyl-1-butan- amine	298.15 323.15 373.15	1763 1463 1120	34 40 51	5555
N-(2-aminoethyl)- N-(3-aminopropyl)- 1,3- propane- diamine	298.15 323.15 373.15	5715 4520 3060	19 22 29	7720
N-N-dibutyl-l- Butanamine	298.15 323.15 373.15	1360 1170 933	31 36 46	4615

The data of Moore and Otto (1) are classified as doubtful whereas those of Brunner (2) are classified as tentative.

REFERENCES:

1. Moore, R.G.; Otto, F.D. Can. J. Chem. Eng. 1972, 50, 355.

2. Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u>, 82, 798.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.		
2. Methanamine; CH ₅ N; [74-89-5]	Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.		
VARIABLES:	PREPARED BY:		
Temperature	C.L. Young		
EXPERIMENTAL VALUES:			
T/K	Mole fraction of hydrogen * in liquid, ¤ _{H2}		
203.2 213.2 223.2 233.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2	0.00007425 0.00008424 0.00009551 0.0001081 0.0001220 0.0001373 0.0001540 0.0001720 0.0001914 0.0002122 0.0002344		
* at a partial pressure	of 101.3 kPa cont.		
AUXILIARY	INFORMATION		
METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;		
Recirculating flow apparatus fitted with magnetic pump. Amine saturated with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released coll- ected in calibrated gas buret. Amount of amine determined gravi- metrically.	 Matheson sample, purity 99.999 mole per cent. Dried. Matheson sample, purity 98.0 mole per cent. Dried. Fractionally distilled under vacuum. 		
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 4\%.$ (estimated by compiler)		
	REFERENCES:		

Can. J 355-60	sited document e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	<u>1972</u> , <i>50</i>
355-60 ken from depo rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .05 1.72 .06 0.79 .89 1.00 .89 1.400 .89 1.400 .03 2.030	sited document e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen ^w H ₂ 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
ken from depo rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .89 1.00 .89 1.40 .89 1.40 .80 0.79 .89 1.40 .89 1.40 .80 0.79 .89 1.40 .80 0.79 .89 1.40 .80 0.79 .89 1.40 .80 0.79 .80 0.	sited document e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen x_{H_2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.00 .89 1.00 .89 1.40 .89 1.40 .03 2.030	e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen x_{H_2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.00 .89 1.00 .89 1.40 .89 1.40 .03 2.030	e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen x_{H_2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.00 .89 1.00 .89 1.40 .89 1.40 .03 2.030	e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen x_{H_2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
rtial pressur hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.00 .89 1.00 .89 1.40 .89 1.40 .03 2.030	e Solub- ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	Mole fraction of hydrogen x_{H_2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
hydrogen atm P/MP .77 0.38 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .04 1.72 .00 1.72 .00 1.72 .89 1.00 .80 0.79 .80 0.79 .89 1.40 .91 40 .03 2.030 .03 2.030	ility + a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	ion of hydrogen w _{H2} 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
atm P/MP .77 0.38 .01 0.91 .01 0.91 .01 0.91 .01 0.91 .01 1.91 .02 1.72 .04 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .03 0.79 .89 1.40 .03 2.030 .03 2.030	a 2 0.3473 3 0.8548 3 0.8533 3 0.8332 5 1.5722 7 1.5826 4 1.5985 3 1.6226 3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	ion of hydrogen ^{xx} H ₂ 0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.004811 0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
.01 0.91 .01 0.91 .01 0.91 .02 1.72 .04 1.72 .01 1.72 .01 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 0.79 .89 1.40 .03 2.03 .03 2.03	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
.01 0.91 .01 0.91 .02 1.72 .04 1.72 .01 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.00 .80 0.79 .83 0.79 .89 1.40 .89 1.40 .03 2.030 .03 2.030	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.01183 0.01181 0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
.01 0.91 .02 1.72 .04 1.72 .01 1.72 .00 1.72 .00 1.72 .00 1.72 .00 1.72 .89 1.007 .80 0.79 .83 0.79 .89 1.40 .89 1.40 .03 2.030	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.01153 0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.02174 0.02188 0.02210 0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
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.00 1.72 .00 1.72 .89 1.00 .80 0.79 .83 0.79 .89 1.40 .89 1.40 .89 1.40 .89 1.40 .03 2.030 .03 2.030	3 1.6226 3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	0.02243 0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
.00 1.72 .89 1.00 .80 0.79 .83 0.79 .89 1.40 .89 1.40 .89 1.40 .03 2.030 .03 2.030	3 1.5960 2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	0.02207 0.01306 0.006680 0.006629 0.01147 0.01144
89 1.002 80 0.79 83 0.79 89 1.40 89 1.40 03 2.030 03 2.030	2 0.9435 0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	0.01306 0.006680 0.006629 0.01147 0.01144
80 0.79 83 0.79 89 1.40 89 1.40 03 2.030 03 2.030	0 0.4824 3 0.4787 7 0.8289 7 0.8265 0 1.1671	0.006680 0.006629 0.01147 0.01144
83 0.79 89 1.40 89 1.40 03 2.030 03 2.030	3 0.4787 7 0.8289 7 0.8265 0 1.1671	0.006629 0.01147 0.01144
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95 1.616		0.01336
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58 1.072		0.01177
27 1.188		0.01319
60 0.871		0.009896
60 0.871		0.009904
17 1.436		0.01645
17 1.436		0.01630
79 1.904		0.02177
79 1.904		0.02173
72 1.289	1.5700	0.02171
		0.02179
		0.03350
		0.03366
	2.2523	0.03111
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81 1.805	2 0050	0.03873
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<u> </u>	and 273.15k d	
	72 1.289 65 1.991 65 1.991 69 1.488 81 1.805	72 1.289 1.5758 65 1.991 2.4257 65 1.991 2.4373 69 1.488 2.2523 81 1.805 2.8261

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.		
<pre>2. Ethanamine; C₂H₇N; [74-04-7]</pre>	Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.		
VARIABLES:	PREPARED BY:		
Temperature	C.L. Young		
EXPERIMENTAL VALUES:	I		
T/K	10 ⁴ x Mole fraction of hydrogen * in liquid, 10 ⁴ x _{H2}		
203.2 213.2 223.2 233.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2 *at a partial pressure	1.118 1.237 1.379 1.559 1.762 1.967 2.167 2.360 2.568 2.826 3.192 e of 101.3 kPa cont.		
	INFORMATION		
METHOD 'APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Recirculating flow apparatus fitted with magnetic pump. Amine saturated with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released collected in calibrated gas buret. Amount of amine determined gravi- metrically.	 Matheson sample, purity 99.999 mole per cent. Dried. Matheson sample, purity 98.5 mole per cent. Dried. Fraction- ally distilled under vacuum. 		
	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4\%.$ (estimated by compiler)		
	REFERENCES :		

COMPONENTS:			ORIGINAL MEASUREMENTS:				
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Ethanamine; C₂H₇N; [74-04-7]</pre>			Moore, R.G.; Otto, F.D. Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.				
DATA taken from deposited document							
		Total pressure	Partial of hydro	pressure ogen	Solubil- ity +	Mole fract ion of hydrogen	
T/°C -24.11 -24.153 -24.53 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.28 -24.00 -24.11 -61.76 -68.17 -68.51 -60.62 -55.64 -35.64 -35.64 -35.62 -35.62 -35.62 -35.62 -35.62 -35.62 -35.62 -35.62 -35.62 -35.64 -35.62 -35	T/K 249.04 248.62 248.62 248.87 248.87 249.15 249.15 249.15 249.15 249.04 211.39 205.14 204.98 204.98 204.98 204.98 204.98 212.12 212.12 212.12 212.31 212.09 212.09 212.09 212.53 237.51 237.51 238.03 238.03 238.03 236.61 273.29 272.86 295.57 295.80 296.05	P/atm 11.34 14.76 14.75 17.84 17.84 10.56 10.56 10.56 14.30 11.44 13.68 13.68 13.68 13.68 13.68 13.68 17.26 17.26 17.26 17.67 17.28 17.28 17.28 17.69 15.14 15.14 15.14 15.14 15.14 15.14 15.90 15.90 15.90 15.90 15.90 15.90 15.90 15.90 17.93 17.93 16.37 20.82 20.82 18.21	P/atm 11.21 14.63 14.61 17.70 17.70 10.42 10.42 14.16 11.43 13.67 13.68 18.34 17.25 17.67 17.67 17.27 17.68 15.13 15.13 15.13 15.13 15.13 15.13 15.83 13.83 20.17 17.45 15.10 19.55 16.92	P/MPa 1.136 1.482 1.480 1.793 1.793 1.056 1.056 1.435 1.158 1.385 1.386 1.858 1.748 1.748 1.748 1.790 1.750 1.749 1.604 1.604 1.768 1.530 1.981 1.981 1.981 1.714	1.0720 1.0561 1.3688 1.3563 1.6553 1.6502 0.9911 0.9748 1.3388 0.7063 0.8347 0.8083 1.0480 0.9882 0.9906 1.0112 0.9806 1.0112 0.9806 1.0728 1.0895 0.9393 0.9242 1.1250 1.0895 0.9393 0.9242 1.1250 1.4336 1.4207 1.3062 1.3169 1.1307 2.3784 2.0514 2.0514 2.0514 2.8538 2.4654	x_{H_2} 0.02152 0.02152 0.02746 0.02721 0.03319 0.03309 0.01990 0.01957 0.02686 0.01419 0.01676 0.01623 0.02104 0.01984 0.01984 0.01989 0.02153 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02185 0.02258 0.02258 0.02269 0.02258 0.02269 0.02621 0.02642 0.02642 0.02642 0.02642 0.0269 0.0410 0.04127 0.04381 0.05682 0.04935	

+ Volume of hydrogen (cm³), reduced to 101.31Pa and 273.15K, dissolved by 1 gram of ethanamine.

> . .

2. Ethanamine (Aminoethane) $C_{2H_7N;}$ [75-04-7]. VARIABLES: Temperature, pressure. EXPERIMENTAL VALUES: T/K $p^+/10^5$ Pa $p^*/10^5$ P 298.15 1.42 0 53.0 51.6 87.7 86.3 323.15 3.41 0 52.8 49.5 88.4 85.1 373.15 13.3 0 58.6 45.6 98.5 85.8 + total pressure * partial pressure * partial pressure Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. Ethanamine (Aminoethane) Ber. 798-8 PREPART PREPART PREPART AUXILIARY INFORMA Details 2. F	ED BY: C.L. Young.
2. Ethanamine (Aminoethane) $C_{2H_7N; [75-04-7]}$. VARIABLES: Temperature, pressure. EXPERIMENTAL VALUES: T/K $p^+/10^5$ Pa $p^*/10^5$ P 298.15 1.42 0 53.0 51.6 87.7 86.3 323.15 3.41 0 52.8 49.5 88.4 85.1 373.15 13.3 0 58.6 45.6 98.5 85.8 + total pressure * partial pressure * partial pressure Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. Ethanamine (Aminoethane) PREPARI	Bunsenges. Phys. Chem. <u>1978</u> , 82, 205. ED BY: C.L. Young. a $10^{4}x$ Mole fraction of hydrogen, $10^{4}x_{H_{2}}$ 0 164 267 0 193 319 0 283
Temperature, pressure.Temperature, pressure.EXPERIMENTAL VALUES: T/K $p^+/10^5$ Pa $p^*/10^5$ P298.151.420298.151.420323.153.41052.849.588.485.1373.1513.3058.645.698.585.8+ total pressure* partial pressure* partial pressureStatic cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details2. F	C.L. Young. a 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2} 0 164 267 0 193 319 0 283
T/K $p^+/10^5$ Pa $p^*/10^5$ P 298.15 1.42 0 298.15 1.42 0 323.15 3.41 0 52.8 49.5 88.4 85.1 373.15 13.3 0 58.6 45.6 98.5 85.8 + total pressure * * partial pressure * * partial pressure Source Static cell fitted with stirrer. Source After equilibrium established 1. N liquid sample withdrawn and analysed 2. F	of hydrogen, 10 ⁴ x _{H2} 0 164 267 0 193 319 0 283
53.0 51.6 87.7 86.3 323.15 3.41 0 52.8 49.5 88.4 85.1 373.15 13.3 0 58.6 45.6 98.5 85.8 + total pressure * * partial pressure * * partial pressure * METHOD /APPARATUS/PROCEDURE: SOURCE Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed 1. N 2. F Y	164 267 0 193 319 0 283
52.8 49.5 88.4 85.1 373.15 13.3 0 58.6 45.6 98.5 85.8 + total pressure * partial pressure * partial pressure METHOD /APPARATUS/PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. F	193 319 0 283
58.6 45.6 98.5 85.8 + total pressure * partial pressure METHOD / APPARATUS / PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. F	283
* partial pressure AUXILIARY INFORMA METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. F	
METHOD /APPARATUS / PROCEDURE: SOURCE Static cell fitted with stirrer. After equilibrium established 1. Nuliquid sample withdrawn and analysed by stripping out hydrogen. Details 2. F	
Static cell fitted with stirrer. After equilibrium established 1. N liquid sample withdrawn and analysed by stripping out hydrogen. Details 2. F	TION
13 63	AND PURITY OF MATERIALS: o details given luka AG sample, purity 99 per ent. TED ERROR: $C/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $C_{H_2} = \pm 2.0$ %. estimated by compiler) NCES:

...

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.		
<pre>2. 1, 2-Ethanediamine; C₂H₈N₂; [107-15-3]</pre>	Can. J. Chem. Engng. <u>1972</u> , 50, 355- 60.		
VARIABLES:	PREPARED BY:		
Temperature	C.L. Young		
EXPERIMENTAL VALUES:			
т/к	* 10 ⁴ x Mole fraction of hydrogen in liquid,10 ⁴ x _{H2}		
293.2 303.2	0.6567 0.7506		
* at a partial pressure			
DATA taken from	deposited document		
pressure of hyd	l pressure Solubil- Mole fract- rogen ity + ion of hydrogen		
T/ ^O C T/K P/atm P/atm	P/MPa x_{H_2}		
26.38 299.53 14.46 14.44 26.38 299.53 14.46 14.44 25.43 298.58 18.01 17.99 25.88 299.03 21.20 21.18 25.88 299.03 21.20 21.18 33.13 306.28 21.69 21.65 33.13 306.28 21.69 21.65 33.61 306.76 18.11 18.08 33.61 306.76 18.11 18.08 + Volume of hydrogen (cm ³), reduced 273.15k, dissolved by 1 gram of 1,	1.463 0.3849 0.01031 1.463 0.3845 0.01030 1.823 0.4735 0.01268 2.146 0.5613 0.01503 2.146 0.5670 0.01518 2.194 0.6355 0.01701 2.194 0.6338 0.01697 1.832 0.5250 0.01406 1.832 0.5263 0.01409 to 101.3kPa and 2-ethanediamine		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Recirculating flow apparatus fitted with magnetic pump. Amine saturated with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released collected in calibrated gas buret. Amount of amine determined gravi- metrically.	 Matheson sample, purity 99.999 mole per cent. Dried. Fischer Scientific sample purity 98.0 mole per cent. Dried. Fractionally distilled under vacuum. 		
· ·	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4\%.$		
	(estimated by compiler)		
	REFERENCES:		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.			
<pre>2. l,2-Ethanediamine, (l,2- Diaminoethane); C₂H₈N₂; [107-15-3]</pre>	Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82 <u>.</u> 798-805.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C.L. Young.			
EXPERIMENTAL VALUES:				
Т/К p ⁺ /10 ⁵ Ра р	[*] /10 ⁵ Pa 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H₂}			
298.15 0.02 53.4 73.7	0 0 53.3 38.51 73.7 52.8			
323.15 22.5 30.5 50.2 85.2	0 0 22.5 22.21 30.5 28.65 50.1 47.00 85.1 79.1			
373.15 0.56 30.3 57.6 80.7	0 0 29.7 46.36 57.1 87.5 80.2 120.8			
+ total pressure * partial pressure.				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	<pre>SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. BASF Aktiengesellschaft sample, purity 99 mole per cent. ESTIMATED ERROR:</pre>			
	REFERENCES :			

64/2 0/2 0/2 0/2 0/2 0/2 0/2 0/2 0/2 0/2 0	ARTAININ
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>	Moore, R.G.; Otto, F.D.
2. 1-Propanamine; C ₃ H ₉ N; [107-10-8]	Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.
VARIABLES: Temperature	PREPARED BY: C.L. Young
EXPERIMENTAL VALUES: T/K 10 hy	[*] x Mole fraction of [*] drogen in liquid, $10^{+}x_{H_{2}}$
203.2 213.2 223.2 233.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2 * Smoothed values q publication at a	1.299 1.462 1.636 1.822 2.020 2.228 2.446 2.675 2.912 3.158 3.412 uoted in original partial pressure of 101.31Pa. cont.
	INFORMATION
METHOD/APPARATUS/PROCEDURE: Recirculating flow apparatus fitted with magnetic pumps. Amine saturated with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released collect ed in calibrated gas buret. Amount of amine determined gravimetrically.	2. Eastman Organic Chemicals sample,
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4$ %. (estimated by compiler) REFERENCES:

COMPONENTS:			ORIGINAL MEASURE	MENTS:	
 Hydrogen; H₂; 	[1333-74-0]			G.; Otto,	
<pre>2. 1-Propanamine; [107-10-8]</pre>	C ₃ H ₉ N;		Can. J. C. 355-60.	hem. Engng	. <u>1972</u> , 50,
T/ ^O C T/K -24.61 248.54 -24.67 248.48 -24.67 248.48 -24.67 248.48 -24.67 248.48 -24.67 248.48 -23.29 249.66 -23.29 249.66 -23.34 249.81 -23.34 249.81 -23.34 249.81 -23.34 249.81 -23.34 249.81 -24.67 248.48 -61.79 211.36 -61.79 211.36 -61.42 211.73 -61.42 211.73 -62.01 211.14 -62.73 210.42 -67.92 205.23 -67.28 205.87 -36.28 236.87 -36.28 236.87 -36.28 236.87 -36.28 236.87 -36.28 236.87 -36.28 236.87 -36.28 236.99 -36.16 236.99 -36.16 236.99 -36.16 236.99 -36.16 236.99 -36.16 236.99 -36.16 236.99 -36.22 236.93 -27.20 245.95 0.11 273.04 0.03 273.12 0.03 273.12 0.03 273.12 21.87 251.28 Volume of hydroged by 1 gram of 1-pr	Total pressure P/atm 4.20 11.14 11.14 11.09 13.94 17.26 17.26 17.26 17.26 10.58 14.11 14.11 17.18 16.65 16.65 18.42 18.42 18.42 18.42 18.44 17.59 17.49 18.86 12.29 12.29 12.29 12.29 12.29 13.93 13.93 20.73 15.27 15.27 en (cm ³), rec	Partial of hydr P/atm 4.17 11.11 11.06 13.92 17.23 10.54 14.08 14.08 17.15 16.65 16.65 18.42 15.89 17.41 18.44 17.59 17.49 18.84 12.28 12.28 12.27 16.88 13.80 20.60 14.92 14.92	P/MPa 0.423 1.126 1.121 1.410 1.746 1.746 1.746 1.688 1.427 1.427 1.738 1.687 1.687 1.687 1.687 1.866 1.866 1.610 1.764 1.868 1.782 1.772 1.909 1.909 1.909 1.244 1.244 1.243 1.710 1.710 1.398 1.398 1.398 2.087 2.087 1.512 1.512	Solubil- ity + 0.3374 0.9211 0.9171 0.8955 1.1345 1.3981 1.3923 0.8584 0.8498 1.1386 1.1281 1.3885 1.3796 0.8949 0.9170 1.0095 1.0031 0.8717 0.9430 0.9300 0.8904 0.8841 1.3766 1.3811 0.8778 0.8791 0.8801 1.3431 1.3196 1.4063 1.4091 2.0965 2.1044 1.8117 1.8227	ion of hydrogen x_{H_2} 0.008891 0.02423 0.02413 0.02356 0.02983 0.03673 0.03658 0.02259 0.02236 0.02994 0.02966 0.03648 0.03625 0.02354 0.02412 0.02655 0.02638 0.02293 0.02481 0.02447 0.02343 0.022481 0.02447 0.02343 0.02326 0.03629 0.02309 0.02313 0.02316 0.03529 0.03468 0.03695 0.03702 0.03468 0.035519 0.04755 0.04784

COMPONENTS:	ORIGINAL MEASUREMENTS:			
<pre>l. Hydrogen; H₂; [1333-74-0]</pre>	Brunner, E.			
2. 1-Propanamine (Aminopropane) C ₃ H ₉ N; [107-10-8]	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C.L. Young.			
EXPERIMENTAL VALUES:				
т/К p ⁺ /10 ⁵ Ра р	*/10 ⁵ Pa 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2}			
298.15 0.41 28.7 49.5 86.7	0 0 28.3 95.3 49.1 167 86.3 287			
323.15 1.10 27.6 54.3 75.1	0 0 26.5 109 53.2 217 74.0 298			
373.15 4.91 19.3 51.5 73.7	0 0 14.4 84.8 46.7 270 69.0 394			
* partial pressure				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	 SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. BASF Aktiengesellschaft sample, purity 99.9 mole per cent. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0\%$ (estimated by compiler) REFERENCES:			

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94	Hydrogen and Deuterium	Solubilities abo	ove 200kPa		
COMPONENTS: 1. Hydrogen; H	2; [1333-74-0]	ORIGINAL MEAS Brunner,			
-	ne (2-Amino propane);	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES: Temperatu	ure, pressure	PREPARED BY: C.L. Young			
EXPERIMENTAL VALUES:	<u></u>	<u>l</u>			
т/к		0 [*] /10 ⁵ ₽a	10 ⁴ x Mole fraction of hydrogen, $10^4 x_{H_2}$		
298.15	0.78 10.1 19.0 43.7 73.7	0 9.32 18.3 43.1 72.9	0 35.9 70.9 163 278		
323.15	1.92 30.8 51.4 70.4 79.6	0 28.9 49.5 68.5 77.8	0 136 232 318 364		
373.15	7.54 40.7 55.6 73.0	0 34.4 48.3 65.8	0 247 350 469		
+ total y	pressure,				
* partia:	l pressure.				
		INFORMATION			
METHOD/APPARATUS/PRO	CEDURE :	1	URITY OF MATERIALS:		
After equilibri liquid sample w	ithdrawn and ipping out hydrogen.	2. BASF	etails given. Aktiengesellschaft sample, sy 99.5 mole per cent.		
		δx _{H2} ≈	ROR: = ± 0.1 ; $\delta p / MPa = \pm 0.01$; = ± 2.0 %. mated by compiler)		

CONDONENTE -	ART CINAL MELCURRENTS
COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.
<pre>2. 1, 2-Propanediamine; C₃H₁₀N₂; [78-90-0]</pre>	Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	
T/K l h	0 ⁴ x Mole fraction of * ydrogen in liquid, 10 ⁴ x _{H2}
243.2	0.7484
253.2	0.8475
263.2	0.9507
273.2	1.058 1.168
283.2 293.2	1.280
303.2	1.395
* at a partial pressure	of 101.3 kPa cont.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Recirculating flow apparatus fitted with magnetic pump. Amine saturated	1. Matheson sample, purity 99.999 mole per cent. Dried.
with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released collected in calibrated gas buret. Amount of amine determined gravi- metrically.	 Union Carbide sample, purity 97.8 mole per cent. Dried. Fractionally distilled under vacuum.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4\%.$
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4\%.$
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4$ %. (estimated by compiler)
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4$ %. (estimated by compiler)
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4$ %. (estimated by compiler)
	$\delta T/K = \pm 0.1; \ \delta x_{H_2} = \pm 4$ %. (estimated by compiler)

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.
2. 1, 2-Propanediamine; C ₃ H ₁₀ N ₂ ;	Can. J. Chem. Engng. <u>1972</u> , 50 355-60.

		Total pressure	Partial of hydro	pressure ogen	Solub- ility +	Mole fract- of hydrogen
т∕°с	T/K	P/atm	P/atm	P/MPa		<i>x</i> _{H₂}
-23.89	249.26	7.54	7.54	0.754	0.1811	0.005987
-24.14	249.01	10.44	10.44	1.058	0.2566	0.008479
-24.45	248.70	13.85	13.85	1.465	0.3456	0.01142
-24.78	248.37	13.79	13.79	1.397	0.3400	0.01123
-24.45	248.70	18.82	18.82	1,907	0.4610	0.01522
-17.06	256.09	17.56	17.56	1.779	0.4590	0.01516
-17.06	256.09	17.56	17.56	1.779	0.4585	0.01514
-18.41	254.74	16.00	16.00	1.621	0.4160	0.01374
-18.41	254.74	16.00	16.00	1.621	0.4189	0.01384
-12.08	261.07	13.17	13.17	1.334	0.3701	0.01222
0.11	273.26	16.65	16.65	1.687	0.5286	0.01745
0.11	273.26	16.65	16.65	1.687	0.5296	0.01748
- 0.43	272.72	18.16	18.15	1.839	0.5735	0.01893
- 0.43	272.72	18.16	18.15	1.839	0.5724	0.01889
10.74	290.89	13.27	13.27	1.345	0.4755	0.01570
10.74	290.89	13.27	13.27	1.345	0.4670	0.01542
10.41	290.56	17.18	17.18	1.741	0.6131	0.02024
10.41	290.56	17.18	17.18	1.741	0.6110	0.02017
10.56	290.71	18.48	18.48	1.872	0.6640	0.02191
10.56	290.71	18.48	18.48	1.872	0.6634	0.02189
10.36	290.51	17.71	17.70	1.793	0.6378	0.02105

DATA taken from deposited document

+ Volume of hydrogen (cm³) reduced to 101.3kPa and 273.15k, dissolved by 1 gram of amine

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.
2. 1,3-Diaminopropane, C ₃ H ₁₀ N ₂ [109-76-2]	; Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.
VARIABLES:	PREPARED BY:
Temperature, pressure	C.L. Young.
EXPERIMENTAL VALUES:	
T/K p ⁺ /10 ⁵ Pa	<pre>p[*]10⁵Pa 10⁴x Mole fraction</pre>
298.15 0.006 38.9 97.2	0 0 38.0 39.8 97.2 94.9
323.15 0.03 50.0 94.2	0 0 50.0 65.3 94.2 118.2
373.15 0.27 54.8 76.9	0 0 54.5 109.5 76.6 150.4
+ total pressure	
* partial pressure	
AU	CILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirrer After equilibrium established liquid sample withdrawn and and by stripping out hydrogen. Details in source.	

OMPONENTS :	······································	ORIGINAL MEA	ASUREMENTS:		
1. Hydrogen; H	2; [1333-74-0]	Brunner,	Ε.		
2. 1-Methylpyrrolidine; C ₅ H ₁₁ N; [120-94-5].		Ber. Buns. 798-805.	enges. Phys. Chem. <u>1978</u> , 82,		
ARIABLES: Temperatu	ure, pressure	PREPARED BY: C.L. Young			
XPERIMENTAL VALUES:		1	<u></u>		
		0 [*] /10 ⁵ Pa	10 ⁴ x Mole fraction of hydrogen, $10^4 x_{\rm H_2}$		
298.15	0.15 31.7 65.6 98.0	0 31.6 65.5 97.9	0 128.5 256 374		
323.15	0.40 30.3 59.7 99.2	0 29.9 59.3 98.8	0 141.5 269 439		
373.15	1.95 32.6 84.9	0 30.7 83.1	0 193.2 485		
+ total r	pressure				
	l pressure				
	AUXILIARY	INFORMATION			
1ETHOD/APPARATUS/PRO	OCEDURE:	SOURCE AND F	PURITY OF MATERIALS:		
After equilibri sample withdraw	ted with stirrer. um established liquid n and analysed by ydrogen. Details in	2. BASF purit	etails given. Aktiengesellschaft sample, ty 99 per cent 0.4 weight cent water.		
		δ <i>x</i> _{H₂}	= ±0.1; δp/MPa = ±0.01; = ±2.0%. .mated by compiler)		

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COMPONENTS:		ORIGINAL MEAS	SUDFWENTS .			
	; H ₂ ; [1333-74-0]		Brunner, E.			
	ine; C ₄ H ₉ N; [123-75-1]	<i>Ber. Buns</i> 798-805.	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82,			
VARIABLES:		PREPARED BY:				
Temperature, pressure		C.L. Young.				
EXPERIMENTAL VAL	.UES:					
T/K	p ⁺ /10 ⁵ Pa	p [*] /10⁵Pa	10^4 x Mole fraction of hydrogen, $10^4 x_{ m H_2}$			
298.15	0.08 45.3 102.7	0 45.2 102.6	0 95.5 207.4			
323.15	0.27 36.7 88.5	0 36.4 88.2	0 93.3 216.8			
373.15	1.53 42.0 93.4	0 40.5 91.9	0 151.5 327			
+ tot	al pressure					
* par	tial pressure					
	AUXILIAF	Y INFORMATION				
After equili liquid sampl	fitted with stirrer. brium established e withdrawn and analyse out hydrogen.	 No detail BASF All 	JRITY OF MATERIALS: ails given. ktiengesellschaft sample 99 mole per cent.			
		$\delta x_{\rm H_2} =$	ROR: = ±0.1; δp/MPa = ±0.01; = ±2.0%. nated by compiler)			

 Hydrogen; H₂; Biperidine (TOUTOTHUT LICH	SUREMENTS:		
_	[1333-74-0]	Brunner, E. Ber Bunsenges. Phys. Chem. <u>1978</u> , 82 798-805			
2. Piperidine, C	[sH ₁₁ N; [100−89−4]				
VARIABLES:		PREPARED BY:			
	re, pressure	TREFACED DI:	C.L. Young.		
EXPERIMENTAL VALUES:			······································		
т/к	P ⁺ /10 ⁵ Pa ₽	> [*] /10⁵Pa	10 ⁴ x Mole fraction of hydrogen, $10^{4}x_{H_{2}}$		
298.15	0.04 40.2 87.0	0 40.2 87.0	0 99.2 204		
323.15	0.14 45.4 98.2	0 45.3 98.1	0 136.7 283		
373.15	0.85 28.1 51.1	0 27.3 50.5	0 116.7 210.7		
			· · · · · · · · · · · · · · · · · · ·		
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROC		1	URITY OF MATERIALS:		
Static cell fitte After equilibriur	EDURE: ed with stirrer. a established chdrawn and analysed	SOURCE AND P	etails given. AG sample, purity 99 mole		

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.			
2. N,N-dimethyl-1,3-propanediamine, (1-Dimethylamino-3-propylamine); C ₅ H ₁ 4N ₂ ; [109-55-7].	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C.L. Young			
EXPERIMENTAL VALUES:				
т/к p ⁺ /10 ⁵ Ра р	//10 ⁵ Pa 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2}			
298.15 0.008 44.2 69.6 105.1	0 0 44.2 137.9 69.6 210 105.1 313			
323.15 0.04 56.5 82.9	0 0 56.5 208 82.9 299			
373.15 0.34 67.3 93.6 95.9	0 0 67.0 337 93.3 457 95.6 464			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Static cell fitted with stirrer.	1. No details given.			
After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	 BASF Aktiengesellschaft sample, purity 98 mole per cent. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01; \ \delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler)			
	REFERENCES :			

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.			
2. 1-Methylpiperidine; C ₆ H ₁ ₄ N ₂ ; [109-55-7]	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C.L. Young.			
EXPERIMENTAL VALUES:				
T/K p ⁺ /10 ⁵ Pa	$p^*/10^5$ Pa 10^4x Mole fraction of hydrogen, $10^4x_{H_2}$			
298.15 27.8 50.1 103.0	0 0 27.8 113 50.1 197 103.0 385			
323.15 0.17 29.6 53.4 98.9	0 0 29.4 136 53.2 240 98.7 422			
373.15 50.6 98.0	0 0 49.6 298 97.0 557			
+ total pressure.				
<pre>* partial pressure</pre>				
AUXILIARY METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	 No details given. Merck AG sample, purity 99 mole per cent. 	e		
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler) REFERENCES:			

COMPONENTS:		ORIGINAL MEAS	UREMENTS:			
	. [1222-74-0]					
		Brunner, E.				
2. N,N-Diethyles (Triethylami) [121-44-8]		Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.				
VARIABLES: Temperature	e, pressure.	PREPARED BY:	C.L. Young.			
EXPERIMENTAL VALUES:	<u></u>					
т/к	p ⁺ /10⁵Pa	p [*] /10⁵Pa	10^{4} x Mole fraction of hydrogen, $10^{4}x_{H_{2}}$			
293.15	0.09 34.1 52.8 93.8	0 34.0 52.7 93.7	0 199.5 308.0 535			
323.15	0.37 21.1 50.1 82.2	0 20.7 49.7 81.9	0 149.1 349.6 560			
373.15	1.40 26.9 94.5 98.8	0 25.5 93.2 97.5	0 230.9 798 836			
+ total pr	essure.					
* partial	pressure					
ME THOD / APPARATUS / PROC		INFORMATION	RITY OF MATERIALS:			
Static cell fitt		1. No deta	ils given.			
After equilibriu liquid sample wi analysed by stri Details in sourc	thdrawn and pping out hydrogen.	2. BASF Ak purity	tiengesellschaft sample 99.5 mole per cent.			
		$\delta x_{H_2} =$	$\pm 0.1; \delta p/MPa = \pm 0.01;$			
		REFERENCES:				

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504	Hydrogen and Deuterium	Coldbindes abo			
COMPONENTS:		ORIGINAL MEASUREMENTS:			
l. Hydrogen; H ₂	2; [1333-74-0]	Brunner, E.			
	iamine, (1,6- ne); C ₆ H ₁₆ N ₂ ;	Ber Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805			
VARIABLES:		PREPARED BY:			
Temperature	e, pressure		C.L. Young.		
EXPERIMENTAL VALUES	:	1			
т/к	p ⁺ /10 ⁵ Pa	p [*] /10 ⁵ ₽a	$10^{4}x$ Mole fraction of hydrogen, $10^{4}x_{H_{2}}$		
298.15	0.002 95.3 147.9 202.7 301.9	0 95.3 147.9 202.6 301.9	0 232.0 348.7 469.6 672		
323.15	0.009 49.4 147.9 301.9	0 49.4 147.9 301.9	0 144.1 425.8 810		
373.15	0.03 49.4 49.4 147.9 147.9 300.9	0 49.4 49.4 147.9 147.9 300.9	0 169.7 171.2 490.9 488.6 948		
+ total p	pressure.				
* partial	l pressure.				
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PRO	OCEDURE :	SOURCE AND PL	URITY OF MATERIALS:		
Static cell fit After equilibri	ted with stirrer. um established	1. No deta	ails given.		
liquid sample w by stripping ou Details in sour	thdrawn and analysed thydrogen.		ktiengesellschaft sample 99 mole per cent.		
		$\delta x_{H_2} =$	$\pm 0.1; \delta p/MPa = \pm 0.01;$		
		REFERENCES:			

COMPONENTS: 1. Hydroger		- 105-0				
T. UATOAEL	1; H ₂ ; [1333-74-0]		ORIGINAL MEASUREMENTS:			
	(; n ₂ ; [1333-74-0]	Br	unner, E.			
<pre>2. N-(3-aminopropyl)- 1,3-propane diamine),(Bis-(3-aminopropyl)- amine); C₆H₁₇N₃; [56-18-8]</pre>			Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES:			ARED BY:			
	ure, pressure	r KEr	C.L. Young			
EXPERIMENTAL VAL	LUES:	l				
т/к	p ⁺ /10 ⁵ Pa	p*/10 ⁵ Pa	$10^4 \times Mole$ fraction of hydrogen, $10^4 x_{H_2}$			
298.15	0.0004 61.0 97.4	0 61.0 97.4	0 91.0 143			
323.15	0.003 47.4 85.5	0 47.4 85.5	0 91.6 161			
373.15	0.008 42.1 99.5	0 42.1 99.5	0 120 267			
	* partial pr	essure.				
	Α					
		UXILIARY INFOR	MATION			
METHOD /APPARATUS						
After equilibliquid sample		r. 1. alysed 2.	MATION CE AND PURITY OF MATERIALS: No details given. BASF Aktiengesellschaft sample, purity 99.2 mole per cent.			

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]				
<pre>2. N,N-Dimethylcyclohexanamine, (Dimethylaminocyclohexane); C₈H₁₇N; [98-94-2]</pre>	Brunner, E. Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES :	PREPARED BY:			
Temperature, pressure	C.L. Young.			
EXPERIMENTAL VALUES:				
T/K p ⁺ /10 ⁵ Pa p	*/10 ⁵ Pa 10 [*] x Mole fraction of hydrogen, 10 [*] x _{H2}			
298.15 0.003 50.4 83.0	0 0 50.4 198 83.0 315			
323.15 0.01 41.6 79.4	0 0 41.6 190 79.4 351			
373.15 0.14 48.9 89.0	0 0 48.8 288 48.9 506			
+ total pressure				
* partial pressure.				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	 No details given. BASF Aktiengesellschaft sample, purity 98 mole per cent. 			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler) REFERENCES:			

i

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Brunner, E.			
<pre>2. N-Butyl-1-butanamine, (Dibutylamine); C₀H₁₉N; [111-92-2]</pre>	Ber. Bunsenges. Phys. Chem. <u>1978</u> , 82, 798-805.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C.L. Young.			
EXPERIMENTAL VALUES:				
т/к p ⁺ /10 ⁵ Ра р	[*] /10 ⁵ Pa 10 ⁴ x Mole fraction of hydrogen, 10 ⁴ x _{H2}			
298.15 0.004 39.9 72.7 92.3	0 0 39.9 219 72.7 388 92.3 487			
323.15 0.02 23.8 54.7 75.7	0 0 23.8 159 54.7 354 75.7 482			
373.15 0.19 20.7 50.2 83.9	0 0 20.5 179 50.0 421 83.8 681			
+ total pressure * partial pressure				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirrer. After equilibrium established liquid sample withdrawn and analysed by stripping out hydrogen. Details in source.	SOURCE AND PURITY OF MATERIALS: 1. No details given. 2. BASF Aktiengesellschaft sample, purity 98 mole per cent. ESTIMATED ERROR:			
	$\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$ $\delta x_{H_2} = \pm 2.0\%$ (estimated by compiler) REFERENCES:			

COMPONENTS:	ORIGINAL MEAS	IDEMENTS .			
1 Hudrogon, U. (1999 74 A)					
<pre>1. Hydrogen; H₂; [1333-74-0] 2. N-(2-aminoethyl)-N-</pre>	Brunner,	Brunner, E.			
(3-aminopropy1)-1,3-propane-		Ber. Bunsenges. Phys. Chem. 1978,			
diamine, (N,N-Bis-(3-amino- propyl)-ethylenediamine;C ₈ H ₂₂ N	82, 798-	805.			
[41240-13-5]					
VARIABLES:	PREPARED BY:				
Temperature, pressure.	c.	L. Young.			
EXPERIMENTAL VALUES:					
$T/K p^{+}/10^{5}Pa$	p [*] /10⁵Pa	10 ⁴ x Mole fraction			
		of hydrogen, $10^4 x_{H_2}$			
298.15 0.0001	0 31.5	0 55.0			
31.5 60.9	60.9	106			
91.5	91.5	157			
323.15 0.0001	0	0			
44.8	44.8	98			
87.3	87.3	189			
373.15 0.0007	0	0			
44.3	44.3 83.9	142 264			
	03.9	201			
+ total pressure.					
* partial pressure.					
AUXILI	ARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PL	JRITY OF MATERIALS;			
	1 · · · · · · · ·				
	1. No det				
Static cell fitted with stirrer.	uid	ails given.			
After equilibrium established liq sample withdrawn and analysed by	uid 2. BASF AN	ails given. ktiengesellschaft sample,			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF AN	ails given.			
After equilibrium established liq sample withdrawn and analysed by	uid 2. BASF AN	ails given. ktiengesellschaft sample,			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF AN	ails given. ktiengesellschaft sample,			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF AN	ails given. ktiengesellschaft sample,			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF AN	ails given. ktiengesellschaft sample,			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity	ails given. ktiengesellschaft sample, 98.2 mole per cent.			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF	ails given. ktiengesellschaft sample, 98.2 mole per cent. ROR:			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF &T/K =	ails given. ktiengesellschaft sample, 98.2 mole per cent. WOR: $\pm 0.1; \delta p/MPa = \pm 0.01;$			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERI $\delta T/K = \delta x_{H_2} =$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF $\delta T/K = \delta x_{H_2} = \delta x_{H_2} = \delta x_{H_2}$	ails given. ktiengesellschaft sample, 98.2 mole per cent. WOR: $\pm 0.1; \delta p/MPa = \pm 0.01;$			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERI $\delta T/K = \delta x_{H_2} =$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF $\delta T/K = \delta x_{H_2} = \delta x_{H_2} = \delta x_{H_2}$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF $\delta T/K = \delta x_{H_2} = \delta x_{H_2} = \delta x_{H_2}$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF $\delta T/K = \delta x_{H_2} = \delta x_{H_2} = \delta x_{H_2}$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			
After equilibrium established liq sample withdrawn and analysed by stripping out hydrogen. Details	uid 2. BASF Al purity ESTIMATED ERF $\delta T/K = \delta x_{H_2} = \delta x_{H_2} = \delta x_{H_2}$	<pre>ails given. ktiengesellschaft sample, 98.2 mole per cent. KOR: ±0.1; δp/MPa = ±0.01; ±2.0%.</pre>			

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Brunner, E.
<pre>2. N,N-Dibutyl-1-butanamine, (Tri-n-butylamine); C12H27 [102-82-9]</pre>	Ber. Bunsenges, Phys. Chem. 1978, 82,
VARIABLES:	PREPARED BY:
Temperature, pressure	C.L. Young.
EXPERIMENTAL VALUES:	
T/K p ⁺ /10 ⁵ Pa	$p^*/10^5$ Pa 10^4x Mole fraction of hydrogen, $10^4x_{H_2}$
298.15 0.0004 43.8 75.5 90.6	0 0 43.8 315 75.5 522 90.6 630
323.15 0.002 44.0 75.0	0 0 44.0 363 75.0 607
373.15 0.03 44.1 76.8	0 0 44.1 453 76.8 759
Al	JXILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE: Static cell fitted with stirre After equilibrium established liquid sample withdrawn and analysed by stripping out hydr Details in source.	estimated error: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01;$
	$\delta x_{H_2} = \pm 2.0\%.$ (estimated by compiler) REFERENCES:

00/00	0			lonter	AT 100 - 00		
COMPONENTS:				ORIGINAL MEASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] Quinoline; C₉H₇N; [91-22-5] 				Sebastian, H.M., Simnick, J.J.; Lin, H-M.; Chao, KC.			
			J. C	hem. Engng	. Data. 197	78, <i>23</i> ,305-8	
						<u></u>	
VARIABLES	5:			PREPAR	ED BY:		
Temperature, pressure			C.L. Young				
EXPERIMEN	TAL VALUES:	Mole fract	ion of			Mole frac	ction of
T/K	P/bar	hydrogen in		т/к	P/bar	hydroge	
		liquid, ^x H ₂	gas, ^Y H2			liquid, ^x H ₂	gas, ^y H2
·		H 2	11 2		an la milan al de anti-tra en an	п ₂	H 2
462.45	0.3156	0.0000		621.75		0.0000	0.0000
l	20.14 30.46	0.0072 0.0110	0.9845 0.9893		20.32 30.52	0.0097 0.0169	0.6029 0.7282
	50.65	0.0180	0.9930		50.65	0.0308	0.8278
	101.3 152.4	0.0359 0.0527	0.9963 0.9972		101.7 151.7	0.0652	0.9040
	202.7	0.0527	0.9972		201.9	0.0965 0.1290	0.9345 0.9465
	253.0	0.0857	0.9978		253.0	0.1532	0.9539
541.85	1.943	0.0000	0.0000	701.65	19.81	0.0000	0.0000
	20.27	0.0095	0.8959		30.66	0.0118	0.2607
	30.39 50.72	0.0147 0.0252	0.9277 0.9558		50.65 102.0	0.0332 0.0837	0.5107 0.7143
	100.99	0.0495	0.9757		151.3	0.1294	0.7939
	152.4	0.0730	0.9821		201.6	0.1708	0.8333
	202.7 253.0	0.0946 0.1160	0.9861 0.9878		252.7	0.2071	0.8634
			AUXILIARY	INFORM	ATION		
METHOD: /	APPARATUS/	PROCEDURE:		SOURCE	AND PURITY	OF MATERIALS	:
		th both lig					ninimum purity
		ntinually p e and then			99.95 mole per cent.		
cell in	which pha	ses separat	ed under	2. Fisher Scientific Co. sample, distilled over zinc under helium,			
		sample remo		purity better than 99 mole per cent.			
		d vapor sam position of					
found b	y strippin	g out gas a	nd estim-				
		olute volum metrically.					
ature m	easured wi	th thermoco	uple and				
		rdon gauge.					
					ATED ERROR:	- /1 -	
				δT/K	$= \pm 0.1; \delta$ = ± 0.001	$P/bar = \pm 0.$	5%; δx _{H2} ,
					$= \pm 0.001.$	compiler)	
					ENCES:	compiler,	
				1			

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Shakhova, S. F.; Zubchenko, Yu. P.;
2. 1-Methyl-2-pyrrolidinone,	Kaplan, L. K. <i>Khim. Prom.</i> <u>1973</u> , 49, 108-110.
(N-methylpyrrolidinone);	<i>49,</i> 108-110.
C₅H9NO; [872-50-4]	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	tion of hudroon
Mole frac T/K P/bar i	tion of hydrogen α [†] n liquid,
	w _{H2} vol/vol
	0.0079 1.84
	0.0088 2.06 0.0092 2.16
	0.0103 2.42
*	0.0114 2.67
20010	0.0142 3.35 0.0082 1.92
	0.0095 2.22
83.9	0.0108 2.52
	0.0129 3.02 0.0144 3.38
	0.0144 3.38 0.0156 3.67
130.4	0.0172 4.05
	0.0117 2.74
• • • • =	0.0122 2.87 0.0152 3.59
• • • •	0.0162 3.82
	0.0174 4.10
	0.0181 4.28 0.0214 5.07
<pre>⁺ quoted in original paper, appears t and ^p = 1 atmosphere adsorbed by un temperature.</pre>	
	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Mixture stirred by ball in rocking autoclave. Sample of liquid	 Dried and oxygen removed; purity 99.8 mole per cent.
analysed by a volumetric method. Details in source.	2. Distilled; purity 99.9 mole per
Securis in source.	cent determined by gas chromato- graphy.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1;$
	$\delta x_{\rm H_2} = \pm 5$ % (estimated by compiler).
	REFERENCES:
· · · · · · · · · · · · · · · · · · ·	

HAD + HH

COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] 1,5-Dimethyl-2-pyrrolidinone, (5-methyl-N-methylpyrrolidinone); 	Shakhova, S. F.; Zubchenko, Yu. P.; Kaplan, L. K. <i>Khim. Prom</i> . <u>1973</u> , 49, 108-110.
C ₆ H ₁₁ NO; [5075-92-3]	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	La
Mole fraction T/K ^P /bar of hydrogen in liquid, ^x H ₂	a [†] vol/vol
283.15 80.5 0.0128 94.1 0.0149 113.8 0.0178 298.15 76.5 0.0135	2.65 3.09 3.70 2.80
99.1 0.0169 127.5 0.0223 323.15 76.5 0.0158 95.7 0.0194 122.6 0.0257	3.51 4.66 3.28 4.04 5.37
temperature.	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Mixture stirred by ball in rocking autoclave. Sample of liquid analysed by a volumetric method. Details in source.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Dried and oxygen removed; purity 99.8 mole per cent. 2. Distilled; purity 99.3 mole per cent determined by gas chromatography. ESTIMATED ERROR:</pre>

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COMPONENTS:			ORIGINAL MEASUREMENTS:	,
1. Hydrogen; H ₂ ; [1333-74-0]		Shiau, J.F.; Ziegler, W.T.		
 Tetrafluoromethane, (Perfluoro- methane); CF₄; [75-73-0] 		J. Chem. Engng. Do 239-246.	ata. <u>1980</u> , 25,	
VARIABLES: Temperatu	ure, pressure	9	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES	S: P/atm	P/MPa	Mole fraction in liquid ^x H ₂	of hydrogen in vapor ^y H2
164.99	20.13 40.30 40.30 59.91 80.19 100.06 100.04 119.99	$\begin{array}{c} 2.0397 \\ 4.083 \\ 4.083 \\ 4.083 \\ 6.070 \\ 8.125 \\ 10.139 \\ 10.137 \\ 12.158 \end{array}$	0.01644 0.03545 0.03511 0.03517 0.05437 0.07115 0.08965 0.0998	- 0.8780 0.8788 0.8784 0.9059 0.91434 0.91985 0.92016 0.92332
149.98	20.05 40.30 59.76 80.04 100.06 120.06	2.0316 4.083 6.055 8.110 10.139 12.165	0.01433 0.02923 0.04377 0.05886 0.07011 0.08446	0.91299 0.94665 0.95667 0.96057 0.96259 0.96305
135.01	20.19 40.30 60.17 80.11 100.11 120.05	2.046 4.083 6.097 8.117 10.144 12.164	0.01198 0.02355 0.03399 0.04475 0.05578 0.06287	0.96946 0.98018 0.98324 0.98441 0.98466 0.98441
		AUXILIARY	INFORMATION	
METHOD APPARATUS / PI Single pass flo compartment equ Temperature mea resistance ther measured with B hydrogen bubble fluorocarbon. by gas chromato source and ref.	w apparatus ilibrium cel sured with p mometer; pre ourdon gauge d through li Samples anal graphy. Det	ll. platinum essure e. Pure iquid	REFERENCES: 1. Kirk, B.S.; Zi	purity 99.97 purs Inc. 99.9 mole $P/MPa = \pm 0.5\%$ $(1-y_{H_2}) = \pm 2.5\%$

<pre>COMPONENTS: L. Hydrogen; H₂; [1333-74-0] 2. Tetrafluoromethane, (Perfluoro- methane); CF₄; [75-73-0]</pre>		ORIGINAL MEASUREMENTS:		
		Shiau, J.F.; Ziegler, W.T.		
		J. Chem. Engng. Data. <u>1980</u> , 25, 239-246.		
XPERIMENTAL	VALUES:	<u> </u>		
т/к	P/atm	P/MPa	in liquid	n of hydrogen in vapor
			<i>x</i> _{H₂}	y_{H_2}
119.94	20.06	2.033	0.008981	0.991922
	40.01	4.054	0.01793	0.994517
	60.38 79.91	6.118 8.097	0.02576 0.03216	0.995034 0.995020
	100.08	10.141	0.03970	0.994854
	119.98	12.157	0.04657	0.994569
105.01	20.07 40.19	2.034	0.006356 0.01201	0.998655
	40.19 60.18	4.072	0.01704	0.998904 0.998905
	79.93	8,099	0.02179	0.998907
	99.99	10.131	0.02629	0.998716
	120.00	12.159	0.03048	0.998537
94.94	20.14 20.21	2.041 2.048	0.004676 0.004692	0.9996676 0.9996570
	20.09	2.040	0.004682	0.9996722
	40.37	4.090	0.008833	0.9997177
	60.17 80.04	6.097 8.110	0.01262 0.01572	0,9996845 0,9996921
	100.06	10.139	0.01846	0.9995534
	119.94	12.153	0.02136	0.9994568
	119.38 119.38	12.096 12.096	0.02114 0.02123	0.9994667 0.9994664
	119.30	12:090	0.02125	0.001001

L

COMPONENTS:			ORIGINAL MEASUREMENTS:	
	: H ₃ ; [1333-74 ifluoromethane		Shiau, J.F.; Zieg J. Chem. Engng. Do	1er, w.T. ata. 1980, 25, 239-
[75-72-9]		246.		
VARIABLES:			PREPARED BY:	
Temperatu	ire, pressure		C.L. Y	oung.
EXPERIMENTAL VAL	.UES:		Mala frantian	
т/к	P/atm	P/MPa	Mole fraction of in liquid, ^x H ₂	in vapor, ^y H2
219.99	20.20	2.047	0.01630	0.7883
219.99	20.20	2.094	0.01620	0.7850
	20.06	2.033	0.01616	0.7811
	39.90	4.043	0.03481	0.8758
	59.90 79.91	6.060 8.097	0.05340 0.07213	0.90199 0.91845
	99.98	10.130	0.08984	0.92646
	119.99	12.158	0.10487	0.93239
	119.99	12.158	0.10585	0.93267
205.03	20.20	2.047	0.01544	0.8872
	40.10	4.063	0.02213	0.93180
	59.90	6.069	0.04773	0.94861
	79.91 100.15	8.097 10.148	0.06412 0.07869	0.95539 0.95898
	120.02	12.161	0.09365	0.96117
189.97	20.09	2.036	0.01407	0.94449
200107	40.16	4.069	0.02920	0.96707
	59.76	6.055	0.04201	0.97460
	79.90	8.096	-	0.97710
	80.25 99.91	8.131 10.123	0.05480 0.06890	0.97724 0.97898
	119.98	12.157	0.08200	0.97976
		AUXILIARY	INFORMATION	<u></u>
METHOD /APPARATUS	/PROCEDURE :		SOURCE AND PURITY OF MA	TERIALS
	low apparatus quilibrium cel		 Airco sample, pu per cent. 	irity 99.97 mole
	easured with p			
	ermometer; pre		2. Du Pont de Nemou	
	Bourdon gauge		purity 99.9 mole	e per cent.
	led through li Samples anal			
gas chromatoo	raphy. Detail	ls in		
source and re				
			ESTIMATED ERROR:	
				$MD_{2} - +0 = 5$
			$\delta T/K = \pm 0.03; \ \delta I$ $\delta x_{H_2} = \pm 2.08; \ \delta I$	$(1-y_{H_2}) = \pm 3\%$
1			PEPEPENCING	
			REFERENCES:	
			1. Kirk, B.S.; Zie	egler, W.T.
			Adv. Cryogen.Er	<i>ug.</i> <u>1965</u> , <i>10</i> , 160.

<pre>COMPONENTS: 1. Hydrogen; H₂; [1333-74-0] 2. Chlorotrifluoromethane; CClF₃; [75-72-9]</pre>		ORIGINAL MEASUREMENTS:	
		Shiau, J.F.; Ziegler, W.T.	
		J. Chem. Engng. Data. <u>1980</u> , 2. 239-246.	
VALUES:	U U	L	
P/atm	P/MPa	Mole fraction of in liquid.	hydrogen in vapor,
·		w _{H₂}	y _{H2}
20.06	2.036	0.01212	0.97632
40.37	4.090	0.02448	0.98622
59.97	6.076	0.03647	0.98858
			0.98972
99.91 119.88	10.123 12.157	0.05716 0.06864	0.99026 0.990397
20.13	2.040	0.01055	0.992078
40.17	4.070		0.994890
59.77	6.056	0.03090	0.995764
79.63	8.069	0.03909	0.996097
100.05 119.99	10.138 12.158	0.04790 0.05681	0.996199 0.996087
20.26	2,053	0.008783	0.997836
40.23	4.076	0.01667	0.998583
59.97	6.076	0.02446	0.998700
	8.055	0.03182	0.998746
99.84 119.92	10.116 12.151	0.03889 0.04553	0.998704 0.998637
20.09	2.036	0.007477	0.999263
20.06	2.033	0.007453	0.999251
20.06	2.033	0.007382	0.999252
			0.999473
			0.999511 0.999497
99.84	10.116	0.03311	0.9994633
119.91	12.150	0.03894	0.999408
120.02	12.161	0.03894	0.999413
	ifluoromethan VALUES: P/atm 20.06 40.37 59.97 79.70 99.91 119.88 20.13 40.17 59.77 79.63 100.05 119.99 20.26 40.23 59.97 79.50 99.84 119.92 20.09 20.06 40.17 59.97 79.50 99.84 119.92 20.09 20.06 40.17 59.97 79.50 99.84 119.92 20.06 40.17 59.97 79.50 99.84 119.91	ifluoromethane; $CClF_3$; VALUES: P/atm $P/MPa20.06 2.03640.37 4.09059.97 6.07679.70 8.07699.91 10.123119.88 12.15720.13 2.04040.17 4.07059.77 6.05679.63 8.069100.05 10.138119.99 12.15820.26 2.05340.23 4.07659.97 6.07659.97 6.07659.97 6.07679.50 8.05599.84 10.116119.92 12.15120.09 2.03620.06 2.03340.17 4.07059.83 6.06279.63 8.06999.84 10.116119.91 12.150$	ifluoromethane; CClF3;J. Chem. Engng. 239-246.VALUES:Mole fraction of in liquid, x_{H_2} 20.062.0360.01212 40.3740.374.0900.02448 59.9759.976.0760.03647 79.709.9110.1230.05716 119.88119.8812.1570.0686420.132.0400.01055 40.1740.174.0700.02018 59.7759.776.0560.03090 79.6319.9912.1580.0568120.262.0530.008783 40.2340.234.0760.01667 59.9759.976.0760.02446 79.5020.062.0330.007783 40.2340.234.0760.01667 50.9720.092.0360.007477 20.0455320.092.0360.007477 20.0620.092.0360.007477 9.8420.092.0360.007453 20.0620.992.0360.007453 20.0620.992.0360.007453 20.0620.992.0360.02674 9.8499.8410.160.03311 119.9119.9112.1500.03894

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Hydrogen, H ₂ ; [1333-74-0]		Sebastian, H.M.; Simnick, J.J.; Lin, H.M.; Chao, K.C.		
2. Benzo [b] thio (Thianaphthene [95-15-8]	phene;); C _{\$} H ₆ S;	Can. J. Chem. Engng. <u>1978</u> , 56,743-6		
VARIABLES:		PREPARED BY:		
Temperature, pr	essure	C.L. Young		
EXPERIMENTAL VALUES:	N	Mole fraction of hydrogen		
Т/К		in liquid in gas ^w H ₂ ^y H ₂		
460.9	2.002 2.912 5.084 10.055 15.10 20.37 25.30	0.00760.97680.01130.98360.01970.99040.03720.99440.05460.99580.07140.99650.08640.9970		
541.1	0.2691* 2.020 3.085 5.030 10.042 15.23 20.34 25.33	0.00000.00000.00960.86260.01550.90700.02640.93840.05030.96530.07560.97500.09950.98010.12110.9835		
621.2	0.9825* 2.012 3.033 5.029 10.096 15.23	0.00000.00000.00820.50450.01650.66350.03130.79230.06700.88390.10120.9156		
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCED Flow apparatus with and gas components passing into a mix. into a cell in white ed under gravity. removed from botton Composition of sam stripping out gas volumetrically and metrically. Temper with thermocouple a measured with Bourd in ref. (1).	h both liquid continually ing tube and then ch phases separat- Liquid sample n of cell. ples found by and estimating solvent gravi- rature measured and pressure	<pre>SOURCE AND PURITY OF MATERIALS; 1. Air Products sample, minimum purity 99.95 mole per cent. 2. Aldrich sample, zone refined and colourless sections used combined with fraction obtained by distillation. ESTIMATED ERROR:</pre>		

<pre>COMPONENTS 1. Hydrogen, H₂; [1333-74-0] 2. Benzo [b] thiophene, (Thianaphthene); C₈H₆S; [95-15-8]</pre>		Sebastia Lin, H.M	L MEASUREMENTS an, H.M.; Simnick, J.J. M.; Chao, K.C. <i>Chem. Engng</i> . <u>1978</u> , 56,
EXPERIMENTAL VALUES: T/K	P/MPa	Mole fraction in liquid, ^{°°} H ₂	of hydrogen in gas, ^y H ₂
621.2	20.31 25.30	0.1307 0.1585	0.9330 0.9425
702.7	3.071 5.049 10.062 15.13 20.19 25.33	0.0087 0.0315 0.0861 0.1431 0.1836 0.2260	0.1834 0.4148 0.6565 0.7601 0.8060 0.8437
* vapor	pressure of p	ure thianaphthene.	

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1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS:
 Aydrogen; M₂; [1555 / 4 6] Tributyl phosphate; C₁₂H₂₇PO₄; [126-73-8] 	Shakhova, S. F.; Zubchenko, Yu. P.; Kaplan, L. K. <i>Khim. Prom.</i> <u>1973</u> , 49, 108-110.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction T/K P/bar of hydrogen in liquid, ^x H ₂	α [†] vol/vol
313.15 22.8 0.0171 42.3 0.0292 59.4 0.0403 83.1 0.0557 98.6 0.0649 104.8 0.0681 116.7 0.0769	1.50 2.59 3.62 5.08 5.98 6.29 7.17
temperature.	
AUXILIARY	INFORMATION
AUXILIARY METHOD /APPARATUS/PROCEDURE: Mixture stirred with ball in rocking autoclave. Sample of liquid analysed by a volumetric method. Details in source.	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Dried and oxygen removed, purity 99.8 mole per cent. 2. Analytical grade sample.

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COMPONENTS:	OPICINAL MEASUPENENTS.		
<pre>COMPONENTS: 1. Hydrogen; H₂; [1333-74-0] 2. Octamethylcyclotetrasiloxane; C₈H₂,0₄Si₄; [556-67-2]</pre>	ORIGINAL MEASUREMENTS: Cannon, P.; St. Pierre, L.E.; Miller, A.A. J. Chem. Engng. Data. <u>1960</u> , 5, 236.		
VARIABLES: Pressure	PREPARED BY: C.L. Young		
EXPERIMENTAL VALUES:			
Т/К р/МРа	Mole fraction of hydrogen in liquid		
303.5 0.77 1.55 2.14	0.058 0.115 0.161		
AUXILIARY	INFORMATION		
METHOD APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Automatic gravimetric sorption balance. Mass of hydrogen deter- mined directly. Correction for buoyancy made. Pressure measured with Bourdon gauge.	 No details given. Purified by distillation, no other details given. 		
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta p/MPa = \pm 0.01; \ \delta x = \pm 0.001$ (estimated by compiler)		
	REFERENCES :		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Frolich, P. K.; Tauch, E. J.;
	Hogan, J. J.; Peer, A. A.
2. Hydrocarbon Blend (Heavy naphtha)	Ind. Eng. Chem. 1931, 23, 548-550.
2. nyurocarbon Brena (neu.j meprena,	
l	
VARIABLES:	PREPARED BY:
Drogguro	C. L. Young
Pressure	C. 1. 100119
EXPERIMENTAL VALUES:	
T/K P/atm P/MP	a Solubility, S [*]
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
40 4.	
50 5.	
60 6.	
70 7.	
80 8.	
90 9. 100 10.	
120 12.	
130 13.	
140 14.	
150 15.3 160 16.3	
170 17.	
180 18.	
dissolved by unit volume of 1: conditions.	quid measured under the same
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
	The second of the second second
Static equilibrium cell. Liquid	1. Hydrogen was of the highest
-	
saturated with gas and after	purity available.
equilibrium established samples	
removed and analysed by volumetric	2. Density 0.8003 g cm ⁻³ , vapor
method. Allowance was made for	pressure 80 mmHg at 298.15 K.
vapor pressure of liquid and the	
solubility of the gas at atmospheric	
pressure. Details in source.	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta S = \pm 5\%.$
	REFERENCES:

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ORIGINAL MEASUREMENTS:
Frolich, P. K.; Tauch, E. J.; Hogan, J. J.; Peer, A. A.
Ind. Eng. Chem. <u>1931</u> , 23, 548-550.
PREPARED BY:
C. L. Young
a Solubility, S [*]
0 0.67 0 1.34 0 2.01 1 2.68 1 3.35 1 4.02 1 4.69 1 5.36 1 6.03 1 6.70 1 7.37 2 8.04 2 8.71 2 9.38 2 10.35 2 10.72 3 11.39 3 12.06
INFORMATION
SOURCE AND PURITY OF MATERIALS:
 Hydrogen was of the highest purity available. Density 0.8319 g cm⁻³, vapor pressure 2 mmHg at 298.15 K. ESTIMATED ERROR: δT/K = ±0.1; δS = ±5%. REFERENCES:

COMPONENTS:	<u></u>	ORIGINAL MEASUREMENTS:						
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Solvent Refined Coal Recycle Oil</pre>				Prather, J. W.; Ahangar, A. M.; Pitts, W. S.; Henley, J. P.; Tarrer, A. R.; Guln, J. A. Ind. Eng. Chem. Process. Des. Dev. 1977, 16, 267-270.				
VARIABLES:		PREPARED BY:						
Temperature, pressure				C. L. Young				
EXPERIMENT	L VALUES	:					<u> </u>	
т/к	P _{H₂} ∕psia	P _{H2} /MPa	Solubility, S (g of H ₂ /10 ⁺ g of oil)	т/к	P _{H₂} ∕psia	P _{H2} /MPa	Solubility, S (g of H ₂ /10 ⁴ g of oil)	
473.15	1104 1089 1051 2124 2084	7.61 7.51 7.25 14.64 14.37	11.59 10.74 10.88 19.72 19.29	573.15	1289 1974 1994 1979 2891	8.89 13.61 13.75 13.64 19.93	20.57 19.44 19.46	
573.15	2043 3130 2959 2845 639 614 599 1204	14.09 21.58 20.40 19.62 4.41 4.23 4.13 8.30	20.68 29.73 26.33 24.93 5.58 6.38 6.28 12.47	673.15	2899 2882 3170	19.99 19.87 21.86 7.62 7.23 12.55 12.12 15.80 15.63	27.78 28.90 34.23 15.86 16.50 26.30 26.51 35.36	
			AUXILIARY	INFORMATIO	N			
METHOD /APPARATUS / PROCEDURE : SOL					SOURCE AND PURITY OF MATERIALS:			
Stirred equilibrium cell of 1 U.S. gallon capacity. Pressure measured with Bourdon gauge and temperature with thermocouple. Samples of liquid and vapor analysed by volumetric methods and gas chromatography, respectively.				 Linde sample, purity 99.995 mole per cent. Wilsonville recycle solvent. Detailed description given in ref. (1). 				
				ESTIMATED ERROR: $\delta T/K = \pm 1$ %; $\delta S = \pm 4-6$ %.				
				REFERENCES: 1. S.R.C. Tech. Report No. 7. Analysis of Operations, Solvent Refined Coal Pilot Plant, Southern Services Inc. Wilsonville <u>1975</u> .				

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COMPONENTS:	ORIGINAL MEASUREMENTS:				
1. Hydrogen; H_2 ; [1333-74-0]	Prather, J. W.; Ahangar, A. M.; Pitts, W. S.; Henley, J. P.;				
2. Creosote Oil	Tarrer, A. R.; Guln, J. A. Ind. Eng. Chem. Process. Des. Dev. <u>1977</u> , 16, 267-270.				
VARIABLES: Temperature, pressure	PREPARED BY: C. L. Young				
EXPERIMENTAL VALUES:					
$\begin{array}{ccc} & & & & \\ & & P & P & Solubility, S \\ & & H_2 & H_2 & (g \text{ of } H_2/10^4 g \\ \hline T/K & /psia & /MPa & of oil) \end{array}$	P P Solubility, S H ₂ H ₂ (g of H ₂ /10 ⁴ g T/K /psia /MPa of oil)				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	473.15 2003 13.81 13.05 2007 13.84 14.08 2009 13.85 13.66 2507 17.29 17.20 2946 20.31 19.54 2999 20.68 19.80 573.15 506 3.49 3.7 526 3.63 3.95 986 6.80 8.06 1005 6.93 7.42 1025 7.07 7.62 1487 10.25 11.14 1504 10.37 11.73 1528 10.54 10.38 1987 13.70 15.83 2002 13.80 16.37 2496 17.21 19.74 2497 17.22 19.73 2945 20.31 23.21 2986 20.59 23.88 3060 21.10 22.25 673.15 385 2.65 4.32 390 2.69 3.60 448 3.09 3.68 (cont.)				
AUXILIARY	INFORMATION				
METHOD 'APPARATUS/PROCEDURE: Stirred equilibrium cell of 1 U.S. gallon capacity. Pressure measured with Bourdon gauge and temperature with thermocouple. Samples of liquid and vapor analysed by volumetric methods and gas chromatography, respectively.	<pre>Source AND PURITY OF MATERIALS: 1. Linde sample, purity 99.995 mole per cent. 2. Allied Chemical Co. sample 24-CB; boiling range 175 to 350 °C. Density at 293.15 K = 1.096 g cm⁻³. Detailed analysis in source. ESTIMATED ERROR:</pre>				

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Prather, J. W.; Ahangar, A. M.; Pitts, W. S.; Henley, J. P.;
2. Creosote Oil	Tarrer, A. R.; Guln, J. A. Ind. Eng. Chem. Process. Des. Dev. <u>1977</u> , 16, 267-270.

EXPERIMENTAL VALUES:

т/к	P _{H2} /psia	P _{H2} /MPa	Solubility, S (g of H ₂ /10 ⁺ g of oil)	т/к	P _{H₂} ∕psia	P _{H2} /MPa	Solubility, S (g of H ₂ /10 ⁴ g of oil)
673.15	850 864 865 1380 1388 1858 1858	5.86 5.96 5.96 9.51 9.57 12.81 12.87	8.45 8.24 7.55 13.08 14.22 18.61 17.23	673.15	1899 2387 2403 2420 2875 2892 2979	13.09 16.46 16.57 16.69 19.82 19.94 20.54	17.63 21.81 22.98 23.93 26.96 29.16 28.99

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COMPONENTS:		ORIGINAL MEASUREMENTS:
l. Hydrogen;	H ₂ ; [1333-74-0]	Grove, N.H.; Whiteley, F.J.; Woolmer, R.N.
		J. Appl. Chem. <u>1960</u> , 10, 101-109.
2. Santowax R;		
VARIABLES:		PREPARED BY:
Temperature, pro	essure	C. L. Young
		-
EXPERIMENTAL VALUES:		
T/K P/bar	Solubility [*] C	Ostwald coefficient
505 1.81	8.4	0.183
508 4.66 511 2.48	16.0 9.7	0.136 0.156
514 1.89	8.7	0.184
521 1.72 595 2.04	8.2 16.3	0.192 0.346
598 5.12	35.3	0.298
602 1.91 604 1.99	13.4 17.2	0.305 0.377
604 2.70	22.3	0.358
677 5.33 680 2.77	55.0 31.7	0.466 0.517
680 2.00 681 2.04	20.5 27.0	0.464
684 1.97	26.6	0.600 0.611
		·····
*		
moles of l	hydrogen per mg of San	towax R.
· <u>······</u> ····	ΔΙΙΧΤΙΤΑΡΥ	INFORMATION
METHOD /APPARATUS,		SOURCE AND PURITY OF MATERIALS:
Static cell with		1. No details given.
	ressure measured	j
with Bourdon gau measured with th		2. Analysis by infrared method showed sample to be 11.8%
placed in cell a	and gas added at room	o-terphenyl, 56.3% m-terphenyl,
temperature. (experimental ter	Cell then heated to mperature. Pressure	29.3% p-terphenyl, 2.6% diphenyl and higher polyphenyls. Obtained
on both sides of	f transducer kept	from Monsanto Chemicals Limited.
approximately equate source.	qual. Details in	
2002000		
l		ESTIMATED ERROR:
		$\delta T/K = \pm 1^{\circ}; \delta P/bar = \pm 0.01;$
		$\delta x_{\rm H_2} = \pm 10\%.$
		REFERENCES:
1		

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COMPONENTS:			ORIGINAL	MEASUREN	IENTS :	
l. Hydrogen; 2. Jojoba Oil	H ₂ ; [1333-	74-0]	} .	• •	Stein, S. Chem. Soc.	<u>1974</u> , <i>51</i> ,
VARIABLES:			PREPARED	BY:		
Temperature, p	ressure		с. г.	Young		
EXPERIMENTAL VALU	M	ole fraction	I		<u> </u>	[†] Mole fraction
T/K ^P /bar o		of hydrogen in liquid, ^x H ₂	т/к	<i>P/</i> bar	Kuenen	of hydrogen t, in liquid, ^x H ₂
323.15 7.6 13.8 20.7 27.6 34.5 41.4 48.3	0.44 0.84 1.21 1.61 2.00 2.41 2.78	0.0118 0.0222 0.0324 0.0417 0.0513 0.0611 0.0700	423.15 473.15	41.4 48.3 55.2	1.49	0.0776 0.0910 0.105 0.116 0.0212 0.0387 0.0562
55.2 373.15 7.6 13.8 20.7 27.6 34.5 41.4 40.2	3.18 0.56 1.06 1.50 2.00 2.51 3.00 3.49	0.0792 0.0150 0.0280 0.0400 0.0513 0.0635 0.0750	523.15	27.6 34.5 41.4 48.3 55.2 7.6 13.8 20.7	2.83 3.58 4.29 4.98 5.64 0.91 1.69 2.46	0.0711 0.0882 0.104 0.119 0.132 0.0240 0.0437 0.0624
48.3 55.2 423.15 7.6 13.8 20.7 27.6	3.97 0.68 1.28 1.88 2.50	0.0863 0.0970 0.0181 0.0333 0.0484 0.0634		27.6 34.5 41.4 48.3 55.2	3.23 4.01 4.80 5.58 6.37	0.0803 0.0979 0.115 0.131 0.147
[†] Reported in the jojoba c	source, calo	culated assu	ming a m	nolecula	ar weight o:	f 606 for
		AUXILIARY	INFORMATI	ION		
METHOD /APPARATU Static equilibr phase sample ar hydrogen to but pressure in a c	ium cell. alysed by al ble out at a	Liquid Llowing atmospheric	1. Pur 2. Pre	ity 99.	OF MATERIALS 9 mole per by crushing betails of c	cent. jojoba
				±0.5; -2%; ð	$\delta^P/\text{bar} = \pm 0$ $\delta^R_{\text{H}_2} = \pm 1 - 28$	
	·····					

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COMPONENTS:	······································	<u></u>		ORICI	NAT MEASUDEMENTS .		
		, [1333-74	4-01	ORIGINAL MEASUREMENTS: Trust, D.B.; Kurata, F.			
2. Carb	on Monox:	ide; CO;	[630-08-0]		. Inst. Chem. Engnrs. J. <u>1971</u> ,		
3. Prop	ane; C ₃ H	₈ ; [74-98-	-6]	17	, 86-91.		
VARIABLES:				PREP	ARED BY:		
Temp	erature,	pressure			C.L. Young.		
EXPERIMENTA	L VALUES:		compositio fractions	n	Vapor composition Mole fractions		
T/K	p/MPa	<i>x</i> _{H₂}	^x co	[∞] C₃H	$_{8}$ y H ₂ y CO y C ₃ H ₈		
		FT 2	0	C 311			
	<u> </u>						
223.15	3.447	0.0051	0.0724	0.922	5 0.1933 0.7830 0.0237		
223023	2.77/	0.0092		0.937			
		0.0164		0.964	5 0.7607 0.2253 0.0140		
	C 005	0.0180		0.970			
	6.895	0.0051 0.0107		0.826			
		0.0180	0.1052	0.876	8 0.3628 0.6132 0.0240		
		0.0300	0.0540	0.916	0 0.6625 0.3176 0.0199		
	13.790	0.0080		0.653			
		0.0081		0.660			
		0.0325 0.0525		0.840			
		0.0672	0.0411	0.891	7 0.8378 0.1477 0.0145		
273.15	3.447	0.0043		0.928			
		0.0134		0.946			
		0.0178 0.0222		0.9540			
	6.895	0.0222		0.876			
		0.0297	0.0774	0.8929	9 0.4295 0.4455 0.1250		
	1	0.0434		0.905			
	13.790	0.0530 0.0546		0.7494 0.7592			
		0.0546		0.7592			
			AUXILIARY	INFOR	MATION		
METHOD / APPA	ARATUS / PROC	CEDURE :		SOUR	CE AND PURITY OF MATERIALS:		
		um cell ((1.	Purity 99.93 mole per cent.		
		with magr ature meas		2.	Purity 99.79 mole per cent. Purity 99.91 mole per cent.		
			urea hermometer	3.	Furrey 33.31 more per cent.		
			irdon gauge				
Contents	charged	into cell	.,				
		amples wit		1			
		gas chroma e and ref.	tography.	1			
Decails	IN SOULC	e and rer.	(1).				
				ESTI	MATED ERROR:		
					$\delta T/K = \pm 0.05; \ \delta p/MPa = \pm 0.02; \ \delta x, \ \delta y = \pm 1-2\%.$		
					(estimated by compiler).		
				REFE	RENCES:		
				1.	Sinor, J.E.; Schindler, D.L.; Kurata, F.		
					Am. Inst. Chem. Engnrs. J. <u>1966</u> , 12, 353.		

COMPONEN	TS:				ORIGINAL	MEASUREM	ENTS:	
l. Hydr	ogen; H ₂ ;	; [1333-7	4-0]		Trust, D.B.; Kurata, F.			
2. Carb	on Monoxi	ide; CO;	[630-08-0	01	Am. Inst. Chem. Engnrs. J.			
3. Propane; C ₃ H ₈ ; [74-98-6]					<u>1971</u> , <i>17</i> ,	86-91.		
EXPERIME	NTAL VAL	JES: Liqu Mo	id composite fract	sitions ion		composit: fraction		
Т/К	p/MPa	^{<i>x</i>} H ₂	^x co	^ж С ₃ Н ₈	У _{Н2}	^y co	y _{C3H8}	
273.15	13.790	0.0670	0.1595	0.7735 0.8184 0.8130	0.4608	0.4709	0.0683	
- 323.15 3.447		0.0918 0.0047 0.0085 0.0094 0.0161	0.0366 0.0266 0.0259	0.8130 0.9587 0.9649 0.9647 0.9739	0.6372 0.0339 0.1595 0.1652 0.3152	0.2920 0.3363 0.2609 0.2389 0.1063	0.0708 0.6298 0.5796 0.5959 0.5785	
	6.895	0.0110 0.0260	0.1225 0.0867 0.0493	0.8665 0.8873 0.9077	0.0685 0.2298 0.4053	0.5072 0.4111 0.2389	0.4243 0.3591 0.3558	
	13.790	0.0697 0.1069		0.6812 0.7723	0.1589 0.3807	0.4203 0.2655	0.4208 0.3538	

....

COMPONENTS :	ORIGINAL MEASUREMENTS:				
1. Hydrogen; H ₂ ; [1333-74-0]	Cosway, H. F.; Katz, D. L.				
2. Nitrogen; N ₂ ; [7727-37-9]	Am. Inst. Chem. Engnrs. ^J .				
3. Methane; CH ₄ ; [74-82-8]	<u>1959</u> , 5, 46-50.				
VARIABLES:	PREPARED BY:				
Temperature, pressure, composition	C. L. Young				
EXPERIMENTAL VALUES:					
	Mole fractions in gas				
^{<i>x</i>} _{H₂} ^{<i>x</i>} _{N₂} ^{<i>x</i>} _{CH₄}	y _{H2} y _{N2} y _{CH4}				
T/K = 199.8 P/psia	= 500 P/MPa = 3.45				
0.0343 0.0000 0.9657	0.6392 0.0000 0.3608 ⁺				
0.0286 0.0998 0.8716 0.0155 0.2739 0.7106	0.4337 0.2191 0.3472 0.1677 0.5080 0.3243				
0.0155 0.2739 0.7106 0.00302 0.4176 0.5794	0.1677 0.5080 0.3243 0.0236 0.6793 0.2971,				
0.0000 0.4900 0.5100	0.0000 0.7300 0.2700				
0.0000 0.5090 0.4910	0.0000 0.7520 0.2480 ⁹				
T/K = 144.3 P/psia	= 1000 P/MPa = 6.89				
0.0781 0.0000 0.9219	0.7618 0.0000 0.2382^{+}				
0.0832 0.0000 0.9168 0.0826 0.0617 0.8557	0.7601 0.0000 0.2399 0.6735 0.0838 0.2427				
0.0849 0.1791 0.7360	0.5002 0.2377 0.2621				
0.0915 0.3733 0.5352	0.3130 0.4291 0.2579				
0.0932 0.3912 0.5156	0.3005 0.4413 0.2582				
A AAAAA A AAAAA					
0.0926 0.4137 0.4937 0.1157 0.5354 0.3489	0.2758 0.4637 0.2605				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take					
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am.	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33.				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am.	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.)				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS;				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE:	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS:				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS:				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1).	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: d 1 and 2. No details given.				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co.				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD 'APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co.				
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0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD 'APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample.				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD 'APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed.	en from Inst. Chem. Engnns. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR:				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta P/MPa = \pm 0.03;$				
 0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD 'APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room 	en from Inst. Chem. Engnns. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR:				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta P/MPa = \pm 0.03;$ $\delta x, \delta y = \pm 2$ % (estimated by compiler).				
 0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD 'APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room 	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta P/MPa = \pm 0.03;$ $\delta x, \delta y = \pm 2$ % (estimated by compiler). REFERENCES:				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta P/MPa = \pm 0.03;$ $\delta x, \delta y = \pm 2$ % (estimated by compiler).				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS; 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \ \delta P/MPa = \pm 0.03;$ $\delta x, \ \delta y = \pm 2$ % (estimated by compiler). REFERENCES: 1. Dodge, B. F.; Dunbar, A. K. J. Am. Chem. Soc. <u>1927</u> , 49, 591.				
0.1157 0.5354 0.3489 ⁺ Data quoted in original but take Benham, A. L.; Katz, D. L. Am. AUXILIAR METHOD APPARATUS/PROCEDURE: Recirculating vapor flow system based on that described in ref. (1). Details of present apparatus in source and ref. (2). Temperature measured with thermocouple. Pres- sure measured with Bourdon gauge. High pressure magnetic circulating pumo employed. Cell charged under pressure. Samples of each phase expanded to room temperature and pressure; analysed	en from Inst. Chem. Engnrs. J. <u>1957</u> , 3, 33. (cont.) Y INFORMATION SOURCE AND PURITY OF MATERIALS: 1 and 2. No details given. 3. Phillips Petroleum Co. sample. ESTIMATED ERROR: $\delta T/K = \pm 0.2; \ \delta P/MPa = \pm 0.03;$ $\delta x, \ \delta y = \pm 2$ % (estimated by compiler). REFERENCES: 1. Dodge, B. F.; Dunbar, A. K.				

l. Hydrogen; H ₂ ; [1333-74-0]	Cosway, H. F.; Katz, D. L.
2. Nitrogen; N ₂ ; [7727-37-9]	Am. Inst. Chem. Engnrs. J.
3. Methane; CH4; [74-82-8]	<u>1959</u> , 5, 46-50.
EXPERIMENTAL VALUES:	
* Data quoted in original but ta	kon from
Bloomer, O. T.; Parent, J. D.	Chem. Eng. Progr. Symposium Ser.
<u>1953</u> , No. 6, <i>49</i> , 11.	
5	
[§] Data quoted in original but ta	
Cines, M. R.; Roach, J. T.; Chem. Eng. Progr. Symposium Se	
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Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS:			ORIGINAL MEAS	UREMENTS:		
1. Hydroge	en; H ₂ ; [1333	-74-0]	Cosway, H.	F.; Katz, D. L.		
2. Methane	e; CH4; [74-8	2-8]	Am. Inst.	Chem. Engnrs. J.		
3. Ethane:	C ₂ H ₆ ; [74-8	4-01	1959, 5, 4	-		
,	02007 [770	,				
VARIABLES:	<u> </u>		PREPARED BY:			
Temperatur	e, pressure, c	omposition		C. L. Young		
10				••• =• =•		
EXPERIMENTAL	VALUES:					
Mole	e fractions in	liquid	Mol	e fractions in gas.		
$x_{\rm H_2}$	^x CH ₄	^x C ₂ H ₆	y _{H2}	^y CH ₄ ^y C ₂ H ₆		
	T/K = 199.8	P/p	sia = 500	P/MPa = 3.45		
0.0187 0.0133 0.0134	0.0000 0.2942 0.3255	0.9813 0.6925 0.6611	0.9166 0.4623 0.3940	0.4586 0.0791 0.5230 0.0830		
0.0120 0.0101 0.0000	0.3859 0.4325 0.6600	0.6021 0.5575 0.3400	0.3062 0.2308 0.0000	0.6153 0.0786 0.6913 0.0779 _* 0.9300 0.0700		
	T/K = 199.8		sia = 1000	P/MPa = 6.89		
0.0390 0.0382 0.0351 0.0400 0.0376	0.0000 0.0000 0.0441 0.1153 0.4957	0.9610 0.9618 0.9208 0.8447 0.4667	0.9476 0.9483 0.9325 0.8372 0.4579	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$		
	T/K = 144.3		sia = 500	P/MPa = 3.45		
0.0120 0.0167 0.0175 0.0327 0.0343	0.0000 0.5224 0.7608 0.9203 0.9637	0.9880 0.4609 0.2217 0.0470 0.0000	0.9969 0.8154 0.7412 0.6915 0.6392	$\begin{array}{ccc} 0.0000 & 0.0031^{\dagger} \\ 0.1819 & 0.00272 \\ 0.2572 & 0.00164 \\ 0.3080 & 0.0051_{\$} \\ 0.3608 & 0.0000^{\$} \end{array}$		
				(cont.)		
		AUXILIAR	INFORMATION			
METHOD APPAR	ATUS/PROCEDURE:			RITY OF MATERIALS:		
	ing vapor flow scribed in ref.	-	1 1. NO	details given.		
Details of	present appara	atus in	2 and 3	. Phillips Petroleum Co. sample.		
measured w	ith thermocoup	le. Pres-				
	red with Bourdo					
High press pump employ	ure magnetic ci ved	rculating				
	ed under pressu	ıre.	ESTIMATED ERR			
Samples of	each phase exp rature and pres	anded to	$\delta T/K = \pm 0.2; \delta P/MPa = \pm 0.03;$ $\delta x, \delta y = \pm 2$ % (estimated by compiler).			
-	y mass spectron		DEPENDING			
		-		B. F.; Dunbar, A. K. Chem. Soc. 1927, 49, 591.		
			2. Aroyan,	H. J.; Katz, D. L. g. Chem. <u>1951</u> , 43, 185.		

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	COMPONENTS :		ORIGINAL MEASUREMENTS:
I	 Hydrogen; H₂; 	[1333-74-0]	Cosway, H. F.; Katz, D. L.
	2. Methane; CH ₄ ;	[74-82-8]	Am. Inst. Chem. Engnrs. J.
	3. Ethane; C ₂ H ₆ ;	[74-84-0]	<u>1959</u> , 5, 46-50.
1			1

EXPERIMENTAL VALUES:

L			n liquid	nore	fractions	ru das
	^ж н2	^{<i>ж</i>} Сн ₄	$x_{C_2H_6}$	${}^{y}\mathrm{_{H_{2}}}$	$y_{CH_{4}}$	$y_{C_2H_6}$
		T/K = 144.3	3	<i>P</i> /psia = 500	P/MPa	= 6.89
	0.0225 0.0242 0.0296 0.0313 0.0487 0.0643 0.0643 0.0832 0.0781	0.0000 0.1115 0.3504 0.4081 0.7571 0.8732 0.9168 0.9219	0.9775 0.8643 0.6200 0.5607 0.1942 0.0625 0.0000 0.0000	0.9974 0.9710 0.9115 0.9009 0.8233 0.7929 0.7601 0.7618	0.0000 0.0266 0.0856 0.0968 0.1754 0.2065 0.2399 0.2382	0.0026 [†] 0.00231 0.00290 0.00136 0.00061 0.0000 ₅ 0.0000

- [†] Data quoted in original but taken from Williams, R. B.; Katz, D. L. Ind. Eng. Chem. <u>1954</u>, 46, 2512.
- * Data quoted in original but taken from Bloomer, O. T.; Gami, D. C.; Parent, J. D. Inst. Gas Tech. Res. Bull. 1953, 22, 1.
- S Data quoted in original but taken from Benham, A. L.; Katz, D. L. Am. Inst. Chem. Engnrs. J. <u>1957</u>, 3, 33.

Hydrogen and Deutenum	Solubilities above 200KPa				
COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Methane; CH ₄ ; [74-82-8]	ORIGINAL MEASUREMENTS: Cohen, A.E.; Hipkin, H.G.; Koppany, C.R.				
3. Ethane; C_2H_6 ; [74-84-0]	Chem. Eng. Prog. Symp. Ser. No. 81. <u>1967</u> , 63, 10-17.				
VARIABLES: Temperature, pressure, composition	PREPARED BY: C.L. Young				
EXPERIMENTAL VALUES: Liquid composition Mole fractions	Vapor compositions Mole fractions				
T/K $p/10^5$ Pa x_{H_2} x_{CH_4} x_{C_2}					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$				
AUXILIARY	INFORMATION				
METHOD APPARATUS/PROCEDURE: Equilibrium established in cell by recirculating vapor through external flow line at room temperature. Pressure measured with dead weight gauge. Temperature measured with platinum resistance thermometer. Liquid and vapor samples analysed by gas chromatography using thermal conductivity and flame ionisation detectors. Details in source and ref. (1).	<pre>SOURCE AND PURITY OF MATERIALS: 1. Air Reduction Corp. bone dry sample, purity 99.8 mole per cent or better. Dried. 2. High purity sample. Dried. 3. Matheson CP grade purity 99.0 mole per cent. Dried. ESTIMATED ERROR:</pre>				

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COMPONENT	rs:			ORIGINAL MEASUREMENTS:					
1. Hydro		[1333-74-	0]		Cohen, A Koppany,		in, H.G.;		
3. Ethar	ne; C_2H_6 ;	[74-82-0]			Chem. Eng. Prog. Symp. Ser. No. 81. <u>1967</u> , 63, 10-17.				
					No. 81.	<u>1967</u> , 63,	10-17.		
EXPERIMEN	NTAL VALUE	S: Liquid	composi fractio	tions	ions Vapor compositions Mole fractions				
T/K	p/10⁵Pa	^ж н ₂	^x CH ₄	^{<i>x</i>} С ₂ Н ₆	$y_{\rm H_2}$	^y CH ₄	^y C ₂ H ₂		
144.1 144.0	69.88 51.68	0.0340 0.0241	0.267 0.264	0.699 0.712	0.935 0.930	0.0633 0.0682	0.00196 0.00234		
144.1	34.39	0.0149	0.237	0.748	0.913	0.0852	0.00241		
144.1	15.07	0.00523	0.222	0.773	0.852	0.144	0.00420		
143.8	13.87	0.00604	0.0842 0.0806	0.910 0.911	0.936 0.972	0.0579 0.0261	0.00559 0.00248		
144.2	34.14 68.38	0.00777 0.0118	0.0744	0.914	0.983	0.0147			
144.1	136.2	0.0201	0.0729	0.907	0.988	0.00956	0.00199		
172.2	13.89	0.00620	0.207	0.787	0.561	0.404	0.0348		
172.2	34.28	0.0180	0.210	0.772 0.768	0.804 0.856	0.179 0.130	0.0170 0.0137		
172.2	51.62 69.94	0.0291 0.0385	0.203 0.187	0.768	0.889	0.0985	0.0119		
172.2	103.4	0.0584	0.162	0.780	0.919	0.0695	0.0114		
172.1	137.6	0.0630	0.163	0.774	0.943	0.0450	0.0115		
172.1	136.5 103.4	0.0712 0.0641	0.100 0.0982	0.829 0.838	0.953 0.951	0.0356 0.0378	0.0109 0.0112		
172.1	68.78	0.0388	0.0835	0.877	0.946	0.0417	0.0122		
172.0	51.64	0.0266	0.0725	0.901	0.941	0.0450	0.0140		
171.5	34.52	0.0180	0.0597	0.922	0.931	0.0513	0.0178 -		
172.2	14.89 35.67	0.0140 0.0222	0.0360 0.624	0.950 0.354	0.892 0.494	0.0717 0.492	0.0362 0.0141		
172.1	34.65	0.0194	0.527	0.454	0.569	0.415	0.0160		
172.1	52.63	0.0344	0.475	0.500	0.695	0.292	0.0126		
172.1	68.63	0.0448	0.471	0.484 0.517	0.743 0.800	0.246 0.188	0.0105 0.0122		
172.1 172.0	102.4 137.9	0.0660 0.0892	0.417 0.372	0.517	0.800	0.148	0.0117		
199.6	25.74	-	0.472	0.528	-	0.906	0.0940		
199.7	35.93	0.0122	0.444	0.544	0.222	0.696	0.0816		
199.7 199.7	42.71 56.32	0.0208 0.0197	0.391 0.338	0.588 0.642	0.308 0.453	0.585 0.487	0.107 0.060		
199.7	70.31	0.0480	0.416	0.536	0.530	0.416	0.0535		
199.8	84.44	0.203	0.469	0.328	0.582	0.365	0.0531		
199.8	87.22	0.0745	0.411	0.514	0.635	0.318	0.0471		
199.8	111.72 123.40	0.116 0.0827	0.411 0.368	0.473 0.549	0.657 0.689	0.294 0.264	0.0487 0.0469		
199.7	83.47	0.0475	0.323	0.630	0.653	0.296	0.0511		
199.8	61.73	0.0388	0.276	0.685	0.6351	0.305	0.0595		
199.8	48.21	0.0241	0.238	0.738 0.795	0.616 0.566	0.318 0.347	0.0656 0.0865		
199.8 240.5	34.99 125.5	0.0191 0.104	0.186 0.266	0.630	0.496	0.347	0.201		
240.5	110.7	0.0901	0.245	0.665	0.516	0.297	0.187		
240.5	96.53	0.0676	0.228	0.704	0.525	0.288	0.187		
240.5	82.74 69.44	0.0590 0.0415	0.210 0.178	0.731 0.781	0.496 0.454	0.300 0.310	0.204 0.236		
240.5	57.80	0.0348	0.164	0.801	0.432	0.306	0.262		
240.5	43.04	0.0202	0.110	0.870	0.390	0.294	0.316		
240.7	47.90	-	0.387	0.613 0.590	- 0.115	0.731 0.645	0.269 0.240		
240.7 240.5	57.76 69.97	0.0148 0.0348	0.395 0.348	0.590	0.115	0.645	0.208		
240.5	83.05	0.0560	0.346	0.598	0.289	0.486	0.225		
240.5	96.53	0.0766	0.320	0.603	0.342	0.438	0.220		
255.4	55.85	0.0222	0.136 0.130	0.842 0.829	0.301 0.389	0.298 0.253	0.401 0.358		
255.5 255.4	68.41 83.52	0.0405 0.0666	0.123	0.810	0.389	0.233	0.331		
255.4	104.8	0.0845	0.117	0.798	0.523	0.169	0.308		
255.4	43.04	-	0.267	0.733		0.568	0.432		
255.4 255.4	58.68 68.95	0.0173 0.0264	0.258 0.232	0.725 0.742	0.144 0.221	0.477 0.415	0.379 0.364		
255.4	48.14	-	0.286	0.714	-	0.529	0.471		

2. Metha	TS: $pgen; H_2;$ $ane; CH_4;$ $ne; C_2H_6;$	[74-82-8]]		ORIGINAL Cohen, A Koppany, <i>Chem. Eng</i> 81, <u>1967</u>	.E. Hipki C.R. g. Prog.	.n, H.G. Symp. Ser.	No.
EXPERIMEN	TAL VALUE		d compos e fractio			r composi le fracti		
T/K	<i>P/</i> 10⁵Pa	<i>x</i> _{H₂}	^{<i>x</i>} Сн ₄	[∞] C₂H ₆	y _{H2}	^y ch₄	^y c₂H ₆	
255.4	54.30 70.39 83.90 98.94 111.01	0.0088 0.0280 0.0595 0.1180 0.1020	0.250 0.288 0.300 0.315 0.266	0.741 0.684 0.640 0.567 0.632	0.177 0.248	0.559 0.469 0.406 0.362 0.339	0.375 0.354 0.346 0.311 0.319	

COMPONENTS	5:			ORIGINAL MEASUREMENTS:				
2. Met	rogen; H ₂ hane; CH ₄ ene; C ₂ H ₄	; [74-82-	-8]	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Engng. Japan <u>1972</u> , 5, 339-348.				
VARIABLES Tempera	: ture, pres	sure, comp	position	PREPARED C. L.				
EXPERIMEN	TAL VALUES:			<u> </u>				
т/к	P/bar	$x_{\rm H_2}$	^ж Сн 4	^{<i>x</i>} С ₂ Н ₄	${}^{\mathcal{Y}}\mathrm{_{H_{2}}}$	^y _{CH₄}	$y_{C_2H_4}$	
123.15	20.3	0.00698 0.00756 0.00930 0.0118	0.476	0.804 0.672 0.515 0.363	0.934 0.908 0.877 0.856	0.0633 0.0898 0.122 0.143	0.00243 0.00258 0.00111 0.00088	
	40.5	0.0177 0.0113 0.0131 0.0187 0.0254	0.309 0.493	0.157 0.795 0.678 0.489 0.344	0.842 0.959 0.944 0.923 0.914	0.157 0.0386 0.0541 0.0756 0.0850	0.00061 0.00202 0.00207 0.00104 0.00056	
	60.8	0.0346 0.0171 0.0170 0.0263 0.0328	0.193 0.326 0.501	0.152 0.790 0.657 0.473 0.337	0.896 0.965 0.954 0.937 0.931	0.104 0.0327 0.0450 0.0622 0.0687	0.00051 0.00193 0.00141 0.00051 0.00044	
	81.1	0.0504 0.0251 0.0321 0.0388 0.0527	0.803 0.193 0.384 0.491	0.147 0.782 0.584 0.470 0.331	0.911 0.970 0.953 0.943 0.937	0.0887 0.0283 0.0457 0.0559 0.0628	0.00060 0.00183 0.00083 0.00083 0.00083 0.00032	
148.15	20.3	0.0678 0.00828 0.00717 0.00722 0.0107 0.0124	0.178 0.280 0.382 0.518 0.668	0.150 0.814 0.713 0.611 0.471 0.319	0.922 0.799 0.725 0.657 0.570 0.493	0.0774 0.180 0.254 0.325 0.415 0.495	0.00030 0.0217 0.0212 0.0176 0.0147 0.0123	
		0.0149	0.856	0.129	0.400	0.594 (c	0.00655	
	PPARATUS/PF				ND PURITY OF		cample	
Static stainless steel cell of capa- city 5×10^5 mm ³ fitted with magnetic stirrer and sampling valves. Cell enclosed in cryostat. Temperature measured with thermocouple. Pressure measured using Bourdon gauge. Gases added to cell and equilibrated. Samples of liquid and gas withdrawn and analysed using a gas chromato- graph with thermal conductivity detector. Details in source.				 purity 99.99 mole per cent. Takachiho Chemical Industry Co. Ltd. sample, purity 99.9 mole per cent 				
				$= \pm 1\%.$	±0.1; δP, ^{δx} C _{2H4} , δι	$y_{H_2} = \pm 0.$	l; ^{δx} H ₂ , , ^{δy} C ₂ H ₄	
				REFERENCI	ES:			

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COMPONEN	ITS:			ORIGINAL MEASUREMENTS: Sagara, H.; Arai, Y.; Saito, S.					
L. Hydr	ogen; H ₂ ;	[1333-7	4-0]						
2. Meth	ane; CH ₄ ;	[74-82-	8]	J. Chem.	Engng. Ja	pan 1972	, 5,		
	ene; C_2H_4 ;	_		339-348.	•				
			-						
XPERIME	NTAL VALUE	S:							
Г/К	P/bar	<i>x</i> _{H₂}	^{<i>x</i>} Сн ,	^{<i>x</i>} С ₂ Н ₄	$y_{\rm H_2}$	^𝔥 CH₄	^y C ₂ H ₄		
148.15	40.5	0.0165	0.174	0.809	0.883	0.102	0.0155		
		0.0168	0.282	0.701	0.841	0.145	0.0148		
		0.0212	0.373	0.606	0.801	0.185 0.241	0.0143 0.0119		
		0.0249 0.0304	0.511 0.653	0.464 0.317	0.747 0.708	0.241	0.00915		
		0.0386	0.835	0.126	0.651	0.344	0.00479		
	60.8	0.0260	0.177	0.797	0.911	0.0767	0.0123		
		0.0278	0.280	0.692	0.877	0.133	0.0100		
		0.0333	0.368	0.599	0.847	0.142	0.0110		
		0.0369	0.508	0.456	0.810	0.181	0.00846		
		0.0436	0.649	0.307	0.772	0.221	0.00712 0.00320		
	81.1	0.0641 0.0332	0.815 0.169	0.121 0.798	0.729 0.926	0.268 0.0647	0.00905		
	01.1	0.0376	0.274	0.688	0.894	0.0957	0.00985		
		0.0437	0.368	0.589	0.871	0.121	0.00863		
		0.0502	0.498	0.452	0.842	0.151	0.00754		
		0.0638	0.631	0.305	0.804	0.189	0.00688		
		0.0924	0.789	0.118	0.746	0.232	0.00443		
173.15	20.3	0.00875	0.0886 0.260	0.903 0.731	0.752 0.491	0.168 0.429	0.0807 0.0800		
		0.00856 0.00808	0.200	0.592	0.329	0.600	0.0712		
		0.00811	0.403	0.589	0.317	0.611	0.0724		
		0.00439	0.599	0.397	0.131	0.808	0.0609		
	40.5	0.0188	0.0902	0.891	0.857	0.0941	0.0488		
		0.0197	0.251	0.729	0.711	0.243	0.0453		
		0.0237	0.389	0.587	0.607	0.346	0.0479		
		0.0271	0.602	0.371	0.449	0.514 0.585	0.0374 0.0286		
	60.8	0.0278 0.0314	0.712 0.0898	0.260 0.879	0.386 0.893	0.0696	0.0376		
	00.0	0.0328	0.250	0.718	0.787	0.178	0.0352		
		0.0391	0.376	0.585	0.699	0.263	0.0380		
		0.0482	0.581	0.371	0.585	0.384	0.0314		
		0.0522	0.687	0.260	0.520	0.452	0.0279		
	81.1	0.0418	0.0938	0.864	0.910	0.0579	0.0325		
		0.0465	0.243	0.710	0.820	0.147	0.0329		
		0.0557 0.0693	0.365 0.566	0.580 0.365	0.748 0.639	0.219 0.330	0.0334 0.0306		
		0.0693	0.566	0.257	0.839	0.330	0.0269		
.98.15	20.3	0.00988	0.0327	0.957	0.644	0.101	0.254		
		0.00843	0.0882	0.903	0.494	0.255	0.251		
		0.00589	0.155	0.839	0.314	0.437	0.248		
		0.00374	0.226	0.770	0.170	0.592	0.239		
	40 5	0.00318	0.236	0.761	0.141	0.626	0.233		
	40.5	0.0238	0.0912	0.885	0.700 0.705	0.160 0.147	0.140 0.149		
		0.0221 0.0227	0.0916 0.139	0.886 0.838	0.629	0.147	0.145		
		0.0198	0.312	0.669	0.400	0.468	0.132		
		0.0186	0.392	0.589	0.330	0.541	0.129		
		0.0116	0.576	0.413	0.145	0.741	0.114		
	60.8	0.0375	0.116	0.846	0.743	0.144	0.114		
		0.0379	0.286	0.676	0.569	0.320	0.111		
		0.0393	0.384	0.577	0.492	0.409	0.0999		
		0.0383	0.561	0.401	0.328	0.577	0.0956		
	01 1	0.0380	0.686	0.276	0.216	0.698	0.0861		
	81.1	0.0537	0.212 0.284	0.734 0.660	0.714 0.642	0.193 0.263	0.0932 0.0951		
		0.0564 0.0651	0.284	0.426	0.642	0.263	0.0934		
		0.0743	0.666	0.260	0.296	0.402	0.0874		
	20.2	0.00632	0.0329	0.961	0.309	0.136	0.555		
223.15	20.3								
223.15	20.3	0.00497	0.0519	0.943	0.227	0.208	0.565		

Сомро	NENTS:			ORIGINAL	MEASUREMI	ENTS:		
2. М	 Hydrogen; H₂; [1333-74-0] Methane; CH₄; [74-82-8] Ethene; C₂H₄; [74-85-1] 				Sagara, H.; Arai, Y.; Saito, S. J. Chem. Engng. Japan <u>1972</u> , 5, 339-348.			
EXPER	IMENTAL VALUE	5:						
т/к	P/bar	^ж н ₂	^{<i>x</i>} Сн ₄	^{<i>x</i>} C ₂ H ₄	y _{H2}	^y CH₄	y _{C2H4}	
223.1	5 40.5	0.0241 0.0204 0.0172 0.0131	0.0914 0.122 0.192 0.259	0.885 0.858 0.791 0.728	0.482 0.428 0.302 0.200	0.190 0.258 0.386 0.499	0.328 0.314 0.311 0.301	
248.1	5 30.4	0.00354 0.00392 0.00389	0.0332 0.0532 0.0498	0.961 0.943 0.946	0.115 0.0708 0.0775	0.106 0.166 0.157	0.780 0.763 0.766	
	40.5	0.00179 0.0168 0.0135 0.00600	0.0689 0.0498 0.0806 0.143	0.929 0.933 0.906 0.851	0.0333 0.233 0.174 0.0629	0.219 0.123 0.191 0.315	0.748 0.644 0.635 0.623	
^ж н ₂ ,	^x CH ₄ and ^x C ₂ H ₄	•	action of respective		methane	and ethene	in liquid	
^y H ₂ ,	^y CH ₄ and ^y C ₂ H ₄	+	action of respectiv		methane	and ethene	in gas [.]	
							i	
							:	
	<u> </u>							

COMPONENTS :				ORIGINAL MEASUREMENTS:					
1. Hydroge	en, H ₂ ;	[1337-74-0]]	Benha	m, A.L.;	Katz, D.L	•		
2. Methane	э; СНц;	[74-82-8]		Am. I	nst. Chem	. Engnrs.	J. <u>1957</u> ,3,		
		[115-07-1]	I	33-36		U	dedicate and		
J. L'Espoin	5, 03,	[110 01 1]							
VARIABLES:				PREPAREI) BY:				
	Compos	ition				. Young			
EXPERIMENTAL	L VALUES:		<u> </u>						
		Liquid Mole f	compositio fractions.	n	Vapor (Mole	composition fraction			
T/K	P/bar			æ	74	74	24		
		^ж н ₂	^x сн ₄	[∞] C₃H ₆	$y_{\rm H_2}$	^𝔥 CH₄	^y C ₃ H ₆		
		<u>.</u>		<u>n</u> _					
199.82	34.47	0.00728	0.5126 0.4115	0.4801	0.1493				
		0.00986 0.0136	0.4115 0.00	0.5786	0.2933 0.9872		0.0158 0.0128		
			AUXILIARY	INFORMAT	ION				
	,	PROCEDURE:			ND PURITY O				
		or flow sys 1. Temper		1. Purity better than 99.5 mole per cent; further purified to remove					
		rmocouple. don gauge.		water. 2. Purity better than 99.0 mole per					
recirculat	ed by hi		e magnetic						
Samples of	each ph		led to room						
spectromet		yseu by mas	5	water a	and higher	hydrocar	bons.		
				1					
				ESTIMATE	D ERROR:		58:		
				$\delta T/K =$	±0.6; δP/				
				$\delta T/K =$	±0.6; бР/ ^С СН ₄ ^{, бх} С₃Н		СН ₄ , ^{бу} С ₃ Н ₆		
				$\frac{\delta T/K}{\delta x_{H_2}} = \frac{\delta x_{H_2}}{\delta x_{H_2}}$	±0.6; δ <i>P/</i> [©] CH₄′ ^{δx} C₃H }				
				$\delta T/K = \delta x_{H_2}; \delta$	±0.6; δ <i>P/</i> [©] CH₄′ ^{δx} C₃H }	₁₆ , ^{δy} H ₂ , ^{δy} Katz, D.	[′] CH ₄ ^{, δy} C ₃ H ₆		
				$\delta T/K = \delta x_{H_2}; \delta$	±0.6; δ <i>P</i> / ^S CH ₄ / ^{δx} C ₃ E & ES: yan, H.J.;	₁₆ , ^{δy} H ₂ , ^{δy} Katz, D.	CH ₄ , ⁶ ^y C ₃ H ₆		
				$\delta T/K = \delta x_{H_2}; \delta$	±0.6; δ <i>P</i> / ^S CH ₄ / ^{δx} C ₃ E & ES: yan, H.J.;	₁₆ , ^{δy} H ₂ , ^{δy} Katz, D.	[′] CH ₄ ′ ^{δy} C ₃ H ₆		

COMPONENTS: 0.800000000000000000000000000000000000				1110001011000	organic i	10103		U	
2. Methane; CH., [74-82-8] Am. Inst. Chem. Engnrs. J. 1957, J. 3. Propane, C,He; [74-98-6] 33-36. VARIABLES: FREPARED BY: Temperature, pressure, composition C.L. Young EXPERIMENTAL VALUES: C.L. Young 1.1000 C.L. Young 255.37 34.47 0.0015 0.2583 0.00229 0.2357 0.7402 0.0398 0.8408 0.0017 0.2025 0.7610 0.0311 0.8408 0.1194 0.0013 0.1367 0.8296 0.2790 0.6670 0.1143 0.0131 0.1367 0.8290 0.5730 0.1366 0.9991 0.0131 0.1372 0.8690 0.4760 0.4337 0.1066 0.0131 0.1372 0.8690 0.5767 0.1434 0.0121 0.00643 0.4293 0.7738 0.6732 0.1140 0.00643 0.4233 0.5797 0.4377 0.1012 0.0131 0.1322 0.2140 0.7738 0.6732 0.0131 0.112 0.0663 0.4233 0.5794 0.3246	COMPONENTS:				ORIGINAL MEASUREMENTS:				
3. Propane, C ₃ H ₈ ; [74-99-6] 33-36. VARIABLES: Temperature, pressure, composition C.L. Young EXPERIMENTAL VALUES: Liquid composition C.L. Young 255.37 34.47 0.0015 0.2853 0.0029 0.2357 0.7402 0.0398 0.8408 255.37 34.47 0.0015 0.2853 0.7402 0.0391 0.8408 255.37 34.47 0.0015 0.2853 0.7402 0.0391 0.8408 0.1194 0.00717 0.2998 0.7830 0.1396 0.7329 0.1275 0.00907 0.1613 0.8296 0.2790 0.6070 0.1140 0.0111 0.1637 0.899 0.4576 0.4337 0.1067 0.0230 0.0000 0.977 0.9070 0.9070 0.1143 0.00645 0.4495 0.4977 0.4367 0.4343 0.0121 0.00645 0.4495 0.4977 0.4367 0.4343 0.0211 0.00645 0.4495 0.4977 0.4367 0.4343 0.0121 0.0012 0.2140 </td <td>l. Hydrog</td> <td>en; H₂;</td> <td>[1333-74-</td> <td>0]</td> <td colspan="4">Benham, A.L.; Katz, D.L.</td>	l. Hydrog	en; H ₂ ;	[1333-74-	0]	Benham, A.L.; Katz, D.L.				
3. Propane, C ₂ H ₆ ; [74-98-6] VARIABLES: Temperature, pressure, composition Liquid composition T/K P/Dar # _{H2} *CH, *C, H, *; [74-98-6] EXPERIMENTAL VALUES: Liquid composition T/K P/Dar # _{H2} *CH, *C, H, *C, H	2. Methan	e; CH ₄ ;	[74-82-8]				Engnrs.	J. <u>1957</u> ,3,	
Temperature, pressure, composition C.L. Young EXPERIMENTAL VALUES: Lignid composition Mole fraction Vapor composition Mole fraction T/K P/bar x _{H2} x _{CH4} F _{C3H2} Y _{H2} Y _{CH4} Y _{C3H2} 255.37 34.47 0.0015 0.2583 0.7402 0.0396 0.4408 0.1194 0.0017 0.2096 0.7830 0.1396 0.7229 0.1275 0.0017 0.2098 0.7830 0.1396 0.7239 0.1166 0.0131 0.1172 0.8220 0.3726 0.5237 0.1066 0.0131 0.1172 0.8930 0.4576 0.3137 0.1066 0.0230 0.0000 0.99770 0.9070 0.0000 0.0930 199.82 34.47 0.0000 6.620 0.380 0.3021 0.0122 0.0122 0.4493 0.7388 0.5872 0.3046 0.0092 0.0122 0.4493 0.7388 0.5872 0.3046 0.0012 0.0122 0.4497 0.4477 0.7421 0.0122 0.122 0.4409<	3. Propan	e, C₃H8;	[74-98-6]]	33-36	•			
Temperature, pressure, composition C.L. Young EXPERIMENTAL VALUES: Liquid composition Mole fraction Vapor composition Mole fraction T/K P/bar x _{H2} x _{CH4} Y _{H2} Y _{CH4} Y _{C3H2} 255.37 34.47 0.0015 0.2583 0.7402 0.0396 0.4408 0.1194 0.00717 0.2098 0.7830 0.1396 0.7229 0.1143 0.00717 0.2098 0.7830 0.1396 0.7239 0.1066 0.0131 0.1172 0.8220 0.3726 0.5337 0.1066 0.0131 0.1172 0.8230 0.5875 0.3166 0.1066 0.0131 0.1172 0.9070 0.0000 0.0591 0.0130 199.82 34.47 0.0000 0.6220 0.380 0.3021 0.0122 0.0122 0.0122 0.0455 0.4997 0.1435 0.8443 0.0121 0.00452 0.0122 0.0122 0.0122 0.0122 0.0122 0.0122 0.0114 0.00976 0.0143 0.0122 0.0122 0.0114 0.00976 0.0143									
EXPERIMENTAL VALUES: Liquid composition Mole fraction T/K P/bar x_{H_2} x_{CH_4} $x_{C_3H_6}$ y_{H_2} y_{CH_6} $y_{C_3H_6}$ 255.37 34.47 0.0015 0.2583 0.7402 0.0398 0.8408 0.1194 0.00230 0.2357 0.7610 0.0831 0.8026 0.1143 0.0017 0.2098 0.7830 0.1396 0.7329 0.1275 0.00297 0.1613 0.8296 0.2790 0.6070 0.1140 0.0113 0.1172 0.6998 0.4576 0.4337 0.1067 0.0131 0.1172 0.6998 0.4576 0.4337 0.1067 0.0100 0.0797 0.9103 0.5875 0.3166 0.0959 0.0230 0.0000 0.9770 0.9070 0.0000 0.9970 0.0230 0.0000 0.9770 0.9070 0.0000 0.0930 199.82 34.47 0.0000 0.620 0.380 0.0000 0.9970 0.0130 0.00645 0.4298 0.4536 0.2213 0.7673 0.0114 0.00663 0.4238 0.5694 0.2457 0.7421 0.0122 0.0116 0.0167 0.8277 0.6733 0.3104 0.0113 0.00645 0.4293 0.5594 0.2950 0.3925 0.0095 0.0122 0.2140 0.7738 0.6872 0.3046 0.0082 0.0126 0.01607 0.8277 0.6733 0.3104 0.0113 0.00789 0.0857 0.9062 0.9973 0.0000 0.0976 144.26 34.47 0.0086 0.0000 0.9914 0.999+ 0.0000 0.00976 144.26 34.47 0.0086 0.0000 0.9914 0.999+ 0.0000 0.0000 0.0285 0.0962 0.9573 0.0379 0.0048 0.0179 0.4367 0.5454 0.8340 0.1592 0.0068 0.0285 0.9062 0.9573 0.0379 0.0048 0.0179 0.4367 0.5454 0.8340 0.1592 0.0068 0.0245 0.9914 0.999+ 0.0000 0.0000 EXTHOD/APPARATUS/PROCEDURE: Recirculating vapor flow system measured with Hormorouple. Pressure measured with Hormorouple. Pressure measured with Hormorouple. Pressure measured with Hormorouple. Pressure measured with Hormorouple. Pressure Mather hurdrocators. 2. Purity better than 99.0 mole per cent; further purified to remove water vapor. ESTIMATED ERROR: $\delta T/K = \pm 0.061, \delta F/bar = \pm 0.581; \delta T_{H_2}, \delta T_{C_3H_2}, $	VARIABLES:	······································			PREPARED	BY:	·······	<u></u>	
$ \begin{array}{c c} \mbox{EXPERIMENTAL VALUES:} \\ \mbox{Liquid composition} \\ \mbox{Mole fraction} \\ $	Temperatu	re, pres	sure, com	position		C.L.	Young		
Liquid composition Mole fraction T/K P/bar π_{H_2} r_{CH_4} $r_{C_3H_6}$ y_{H_2} y_{CH_4} $y_{C_3H_6}$ 255.37 34.47 0.0015 0.2583 0.7402 0.0396 0.8408 0.1194 0.00329 0.2357 0.7610 0.0831 0.8026 0.1143 0.00717 0.2098 0.7330 0.1396 0.7329 0.1275 0.00907 0.1613 0.8296 0.2790 0.6670 0.1140 0.0131 0.1172 0.8698 0.4576 0.4337 0.1067 0.0100 0.0797 0.9030 0.5875 0.1366 0.0959 0.0230 0.0000 0.9770 0.9070 0.0000 0.0930 199.82 34.47 0.0000 0.620 0.380 0.0000 0.9870 0.0130 0.00452 0.4958 0.4997 0.1436 0.2121 0.00645 0.4499 0.5436 0.2213 0.7673 0.0114 0.00645 0.4499 0.5436 0.2213 0.7673 0.0122 0.0109 0.2493 0.7398 0.5694 0.3925 0.0095 144.26 34.47 0.0086 0.0000 0.9914 0.9992 0.0000 0.00976 144.26 34.47 0.0086 0.0000 0.9914 0.9999 0.0000 0.00976 144.26 34.47 0.0285 0.9052 0.9052 0.0005 0.0155 0.0000 0.9845 0.9902 0.0000 0.00976 144.26 34.47 0.0086 0.0000 0.9914 0.9994 0.0000 0.0007 0.0179 0.4367 0.5454 0.3340 0.1592 0.0068 0.0285 0.8707 0.1008 0.0343 0.9657 0.0000 0.6392 0.3608 0.0000 40XILIARY INFORMATION METHOD//APPARATUS/PROCEDURE: Recirculating vapor flow system measured with thermocouple. Pressure- measured with Bourdon gauge. Vapor recirculating vapor flow system measured with Bourdon gauge. Vapor measured with Bourdon gauge. Vapor METHOD//APPARATUS/PROCEDURE: Recirculating vapor flow system measured with Bourdon gauge. Vapor measured with Bourdon gauge. Vapor METHOD//APPARATUS/PROCEDURE: Recirculating vapor flow system measured with Bourdon gauge. Vapor measured with thermocupile pressure- measured with thermocupile pressure- measured with thermocupile pressure- measured with thermocupile pressure- measured with Bourdon gauge. Vapor METHODE (AND PURITY OF MATERIALS; 1. Purity better than 99.0 mole per cent; further purified to remove water and higher hydrocarbons. 2. Purity better than 99.0 mole per cent; further purified to remove water and higher hydrocarbons. 3. Purity better than 99.0 mole per cent; further purified to remove water dayor. ESTIMA									
Mole fractionMole fraction T/K P/bar π_{H_2} x_{CH_4} $x_{C_3H_4}$ y_{H_2} y_{C_4} $y_{C_3H_4}$ 255.3734.470.00150.25830.74020.03980.84080.11940.002190.23570.76100.08310.80260.11430.007170.20960.78300.13960.72290.12750.009070.16130.82960.27200.52080.10670.01310.13720.86980.45760.43370.10670.01000.07770.91030.55750.31660.05590.02300.00000.97700.90700.00000.0330199.8234.470.00000.6200.3800.00000.98700.06650.44990.54360.22130.76730.01140.066450.44990.54360.22130.76730.01210.066450.44990.54360.22130.76730.01220.01200.24930.73980.58900.39250.00950.01220.21400.73980.58900.30250.00920.01200.007990.68590.90620.57330.31440.01130.01550.00000.99440.99940.00000.00000.01790.43670.54540.31290.00680.02850.87070.10080.32920.36080.00000.02450.87070.10080.32920.36080.0000<	EXPERIMENTAL	VALUES:							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					on				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	т/к	P/bar	$x_{\rm H_2}$	^x CH ₄	^x C ₃ H _e	$y_{\rm H_2}$	y_{CH_4}	^y C _{3H8}	
$\begin{array}{c} 0.00452 & 0.4958 & 0.4997 & 0.1436 & 0.8443 & 0.0121 \\ 0.00645 & 0.4499 & 0.5436 & 0.2213 & 0.7673 & 0.0114 \\ 0.00683 & 0.4238 & 0.5694 & 0.2457 & 0.7421 & 0.0122 \\ 0.0109 & 0.2493 & 0.7398 & 0.5980 & 0.3925 & 0.0095 \\ 0.0122 & 0.2140 & 0.7738 & 0.6872 & 0.3046 & 0.0082 \\ 0.0116 & 0.1607 & 0.8277 & 0.6783 & 0.3104 & 0.0113 \\ 0.0155 & 0.0000 & 0.9914 & 0.9994 & 0.0000 & 0.00976 \\ 0.00789 & 0.0859 & 0.962 & 0.9573 & 0.0379 & 0.0048 \\ 0.0179 & 0.4367 & 0.5454 & 0.8340 & 0.1552 & 0.0068 \\ 0.0285 & 0.8707 & 0.1008 & - & - & - \\ 0.0343 & 0.9657 & 0.0000 & 0.6392 & 0.3608 & 0.0000 \\ \end{array}$	255.37	34.47	0.00329 0.00717 0.00907 0.0113 0.0131 0.0100	0.2357 0.2098 0.1613 0.1367 0.1172 0.0797	0.7610 0.7830 0.8296 0.8520 0.8698 0.9103	0.0831 0.1396 0.2790 0.3726 0.4576 0.5875	0.8026 0.7329 0.6070 0.5208 0.4337 0.3166	0.1143 0.1275 0.1140 0.1066 0.1087 0.0959	
$\begin{array}{c} 0.00789 0.0859 0.9062 0.9573 0.0379 0.0048 \\ 0.0179 0.4367 0.5454 0.8340 0.1592 0.0068 \\ 0.0285 0.8707 0.1008 - - - - - - - - - $	199.82	34.47	0.00452 0.00645 0.00683 0.0109 0.0122 0.0116	0.4958 0.4499 0.4238 0.2493 0.2140 0.1607	0.4997 0.5436 0.5694 0.7398 0.7738 0.8277	0.1436 0.2213 0.2457 0.5980 0.6872 0.6783	0.8443 0.7673 0.7421 0.3925 0.3046 0.3104	0.0121 0.0114 0.0122 0.0095 0.0082 0.0113	
METHOD:/APPARATUS/PROCEDURE: Recirculating vapor flow system described in ref. 1. Temperature measured with thermocouple. Pressure neasured with Bourdon gauge. Vapor recirculated by high pressure magnetic pump. Cell charged under pressure. Samples of each phase expanded to room pressure and analysed by mass spectro- meter. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \ \delta P/bar = \pm 0.5\%;$ $\delta x_{H_2}, \delta x_{C_3H_8}, \delta y_{H_2}, \delta y_{C_3H_8}, \delta $	144.26	34.47	0.00789 0.0179 0.0285	0.0859 0.4367 0.8707	0.9062 0.5454 0.1008	0.9573 0.8340	0.0379 0.1592 -	0.0048 0.0068 -	
Recirculating vapor flow system described in ref. 1. Temperature measured with thermocouple. Pressure measured with Bourdon gauge. Vapor recirculated by high pressure magnetic pump. Cell charged under pressure. Samples of each phase expanded to room pressure and analysed by mass spectro- meter. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \ \delta P/bar = \pm 0.58;$ $\delta x_{H_2}, \delta x_{C_3H_8}, \delta y_{H_2}, \delta y_{C_4}, \delta y_{C_3H_8}'$ $= \pm 0.58.$ REFERENCES: 1. Aroyan, H.J.; Katz, D.L.			<u></u>	AUXILIARY	INFORMATI	ION			
	Recirculati described i measured wi measured wi recirculate pump. Cell Samples of pressure ar	ing vapo in ref. ith ther ith Boun ed by hi l charge each ph	r flow sys 1. Temper mocouple. cdon gauge gh pressur d under pr ase expand	ature Pressure • Vapor • magnetic • essure. • ed to room	1. Puri cent; f and hig 2. Puri cent; f vapor. 3. Puri cent; f vapor. ESTIMATE $\delta T/K =$ $\delta x_{H_2}, \delta x$ $= \pm 0.5$ % REFERENC 1. Aro	ty better urther pu ther hydro ty better urther pu ty better urther pu D ERROR: ±0.06; δP CH ₄ , δx C ₃ H ES: yan, H.J.	<pre>than 99. rified to carbons. than 99. rified to than 99. rified to /bar = ±0 ,^{δy}H₂,^{δy} ; Katz, D</pre>	<pre>5 mole per o remove wate 0 mole per o remove wate 0 mole per o remove wate .5%; CH₄ ^{, &y}C₃H₈ ' .L.</pre>	

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Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS ORIGINAL MEASUREMENTS 1. Hydrogen; H₂; [1333-74-0] Benham, A.L.; Katz, D.L.; 2. Methane; CH₄; [74-82-8] Am. Inst. Chem. Engnrs. J., 1957, 3, 33-36 3. Propane; C₃H₈; [74-98-6] EXPERIMENTAL VALUES: Liquid composition Vapor composition Mole fractions Mole fractions T/K P/bar $x_{\rm H_2}$ ^{*x*}СзН8 y_{H_2} $y_{\mathbf{C}_{3}\mathbf{H}_{8}}$ ^xCH₄ ^yCF_L 255.37 68.95 0.0000 0.5300 0.4700 0.0000 0.9030 0.0970 0.3277 0.0202 0.6521 0.2554 0.6609 0.0837 0.0267 0.2570 0.7163 0.4549 0.4777 0.0674 0.4578 0.0275 0.2430 0.7295 0.4689 0.0733 0.0309 0.1790 0.7901 0.5895 0.3457 0.0648 0.2657 0.0379 0.1303 0.8318 0.6657 0.0686 0.0475 0.0000 0.9525 0.9408 0.0000 0.0592 199.82 68.95 0.0302 0.0000 0.9698 0.9931 0.0000 0.0069 0.0276 0.1470 0.8254 0.8562 0.1339 0.0099 0.0327 0.3428 0.6245 0.6182 0.3681 0.0137 0.0327 0.4637 0.5036 0.0366 0.5844 0.3790 0.4323 0.5301 0.0376 144.26 68.95 0.0000 0.999+ 0.0000 0.0163 0.9837 0.0000 0.0179 0.9900 0.0063 0.1014 0.8807 0.0037 0.5593 0.0300 0.4107 0.8770 0.1204 0.0026 0.0296 0.5784 0.3920 0.8770 0.1204 0.0026 0.0312 0.8666

0.3774

0.1281

0.0000

0.8008

0.7618

0.5914

0.8122

0.9219

0.0597

0.0781

0.1307

0.1961

0.2382

0.0027

0.0031

0.0000

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COMPONENTS	:			ORIGINAL MEASUREMENTS:				
	cogen; H ₂	; [1333-7	4-01	}	, H.; Arai		to.S.	
-		; [74-85-		-	m. Engng. J			
		; [74-84-		339-34		<u></u>		
J. ETHE	$1ne; C_2n_6$; [/4-04-	0]					
VARIABLES				PREPARED		·		
	-		acition	C. L.				
Temperat	ure, pres	sure, compo	SILION		Toung			
EVDEDTVEN	TAL VALUES:			L				
T/K	P/bar	~	m and a second se	r	1/	11	27	
1/1	17Dar	^ж н ₂	^{<i>x</i>} С ₂ Н ₄	^{<i>x</i>} C ₂ H ₆	^y _{H₂}	^y C ₂ H ₄	y _{C2H6}	
148.15	20.3	0.00621	0.220	0.774	0.983	0.00640	0.0104	
140.13	20.5	0.00675	0.423	0.570	0.981	0.0112	0.00802	
1		0.00597	0.432	0.562	0.980	0.0126	0.00782	
		0.00587	0.636	0.358	0.977 0.975	0.0174 0.0195	0.00576	
		0.00736 0.00642	0.704 0.704	0.288	0.975	0.0195	0.00510 0.00396	
	40.5	0.0123	0.220	0.768	0.990	0.00393	0.00651	
		0.0123	0.222	0.766	0.990	0.00394	0.00625	
		0.0121	0.439	0.549	0.988	0.00752	0.00455	
		0.0129	0.424 0.637	0.564	0.987 0.986	0.00785 0.0107	0.00472 0.00332	
		0.0132 0.0116	0.693	0.296	0.985	0.0115	0.00318	
	60.8	0.0162	0.219	0.765	0.993	0.00310	0.00425	
		0.0160	0.434	0.550	0.990	0.00606	0.00408	
		0.0163	0.639	0.345	0.990	0.00819	0.00232	
	81.1	0.0162 0.0229	0.693 0.218	0.291 0.759	0.989 0.994	0.00848 0.00266	0.00227 0.00355	
	01.1	0.0269		0.547	0.993	0.00445	0.00266	
		0.0205		0.350	0.990	0.00778	0.00252	
		0.0256	0.686	0.288	0.991	0.00785	0.00159	
173.15	20.3	0.00816		0.768 0.536	0.954 0.943	0.0218 0.0394	0.0240 0.0179	
		0.00922 0.00919		0.383	0.933	0.0526	0.0143	
		0.00896	0.710	0.281	0.932	0.0577	0.0108	
		0.00800	0.764	0.229	0.931	0.0604	0.00904	
						(cont.)	
			AUXILIARY	INFORMAT	ION			
METHOD/AP	PARATUS/P	ROCEDURE:		SOURCE AND PURITY OF MATERIALS:				
Static s city 5 x	tainless	steel cell fitted with	of capa- magnetic	 Nippon Sanso Co. Ltd. sample, purity 99.99 nole per cent. 				
stirrer	and sampl:	ing valves.	Cell		kachiho Cher			
	in cryos with the	rat. Temp rmocouple.	erature Pressure	sai	mple, purity	y 99.5 mol	e per cent.	
measured	with Bou	rdon gauge.			kachiho Cher			
		equilibrat		sai	mple, purity	y 99.7 mol	e per cent.	
		and gas wi g a gas chr						
		l conductiv						
		ls in sourc		1				
				ESTIMATE	D ERROR:			
					±0.1; δP/1	$ar = \pm 0.1$; δ <i>x</i> , ,	
				δx	, δx _{C2H6} , δι		; δx_{H_2} , $\delta y_{C_2H_2}$	
				$= \pm 18.$	~2116	₂ C ₂ n	4 0246	
				REFERENC	CES:			
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				ł				
				1				
				l				

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COMPONEN	ITS:			ORIGINAL	MEASUREN	1ENTS:	
2. Ethe	rogen; H_2 ene; C_2H_4 ine; C_2H_6	; [74-85-	1]	Sagara, H.; Arai, Y.; Saito, S. J. Chem. Engng. Japan <u>1972</u> , 5, 339-348.			
EXPERIME	NTAL VALU	ES:					
т/к	P/bar	$x_{\rm H_2}$	^{<i>x</i>} С ₂ Н ₄	$x_{C_2H_6}$	${}^{\mathcal{Y}}\mathrm{_{H_{2}}}$	^{<i>y</i>} C ₂ H ₄	$y_{C_2H_6}$
173.15	40.5	0.0148 0.0163 0.0158 0.0155	0.219 0.457 0.606 0.705	0.767 0.526 0.378 0.280	0.972 0.965 0.960 0.962	0.0120 0.0230 0.0310 0.0315	0.0159 0.0117 0.00950 0.00676
	60.8	0.0154 0.0256 0.0241 0.0265	0.753 0.215 0.454 0.600	0.231 0.759 0.522 0.374	0.960 0.978 0.972 0.970	0.0344 0.00934 0.0180 0.0231	0.00579
	81.1	0.0253 0.0281 0.0330 0.0352 0.0341	0.702 0.741 0.217 0.449 0.597	0.273 0.231 0.750 0.516 0.369	0.969 0.968 0.980 0.975 0.974	0.0257 0.0272 0.00806 0.0161 0.0200	0.00848 0.00624
198.15	20.3	0.0334 0.0350 0.0106 0.0102 0.00970 0.0104	0.694 0.732 0.161 0.265 0.494 0.501	0.273 0.233 0.829 0.725 0.497 0.482	0.973 0.973 0.852 0.843 0.816 0.805	0.0222 0.0231 0.0480 0.0717 0.124 0.132	0.00467 0.00398 0.100 0.0852 0.0604 0.0631
	40.5	0.0104 0.0100 0.0221 0.0214 0.0205 0.0217	0.615 0.703 0.160 0.261 0.501 0.501	0.375 0.287 0.818 0.718 0.478 0.477	0.787 0.764 0.913 0.902 0.888 0.888	0.161 0.191 0.0274 0.0428 0.0734 0.0742	0.0517 0.0453 0.0592 0.0557 0.0388 0.0376
	60.8	0.0210 0.0215 0.0320 0.0320 0.0349 0.0318	0.608 0.691 0.158 0.264 0.487 0.488	0.371 0.288 0.810 0.704 0.479 0.480	0.879 0.872 0.935 0.930 0.914 0.917	0.0910 0.103 0.0201 0.0302 0.0559 0.0544	0.0303 0.0256 0.0453 0.0395 0.0303 0.0286
	81.1	0.0351 0.0351 0.0332 0.0449 0.0437 0.0449 0.0457 0.0488	0.488 0.603 0.683 0.160 0.260 0.479 0.479 0.592	0.480 0.362 0.284 0.795 0.697 0.476 0.474 0.359	0.917 0.908 0.898 0.944 0.940 0.928 0.932 0.922	0.0344 0.0677 0.0811 0.0164 0.0250 0.0469 0.0455 0.0573	0.0240 0.0210 0.0397 0.0347 0.0251 0.0226 0.0208
223.15	20.3	0.0472 0.0105 0.0103 0.00947	0.671 0.223 0.328 0.524	0.282 0.767 0.662 0.466	0.917 0.575 0.542 0.520	0.0648 0.150 0.221 0.315	0.0179 0.275 0.238 0.165
	40.5	0.00879 0.0258 0.0256 0.0255	0.713 0.223 0.327 0.522	0.278 0.752 0.647 0.453	0.428 0.762 0.737 0.706	0.456 0.0818 0.125 0.193	0.116 0.156 0.138 0.101
	60.8	0.0273 0.0411 0.0427	0.685 0.221 0.317	0.288 0.738 0.640	0.656 0.807 0.806	0.272 0.0651 0.0920	0.0730 0.128 0.101
	81.1	0.0421 0.0423 0.0558 0.0573 0.0587 0.0585	0.507 0.670 0.216 0.316 0.502 0.661	0.451 0.288 0.728 0.627 0.439 0.280	0.780 0.737 0.850 0.837 0.813 0.778	0.143 0.208 0.0508 0.0746 0.121 0.173	0.0767 0.0549 0.0991 0.0880 0.0657 0.0487
^c H ₂ , ^x C ₂ F	H_4 and x_{C_2H}	6	actions of	hydrogen, ly.	ethene a	and ethane	in lıquıd
' _{H2} ' ^y C ₂ Η	$_{\rm H_4}$ and $_{\rm C_2H}$	mole fra	-	hydrogen,	ethene a	and ethane	in vapor

COMPONENTS	S:			ORIGINAL MEASUREMENTS:					
1. Hyd	rogen; 1	H ₂ ; [1333-	-74-0]	Sagara, H; Mihara, S.; Arai, Y.;					
	ene (Eth <u>)</u> [74-85-1	ylene); C	2H4;	Saito, S.					
3 Pro	nanos C	3H8; [74-9	98-61	J. Che	m. Engng.	Japan <u>1975</u> ,	8,		
5. 110	pane, c	3118/ [/1 -	,,,,,,	98-104	•				
VARIABLES	:	<u></u>		PREPARED I	BY:				
Tempera	ature, p	ressure, co	omposition		С. L.	Young			
	-								
EXPERIMEN	TAL VALUES	:							
		Mole fra	actions in 1						
т/к	P/MPa	^x H ₂	^{<i>x</i>} C ₂ H ₄	^{<i>x</i>} С ₃ Н ₈	^y H ₂	^{<i>y</i>} C ₂ H ₄	^у с ₃ н ₈		
173.2	2.03	0.00845	0.519	0.538 0.473	0.962	0.0371 0.0430	0.00108 0.00147		
	4.05	0.00845 0.0171		0.311 0.510	0.947 0.976	0.0525 0.0231	0.00059 0.00090		
		0.0162	0.681	0.303	0.970	0.0292	0.00048		
1	6.08	0.0244 0.0249		0.510 0.303	0.982 0.977	0.0173 0.0221	0.00064 0.00042		
	8.11	0.0314 0.0333		0.516 0.301	0.985 0.980	0.0145 0.0194	0.00060 0.00037		
198.2	2.03	0.00823	0.332	0.659	0.910	0.0835	0.00652		
		0.00813 0.00976		0.580 0.285	0.894 0.821	0.101 0.175	0.00565 0.00348		
	4.05	0.0181	0.399	0.583	0.939	0.0570	0.00392		
	6.08	0.0185 0.0288		0.281 0.579	0.907 0.955	0.0912 0.0420	0.00208		
ļ		0.0323	0.678	0.290	0.933	0.0658	0.00159		
	8.11	0.0378 0.0427		0.574 0.290	0.962 0.942	0.0352 0.0564	0.00291 0.00164		
223.2	2.03	0.00916	0.434	0.557	0.705	0.269	0.0259		
	4.05	0.0104 0.0222		0.185 0.564	0.542 0.853	0.446 0.132	0.0117 0.0152		
	6.08	0.0261 0.0360		0.186 0.592	0.742 0.896	0.251 0.0917	0.00613 0.0122		
	0.00	0.0397		0.217	0.815	0.179	0.00539		
			AUVILLADY	INFORMATIO	N	(cont.)			
MUTTION /ADJ		O OF DUDE				compative a			
	PARATUS/PR		11 of) PURITY OF I	mole per ce	nt		
capacit	$:y 5 \times 10$	s steel ce) ⁵ mm ³ fitt	ed with		-				
magneti valves.		r and samp	ling n cryostat.	2. Pur:	ity 99.5 m	ole per cen	t.		
Tempera	ture mea	sured with	thermo-	3. Purity 99.7 mole per cent.					
couple. Bourdon	Press gauge.	ure measur Gases ad	ed with ded to cell						
and equ	ilibrate	d. Sampl	es of						
		withdrawn a gas chro							
with th	ermal co	nductivity	detector.						
Details	in ref.	(1).		ESTIMATED	ERROR:	<u></u>			
				$\delta T/K = \pm$	±0.1; δΡ/	$MPa = \pm 0.01$			
					$x_{C_2H_4}$, δx_{C}	₃ H ₈ , ⁶ y _{H2} ,	⁵ ^y C ₂ H ₄ '		
			,	C 311 8	= ±1%.				
				REFERENCES	- •				
				1		rai, Y.; Sa			
					hem. Engng	. Japan <u>197</u> 2	<u>2</u> , 5,		
				339.					
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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0]</pre>	Sagara, H; Mihara, S.; Arai, Y.;
 2. Ethene (Ethylene); C₂H₄; [74-85-1] 3. Propane; C₃H₈; [74-98-6] 	Saito, S. J. Chem. Engng. Japan <u>1975</u> , 8, 98-104.
EXPERIMENTAL VALUES:	

m /12	D /WD-	Mole fractions in liquid			Mole fractions in vapor			
Т/К	P/MPa	$x_{\rm H_2}$	^{<i>x</i>} С ₂ н ₄	^{<i>x</i>} С ₃ Н ₈	y_{H_2}	^{<i>y</i>} C ₂ H ₄	^y C ₃ H ₈	
223.2	8.11	0.0474	0.364	0.588	0.915	0.0742	0.0108	
		0.0531	0.691	0.256	0.856	0.138	0.00588	
248.2	2.03	0.0101	0.334	0.656	0.541	0.370	0.0891	
		0.00780	0.541	0.451	0.363	0.568	0.0693	
		0.00583	0.704	0.290	0.226	0.723	0.0504	
	4.05	0.0246	0.318	0.657	0.748	0.202	0.0502	
		0.0250	0.519	0.456	0.640	0.318	0.0420	
		0.0223	0.705	0.273	0.517	0.452	0.0310	
	6.08	0.0419	0.312	0.646	0.821	0.140	0.0386	
		0.0435	0.503	0.454	0.733	0.235	0.0324	
		0.0414	0.689	0.270	0.639	0.336	0.0248	
	8.11	0.0562	0.298	0.646	0.854	0.114	0.0325	
		0.0586	0.656	0.285	0.713	0.264	0.0231	

Miscellaneous Organic Fluids

COMPONENT				OPTOTNAL				
COMPONENTS: 1. Hydrogen; H_2 ; [1333-74-0]					ORIGINAL MEASUREMENTS: Sagara, H.; Mihara, S.; Arai, Y.;			
							ALAL, I.,	
2. Propene (Propylene); C ₃ H ₆ ; [115-07-1]				Saito		_		
3. Prop	ane: C	3H8; [74-	98-61	J. Ch	em. Engng.	Japan <u>1975</u>	, 8,	
5. 1105		5		98-10	4.			
VARIABLES	:			PREPAREI	D BY:			
Tempera	ture, p	ressure, co	omposition		С. L.	Young		
EXPERIMEN	TAL VALUE	S:						
/	D /40		actions in			fractions in		
т/к	P/MPa	^х н ₂	^{<i>x</i>} C ₃ H ₆	^ж С ₃ Н ₈	^у н ₂	^y C ₃ H ₆	^У С 3Н 8	
173.2	2.03	0.00705	0.246	0.747	0.998	0.00066	0.00132	
		0.00828 0.00625	0.492 0.749	0.499 0.244	0.998 0.998	0.00116 0.00175	0.00098 0.00068	
	4.05	0.0134	0.237	0.749	0.998	0.00047	0.00117	
		0.0139	0.490	0.496	0.998	0.00089	0.00086	
		0.0135	0.750	0.237	0.998	0.00135	0.00048	
	6.08	0.0196 0.0204	0.246 0.489	0.734 0.491	0.999 0.998	0.00039 0.00082	0.00099 0.00075	
		0.0204	0.739	0.241	0.998	0.00116	0.00042	
	8.11	0.0317	0.241	0.727	0.999	0.00041	0.00100	
		0.0255	0.476	0.498	0.999	0.00074	0.00066	
100 2	2 0 2	0.0253	0.737	0.237 0.739	0.999	0.00096	0.00037	
198.2	2.03	0.00907 0.00909	0.252 0.523	0.468	0.990 0.989	0.00329 0.00616	0.00664 0.00445	
		0.00890	0.746	0.245	0.989	0.00849	0.00244	
	4.05	0.0175	0.241	0.741	0.994	0.00188	0.00401	
		0.0193	0.521	0.459	0.994	0.00362	0.00267	
	6.08	0.0172 0.0257	0.736 0.235	0.246 0.739	0.993 0.995	0.00520 0.00150	0.00174 0.00346	
	0.00	0.0253	0.514	0.461	0.995	0.00290	0.00222	
		0.0221	0.728	0.250	0.994	0.00437	0.00136	
	8.11	0.0305	0.244	0.725	0.996	0.00143	0.00320 0.00212	
		0.0337 0.0319	0.502 0.726	0.464 0.242	0.995 0.995	0.00271 0.00411	0.00132	
			AUXILIA	RY INFORMAT	ION.	(<u>cont.</u>)		
METHOD/API	PARATUS / P	ROCEDURE :				F MATERIALS:		
		s steel ce	11 of	1			ent.	
capacity	y 5 × 10) ⁵ mm ³ fitt	ed with	1	 Purity 99.99 mole per cent. Purity 99.5 mole per cent. 			
magnetic valves.		er and samp	ling n cryostat.		city 99.5	mole per cer	it.	
		sured with			3. Purity 99.7 mole per cent.			
		sure measur			-	-		
			dded to cel	1				
liquid a	ulibrate	ed. Sampl withdrawn	es or and	}				
		a gas chro						
with the	ermal co	onductivity	detector.					
Details	in ref.	(1).		FOTTMATT	ED ERROR:		······	
						/MPa = ±0.01	.;	
						С ₃ Н ₈ ' ^{бу} Н ₂ '		
				δ ^{<i>y</i>} C ₃ H ₈	$= \pm 18.$	- 311 8 11 2 11 2	U 311 b	
				REFEREN	CES:			
				1. Saga	ara, H.; 2	Arai, Y.; S	Saito, S.	
				J. (chem. Engn	g. Japan 197	12, 5,	
				339.	•	· •		
				1				

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Sagara, H.; Mihara, S.; Arai, Y.;		
2. Propene (Propylene); C ₃ H ₆ ; [115-07-1]	Saito, S.		
3. Propane; $C_{3}H_{8}$; [74-98-6]	J. Chem. Engng. Japan <u>1975</u> , 8,		
$3. 10 pane, 03 n_8, [74-30-0]$	98-104.		

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EXPERIMENTAL VALUES:
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		Mole fra	actions in	liquid	Mole fractions in vapor			
Т/К	P/MPa	^{<i>x</i>} H ₂	^{<i>x</i>} C ₃ H ₆	^x C ₃ H ₈	y_{H_2}	y _{C3H6}	^{<i>Y</i>} C ₃ H ₈	
223.2	2.03	0.0108	0.280	0.709	0.964	0.0128	0.0230	
		0.0106	0.480	0.509	0.958	0.0229	0.0186	
		0.00976	0.697	0.293	0.958	0.0307	0.0109	
	4.05	0.0206	0.281	0.699	0.978	0.00742	0.0141	
		0.0210	0.465	0.514	0.976	0.0125	0.0110	
		0.0198	0.686	0.294	0.976	0.0173	0.00626	
	6.08	0.0319	0.272	0.696	0.984	0.00527	0.0103	
		0.0307	0.466	0.504	0.981	0.0101	0.00877	
		0.0295	0.683	0.288	0.982	0.0133	0.00480	
	8.11	0.0414	0.265	0.694	0.985	0.00494	0.00966	
		0.0386	0.459	0.503	0.984	0.00833	0.00736	
		0.0396	0.668	0.293	0.984	0.0115	0.00434	
248.2	2.03	0.0115	0.323	0.665	0.876	0.0478	0.0761	
		0.0119	0.479	0.509	0.871	0.0701	0.0590	
		0.0109	0.642	0.347	0.864	0.0931	0.0426	
	4.05	0.0250	0.320	0.655	0.930	0.0269	0.0430	
		0.0256	0.465	0.509	0.930	0.0369	0.0328	
		0.0247	0.631	0.345	0.928	0.0495	0.0229	
	6.08	0.0403	0.317	0.642	0.950	0.0189	0.0309	
		0.0392	0.465	0.496	0.946	0.0284	0.0255	
		0.0399	0.624	0.336	0.946	0.0366	0.0174	
	8.11	0.0536	0.304	0.642	0.957	0.0160	0.0270	
		0.0549	0.457	0.488	0.957	0.0220	0.0210	
		0.0537	0.612	0.335	0.953	0.0318	0.0150	

COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [13	33-74-01	Sagara, H.; Mihan			
2. Methane; CH4; [74		Saito, S.	La, 5.; Alal, 1.;		
3. Propene (Propylene)		J. Chem. Engng. Ja	ipan 1975. 8.		
[115-07-1]		98-104.	<u> </u>		
VARIABLES:		PREPARED BY:			
Temperature, pressure,	composition	C. L. Your	ıg		
EXPERIMENTAL VALUES:					
Mole T/K P/MPa ^x H ₂	fractions in lie ^x CH4	uid Mole fra C ₃ H ₆ ^y H ₂	Ctions in vapor ⁹ CH4 ⁹ C3H6		
173.2 2.03 0.0 0.0036 0.0049 0.0037 0.0042	0 0.500 0 3 0.246 0 5 0.155 0 7 0.116 0	152 0.0 497 0.236 749 0.504 841 0.662 880 0.734	1.0 0.764 0.496 0.338 0.266		
0.00430 4.05 0.0154 0.0145 0.0109 0.0108 0.0094	0.690 0 0.524 0 0.309 0 0.107 0	996 1.0 294 0.459 462 0.528 680 0.679 882 0.861 991 1.0	0.0 0.541 0.472 0.321 0.139 0.0		
6.08 0.0303 0.0253 0.0201 0.0163 0.0143	0.633 0 0.500 0 0.291 0 0.0994 0	337 0.585 475 0.640 689 0.765 884 0.906	0.415 0.360 0.235 0.0935 0.0		
8.11 0.0770 0.0622 0.0622 0.0352 0.0251 * The mole fraction of	0.842 0 0.788 0 0.772 0 0.566 0 0.234 0 propylene in th	0805 0.518 150 0.566 165 0.574 399 0.660 741 0.823	0.482 0.434 0.426 0.340 0.177 (cont.)		
for accurate estimati		NFORMATIO <u>N</u>			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MA	ATERIALS:		
Static stainless steel capacity 5 × 10 ⁵ mm ³ fi magnetic stirrer and sa Cell enclosed in cryost Temperature measured wi couple. Pressure meas Bourdon gauge. Gases	tted with mpling valves. at. th thermo- ured with added to cell ples of liquid nalysed using h thermal	1. Purity 99.99 mole per cent.			
		ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/MB$ $\delta x_{H_2}, \delta x_{CH_4}, \delta x_{C_3H_6}$ $\delta y_{C_3H_6} = \pm 1$ %. REFERENCES: 1. Sagara, H.; Ara J. Chem. Engng. 339.	, ^{δy} H ₂ , ^{δy} CH ₄ , ai, Y.; Saito, S.		
			,		

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COMPONENTS:

1.	Hydrogen;	H ₂ ;	[1333	-74-0]
2.	Methane;	СН4;	[74-8	2-8]
3.	Propene (1 [11]	Propyle 5-07-1]		C ₃ H ₆ ;

ORIGINAL MEASUREMENTS:
Sagara, H.; Mihara, S.; Arai, Y.;
Saito, S.
J. Chem. Engng. Japan 1975, 8,
98-104.

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EXPERIMENTAL VALUES:

	- (actions ir			fractions :	
т/к	P/MPa	^х н ₂	^{<i>x</i>} Сн ₄	^{<i>x</i>} С ₃ Н ₆	y _{H2}	^у СН ₄	^у с _{зн6} *
173.2	8.11	0.0229 0.0200	0.126	0.851	0.897	0.103	
198.2	2.03	0.0200	0.0 0.384	0.980 0.616	1.0 0.0	0.0 0.991	0.00942
		0.00244	0.259	0.739	0.197	0.794	0.00854
		0.00355	0.178	0.818	0.389	0.601	0.00969
		0.00475	0.116	0.879	0.573	0.418	0.00858
		0.00600 0.00599	0.0672 0.0	0.927 0.994	0.754 0.992	0.238 0.0	0.00808
	4.05	0.0	0.851	0.149	0.992	0.993	0.00768 0.00707
		0.00984	0.516	0.474	0.257	0.735	0.00776
		0.0101	0.386	0.604	0.386	0.610	0.00457
		0.0104	0.245	0.744	0.558	0.435	0.00678
		0.0108	0.124	0.866	0.758	0.238	0.00421
	6.08	0.0108 0.0230	0.0 0.622	0.989 0.355	0.996 0.335	0.0 0.660	0.00423 0.00434
	0.00	0.0199	0.381	0.600	0.533	0.462	0.00521
		0.0197	0.219	0.761	0.694	0.301	0.00458
		0.0209	0.163	0.816	0.775	0.219	0.00521
		0.0166	0.0	0.983	0.996	0.0	0.00388
	8.11	0.0359 0.0329	0.587 0.438	0.377	0.453 0.563	0.543 0.433	0.00304
		0.0286	0.438	0.529 0.744	0.743	0.253	0.00385 0.00374
		0.0263	0.161	0.813	0.811	0.185	0.00449
		0.0239	0.0	0.976	0.997	0.0	0.00327
223.2	2.03	0.0	0.226	0.774	0.0	0.960	0.0401
		0.00162	0.180	0.818	0.123	0.828	0.0488
		0.00424 0.00589	0.110 0.0693	0.885 0.925	0.389 0.597	0.567 0.364	0.0439 0.0392
		0.00741	0.0348	0.925	0.768	0.192	0.0392
		0.00857	0.0	0.991	0.958	0.0	0.0422
	4.05	0.0	0.441	0.559	0.0	0.974	0.0256
		0.00868	0.289	0.703	0.280	0.692	0.0284
		0.0112	0.196	0.793	0.472	0.504	0.0240
		0.0132 0.0126	0.103 0.0382	0.884 0.949	0.694 0.863	0.283 0.115	0.0233 0.0211
		0.0146	0.0	0.985	0.977	0.0	0.0228
	6.08	0.0	0.751	0.249	0.0	0.977	0.0233
		0.0160	0.450	0.534	0.261	0.716	0.0238
		0.0211	0.314	0.664	0.437	0.543	0.0203
		0.0229 0.0216	0.210	0.767	0.607	0.377	0.0166
		0.0216	0.112 0.0	0.866 0.978	0.765 0.986	0.220 0.0	0.0151 0.0136
	8.11	0.0286	0.507	0.465	0.315	0.662	0.0222
		0.0283	0.448	0.523	0.365	0.615	0.0200
		0.0319	0.343	0.625	0.496	0.486	0.0174
		0.0349	0.164	0.801	0.741	0.245	0.0143
248.2	2.03	0.0275 0.0	0.0 0.149	0.972 0.851	0.988 0.0	0.0 0.858	0.0119 0.142
	2.05	0.00326	0.100	0.896	0.231	0.634	0.134
		0.00545	0.0679	0.927	0.403	0.459	0.137
		0.00687	0.0371	0.956	0.593	0.268	0.139
		0.00802	0.0179	0.974	0.726	0.135	0.139
		0.00977	0.0	0.990	0.863	0.0	0.137
						(con	t.)
				n the gas	phase at 1	73.15 K was	too small
for a	ccurate	estimatior	1.				

Miscellaneous Organic Fluids

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Sagara, H.; Mihara, S.; Arai, Y.;
2. Methane; CH4; [74-82-8]	Saito, S.
3. Propene (Propylene); C_3H_6 ; (115-07-1)	J. Chem. Engng. Japan <u>1975</u> , 8,
[112-07-1]	98-104.

EXPERIMENTAL VALUES:

	- /		actions in		Mole fractions in vap		
Т/К	P/MPa	^ж н ₂	^ж Сн 4	^ж С ₃ Н ₆	^y H ₂	^y CH 4	^y c₃h ₆
248.2	4.05	0.0 0.00436 0.0119 0.0159 0.0175	0.334 0.273 0.174 0.0994 0.0468	0.666 0.723 0.814 0.885 0.936	0.0 0.100 0.350 0.586 0.753	0.913 0.812 0.567 0.334 0.170	0.0872 0.0877 0.0829 0.0800 0.0768
	6.08	0.0183 0.0 0.0147 0.0226 0.0306 0.0295	0.0 0.505 0.330 0.232 0.0969 0.0864	0.982 0.495 0.655 0.745 0.873 0.884	0.914 0.0 0.245 0.422 0.705 0.728	0.0 0.927 0.690 0.516 0.236 0.212	0.0857 0.0733 0.0646 0.0616 0.0580 0.0598
	8.11	0.0292 0.0 0.0216 0.0331 0.0365 0.0416 0.0409	0.0 0.712 0.445 0.248 0.229 0.0931 0.0	0.971 0.288 0.533 0.719 0.734 0.865 0.959	0.949 0.0 0.207 0.496 0.542 0.775 0.956	0.0 0.921 0.726 0.452 0.407 0.181 0.0	0.0512 0.0790 0.0661 0.0516 0.0507 0.0446 0.0438
			· <u> </u>	<u>,</u> ,, _,			
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COMPONENTS:			ORIGINAL ME	ASUREMENTS:		
l. Hydrogen; H ₂ ;	[1333-74-	0]		H. F.; H		L.
2. Nitrogen; N ₂ ;			Am. Inst. Chem. Engnrs. J.			
3. Methane; CH ₄ ;			1959, 5,		•	
4. Ethane; C_2H_6 ;			<u> </u>			
4. Ethane; C2H6; VARIABLES:	[/4-84-0]		PREPARED BY	·		
Temperature, pres	51170 COMPO	sition		C T	L. Young	E Contraction of the second
Temperature, pres	sure, compo	5101011			it roung	
EXPERIMENTAL VALUES:						
Mole fraction	s in liquid		Мс	ole fracti	ions in g	as
x _{H₂} x _{N₂}	^x CH ₄	$x_{C_2H_6}$	$y_{\rm H_2}$	y_{N_2}	^𝔥 CH₄	^y C ₂ H ₆
т/к	= 199.8	P/psia	= 1000	P/MI	Pa = 6.89	
]	_					
0.00296 0.1880	0.0852 0.0791	0.7239 0.7653	0.0410 0.2073	0.6196 0.6282		
T/K	= 144.3	P/psia	= 500	P/MI	Pa = 3.45	
0.00462 0.1215	0 0000	0.7859	0 2454	0.7087	0.0398	0.00606
0.00626 0.0973	0.0873	0.8091	0.3448	0.6101	0.0391	0.00608
0.00698 0.0795 0.00743 0.0705	0.0841 0.0844	010220				0.00525
0.00882 0.0633	0.0848	0.8431	0.5676	0.3932	0.0346	0.00456
			INFORMATION			
METHOD APPARATUS/PROCE	DURE .				(17PDI 110	
				PURITY OF N		
Recirculating vapo	-		l and 2. No details given.			
based on that desc Details of presen			3 and 4.	. Philli	ips Petro	leum Co.
source and ref. (2				sample	es.	
measured with ther	-					[
measured with Bour	don gauge.	High				
pressure magnetic	circulating	pump				(
employed.	220000		ESTIMATED E	ERROR:		
Cell charged under Samples of each ph	-	d to		± 0.2; δ ^P /		
room temperature a	-		δx , $\delta y =$	= ±2% (est	imated b	y compiler)
analysed by mass s			REFERENCES	:		
			<pre>I. Dodge, B. F.; Dunbar, A. K. J. Am. Chem. Soc. <u>1927</u>, 49, 591.</pre>			
			2. Aroyan, H. J.; Katz, D. L.			
			Ind. H	Eng. Chem.	<u>1951</u> , 4	3, 185.
			L			

COMPONENTS: 1. Hydrogen; 2. Methane;CH 3. Ethene; C2 4. Ethane; C2 5. Propene; C 6. Propane; C	4; [74-82-3] H ₄ ; [74-85-3] H ₆ ; [74-84-3] JH ₆ ; [115-3]	8] -1] -0] 07-1]	ORIGINAL MEASUREMENTS: Benham, A.L.; Katz. D.L.; Am.Inst. Chem. Engnrs. J. <u>1957</u> ,3, 33-36.				
VARIABLES: Temperature,	pressure,	compositi	lon	PREPA	RED BY:	C.L. Young	
EXPERIMENTAL VAL	UES:	<u></u>		L			
T/K		255.37	199.	82	199.82	255.37	199.82
P/bar	<i>x</i> _{H₂}	34.47 0.0104	34. 0.01		34.47 0.0148	68.95 0.0236	68.95 0.0197
Liquid Composition	^{<i>x</i>} СН ₄	0.0767	0.14	84	0.1277	0.1645	0.1782
Mole fractions	^x C ₂ H ₄ ^x C ₂ H ₆	0.0942 0.0507	0.09 0.04		0.1823 0.0421	0.1732 0.0402	0.1797 0.0374
	^ж С ₃ Н ₆ ^ж С ₃ Н ₈	0.0839 0.6841	0.07 0.62		0.0707 0.5624	0.0667 0.5318	0.0600 0.5250
	y _{H2}	0.3828	0.65	79	0.6860	0.4693	0.7726
Vapor compositions	^У СН ₄ У _{С2Н4}	0.3137 0.0856	0.30 0.02		0.2545	0.3518 0.0964	0.1966 0.0209
Mole fractions	^У С ₂ Н ₆ ^У С ₃ Н ₆	0.0344	0.00 0.00		0.0060	0.0173	0.0038 0.0010
	^y C ₃ H ₈	0.1572	0.00		0.0105	0.0566	0.0051

AUXILIARY	INFORMATION
METHOD:/APPARATUS/PROCEDURE: Recirculating vapor flow system. described in ref. 1. Temperature measured with thermocouple. Pressure measured with Bourdon gauge. Vapor recirculated by high pressure magnetic pump. Cell charged under pressure. Samples of each phase expanded to room pressure and analysed by mass spectrometer.	carbons.
	<pre>δT/K = ±0.6; δP/bar = ±0.5%; δx, δy = ±0.5%. REFERENCES: 1. Aroyan, H.J.; Katz, D.L. Ind. Eng. Chem. <u>1951</u>,43,185.</pre>

COMPONENT	S:				ORIGINAT	MEASUREM	ENTS .			
	<pre>l. Hydrogen; H₂; [1333-74-0]</pre>					ORIGINAL MEASUREMENTS: Brainard, A.J. Williams, G.B.				
_	-									
	 Benzene; C₆H₆; [71-43-2] Cyclohexane; C₆H₁₂; [110-82-7] 				Am. In	st. Che	m. Engnr	s.J. <u>196</u>	<u>57</u> ,	
-				2-1]	13, 60	-69.				
4. Hexa	ine; C_6	H ₁₄ ; [11	.0-54-3]							
VARIABLES	3:				PREPARED	BY:				
Temper	cature,	pressur	e, compo	sition			C.L. You	ing		
-	·	-	•					•		
EXPERIMEN		_	iquid co Mole fr	mpositio action	n			lues		
т/к	P/bar	^ж н 2	^x C ₆ H ₆	^{<i>x</i>} C ₆ H ₁₂	^{<i>x</i>} С ₆ Н ₁₄	K _{H₂}	^K C ₆ H ₆	^K C ₆ H ₁₂	^K C ₆ H ₁ 4	
366.48	36.3	0.0235	0.3935	0.3298	0.2532	40.00	0.0582	0.0546	0.0794	
	71.2	0.0450	0.3859	0.3225	0.2476	21.46	0.0329	0.0309	0.0448	
	105.9	0.0655	0.3766	0.3156	0.2423	14.84	0.0287	0.0269	0.0390	
1	137.7 35.0	0.0849 0.0204	0.3688 0.4738	0.3090 0.3786	0.2373 0.1272	11.52 46.13	0.0226	0.0212	0.0307	
	35.0	0.0204	0.4/38	0.3786	0.1272	24.17	0.0393	0.0308	0.0473	
1	101.9	0.0580	0.4515	0.3671	0.1234	16.82	0.0240	0.0247	0.0379	
	136.9	0.0756	0.4440	0.3619	0.1185	12.94	0.0213	0.0215	0.0335	
	35.9	0.0245	0.2341	0.5558	0.1856	38.16	0.0684	0.0609	0.0825	
	69.8	0.0455	0.2277	0.5441	0.1827	21.25	0.0356	0.0308	0.0442	
	102.2 137.0	0.0651 0.0854	0.2243 0.2193	0.5327 0.5234	0.1779 0.1719	14.98 11.46	0.0270 0.0239	0.0232 0.0209	0.0342 0.0308	
394.26	35.2	0.0854	0.3935	0.3287	0.2523	34.66	0.1080	0.1010	0.1530	
554.20	70.6	0.0255	0.3935	0.3287	0.2323	18.30	0.1080	0.0590	0.0888	
	105.8	0.0741	0.3742	0.3124	0.2393	12.85	0.0470	0.0433	0.0688	
	137.4	0.0976	0.3646	0.3045	0.2333	9.80	0.0450	0.0397	0.0639	
	38.3	0.0255	0.4662	0.3830	0.1253	35.52	0.0917	0.0890	0.1417	
	72.2	0.0464	0.4562	0.3748	0.1226	20.34	0.0544	0.0530	0.0862 0.0663	
	102.9 137.6	0.0682 0.0897	0.4458 0.4334	0.3662 0.3580	0.1198 0.1189	14.04 10.75	0.0430 0.0377	0.0425 0.0370	0.0805	
	35.8	0.0258	0.2266	0.5660	0.1816	34.98	0.1069	0.0895	0.1344	
	70.1	0.0509	0.2237	0.5487	0.1767	18.52	0.0623	0.0556	0.0780	
	102.2	0.0752	0.2170	0.5357	0.1721	12.72	0.0480	0.0410	0.0626	
	134.7	0.0957	0.2178	0.5189	0.1676	10.07	0.0399	0.0350	0.0521	
- <u></u>				AUXILIARY	INFORMATI	ON				
METHOD/AL	PARATUS	PROCEDURE	:		SOURCE AN	ND PURITY	OF MATER	IALS:		
Stirred	equil	ibrium c	ell. Pr	essure	1. Math	eson 111	trapure	sample,	purity	
				Analysis	bett	er than	99.998	mole per	cent.	
of samp	les ca	rried ou	tbyexp	anding	2. Phil	lips Pe	troleum	sample,	purity	
				d freez-	99.8	9 mole	per cent	; major		
			on; hydr			toluene				
			ly and t imated v					sample, ; major		
			of hydr		itv	2,4-dim	ethvl pe	ntane an	d 2,2-	
			ass spec		diet	hyl pen	tane.			
		ls in so			4. Phil	līps Pe	troleum	sample,	purity	
					99.9 itv	7 mole methvl	per cent cyclopen	; major tane.	1mpur-	
					ESTIMATE					
							; δP/bar	= ±0.15	;	
						$y = \pm 2$.				
1					(est	imated	by compi	ler).		
					REFERENC	ES :				
]					
					i					

COMPONE	ents:				ORIGI	NAL MEA	SUREMENT.	'S:	
1. Hydrogen; H ₂ ; [1333-74-0]				Brainard, A.J. Williams. G.B.					
3. Cyc]	lohexan	; C ₆ H ₆ ; [71-43-2] exane; C ₆ H ₁₂ ; [110-82-7] C ₆ H ₁₄ ; [110-54-3]			Am. Inst. Chem. Engnrs. J. <u>1967</u> , 13, 60-69.				967,
EXPERIM	1ENTAL	VALUES:	Liquid c Mole f	ompositi raction	on		K-Va	lues	
T/K	P/bar	$x_{\rm H_2}$		^x C ₆ H ₁₂	^{<i>x</i>} C ₆ H ₁₄	^Ж Н 2	KC6H6	^K C ₆ H ₁₂	^K C ₆ H ₁₂
422.04	34.8 71.8 103.1 139.5 37.9 70.4 105.7 138.8 35.3 70.3 103.6 132.4	0.0272 0.0578 0.0844 0.1105 0.0277 0.0530 0.0793 0.1018 0.0278 0.0561 0.0829 0.1062	0.4022 0.3896 0.3786 0.4670 0.4511 0.4405 0.4333 0.2261 0.2195 0.2133 0.2079	0.3127 0.3028 0.2943 0.2859 0.3818 0.3714 0.3623 0.3492 0.5649 0.5485 0.5329 0.5193	0.2579 0.2498 0.2427 0.2358 0.1235 0.1245 0.1179 0.1157 0.1812 0.1759 0.1709 0.1666	29.32 15.38 10.82 8.41 29.58 16.75 11.63 9.20 29.52 16.01 11.12 8.81	0.1980 0.0859 0.0715 0.1769 0.1148 0.0806 0.0673 0.1827 0.1060 0.0847 0.0750	0.1810 0.1050 0.0854 0.0719 0.1716 0.1126 0.0791 0.0673 0.1685 0.0985 0.0775 0.0640	0.2590 0.1496 0.1205 0.1008 0.2510 0.1538 0.1142 0.0978 0.2380 0.1351 0.1098 0.0923

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COMPONENTS	:		·····	ORIGINAL MEASU	REMENTS	·····		
		[1333-74-0]	Ì			an HM.		
-				Simnick, J. J.; Sebastian, H. M.; Lin, HM.; Chao, KC.				
		[74-82-8]						
		ydronaphthale		J. Chem. E	ng. Data <u>1980</u> ,	25,		
(Tet	ralin); C	10H12; [119-	-64-2]	147-149.				
VARIABLES	:	······		PREPARED BY:				
	Temperat	ture, pressur	· e		C. L. Yound	T		
	Tempera	cure, pressur			0, 1, 10un	5		
EXPERIMENT	TAL VALUES:							
					Mole fractio	ons		
Т/К	P/atm	<i>P/</i> MPa	Phas	e ^x H ₂	^{<i>x</i>} Сн ₄	^x C ₁₀ H ₁₂		
462.3	49.7	5.04	liqu	id 0.0256	0.00834	0,9661		
			vapo	r 0.8825	0.1033	0.01417		
462.2	101.0	10.23	liqu			0.9341		
462.2	150.3	15.23	vapo ligu			0.00769 0.9054		
702.2	T O . O		vapo			0.00519		
462.4	249.4	25.27	liqu	id 0.1194	0.0309	0.8497		
462.2	49.9	5.06	vapo			0.00398 0.9616		
462.2	49.9	5.00	ligu vapo			0.01518		
462.2	100.5	10.18	liqu	id 0.0459	0.0289	0.9252		
	150 5	1	vapo			0.00920		
462.2	150.1	15.21	liqu vapo			0.8902 0.00714		
462.3	252.8	25.61	liqu			0.8338		
			vapo	r 0.8154	0.1785	0.00621		
462.3	50.0	5.07	liqu			0.9490 0.01677		
462.2	100.4	10.17	vapo ligu			0.9029		
			vapo		0.4377	0.01090		
462.2	150.5	15.25	liqu			0.8573		
462.3	249.1	25.24	vapo ligu			0.00961 0.7836		
102.5	~ T		vapo		0.4076	0.00938		
					(co:	nt.)		
		A	UXILIARY	INFORMATION				
METHOD 'API	PARATUS/PROCE	DURE:	<u> </u>	SOURCE AND PUR	RITY OF MATERIALS:			
Flow ap	paratus wit	ch both liqui	d and	1. Purity	99.95 mole per	cent.		
gas com	ponents cor	tinually pas	sing	2. Purity b	better than 99	mole per		
	-	and then in		cent.		-		
					ottor than 00	mole ner		
		ses separated		-	better than 99	more her		
	-	sample remov		cent.				
bottom o	of cell and	l vapor sampl	e from					
top of c	cell. Det	ails in ref.	(1).					
Composi	tion of lig	uid and vapo	r					
-		.pping out hy		ESTIMATED ERRO	DR:			
	-	alysing by g			$\delta P/MPa = \pm 0$			
		Amount of ga		^{δx} H ₂ , ^{δx} CH	$\int \delta x_{C_4H_{10}} = \pm 2$	28.		
		rically and						
1				REFERENCES:				
		ed gravimetr	rearry.	1. Simnick,	J.J.; Lawso	on, C. C.;		
Details	in source.			Lin, H.	M.; Chao, K.	с.		
					t. Chem. Engnre			
				1977, 23	-			
				<u> </u>	, 307.			

COMPONENTS:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
 Hydrogen; H₂; [1333-74-0] Methane; CH₄; [74-82-8] 1,2,3,4-Tetrahydronaphthalene (Tetralin); C₁₀H₁₂; [119-64-2] 	Simnick, J. J.; Sebastian, H. M.; Lin, HM.; Chao, KC. <i>J. Chem. Eng. Data</i> <u>1980</u> , 25, 147-149.

EXPERIMENTAL VALUES:

				Mole fractions				
Т/К	P/atm	P/MPa	Phase	^ж н ₂	[∞] CH₄	^{<i>x</i>} C ₁₀ H ₁₂		
663.4	50.0	5.07	liquid	0.0435	0.0065	0.9491		
663.3	101.5	10.28	vapor liquid vapor	0.4608 0.1080 0.6471	0.0428 0.0156 0.0609	0.4965 0.8762 0.2920		
663.3	151.3	15.33	liquid vapor	0.1666 0.7182	0.0211	0.8119		
663.5	250.2	25.35	liquid vapor	0.2762	0.0315	0.6920		
663.4	50.0	5.07	liquid vapor	0.0393 0.4135	0.0124 0.0854	0.9483 0.5012		
663.3	99.9	10.12	liquid vapor	0.0981 0.5741	0.0303 0.1179	0.8717 0.3080		
663.4	146.3	14.82	liquid vapor	0.1387 0.6105	0.0450 0.1356	0.8163 0.2539		
663.4	252.1	25.54	liquid vapor	0.2604 0.6754	0.0732 0.1368	0.6664 0.1879		
663.3	50.1	5.08	liquid vapor	0.0284 0.2865	0.0308 0.2081	0.9408		
663.3	100.9	10.22	liquid vapor	0.0722 0.3931	0.0764 0.2819	0.8514		
663.3	150.5	15.25	liquid vapor	0.1129 0.4227	0.1114 0.3055	0.7745 0.2718		

COMPONENTS:		ORIGINAL MEASUREMENTS:
(Tetralin);C	hydronaphthalene, 0H12;[119-64-2] Denzene,(m-xylene);	Oliphant, J.L.; Lin, HM.; Chao, KC. Fluid Phase Equil. <u>1979</u> , 3, 35-46
VARIABLES: Temperature, liquid compos		PREPARED BY: C.L. Young
EXPERIMENTAL VALUES:	Mole fraction in	liquid Mole fraction in vapor,
T/K <i>P</i> /10 ⁵ Pa	^x _{H₂} ^x C ₁₀ H ₁₂ ^x C	${}_{\mathfrak{g}}\mathrm{H}_{10}$ ${}^{\mathcal{Y}}\mathrm{H}_{2}$ ${}^{\mathcal{Y}}\mathrm{C}_{10}\mathrm{H}_{12}$ ${}^{\mathcal{Y}}\mathrm{C}_{\mathfrak{g}}\mathrm{H}_{10}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	486 0.892 0.0204 0.0872 486 0.894 0.01923 0.0868 479 0.952 0.00823 0.0394 480 0.955 0.00785 0.0370 447 0.978 0.00348 0.0184 453 0.978 0.00345 0.01832 422 0.983 0.00257 0.01489 420 0.982 0.00289 0.01522 388 0.796 0.0594 0.1445 389 0.797 0.0598 0.1437 412 0.907 0.0237 0.6688 419 0.909 0.0232 0.0674 397 0.958 0.01021 0.0316 394 0.959 0.00750 0.0240 384 0.589 0.1394 0.272 384 0.598 0.1391 0.263 437 0.813 0.0538 0.1332 420 0.922 0.0211 0.0570 427 0.920 0.0215 0.0587 382 0.940 0.01642 0.0433 378 0.941 0.01605 0.0425
	AUXILIARY	INFORMATION
and gas componer passing into a m then into a cell phases separated Liquid sample re bottom of cell a from top. Compo found by strippi estimating amour volumetrically a metrically. Com solvent determin Temperature meas	with both liquid ts continually hixing tube and in which the d under gravity. emoved from the and vapor sample osition of samples ong out gas and ht of solute and solvent gravi- mposition of	<pre>SOURCE AND PURITY OF MATERIALS: 1. Air Products sample, minimum purity 99.95 mole per cent. 2. and 3. Aldrich Chemical Company samples, purity better than 99 mole per cent. ESTIMATED ERROR:</pre>

COMPONENTS:					ORIGINAL MEASUREMENTS:			
 1,2,3 [Tetr 1,3-D 	,4-Tetrah alin); C ₁	<pre>[1333-74-4 ydronapht] 0H12; [11 nzene, (main -3]</pre>	halene, 9-64-2]		Oliphant, J.L.; Lin, HM.; Chao, KC. <i>Fluid Phase Equil</i> . <u>1979</u> , 3, 35-46.			
EXPERIME T/K	NTAL VALU P/l0 ⁵ Pa	ES: Mole ^x H2	fraction ^x C ₁₀ H ₁₂			fraction ^y C ₁₀ H ₁₂	n in vapor, ^Y C ₈ H ₁₀	
582.45 582.45 582.35 582.35 582.65 582.65 582.65 582.35 582.35	20.2 20.2 50.6 50.6 151.6 151.6 252.9 252.9	0.00986 0.00989 0.0432 0.0430 0.1459 0.1459 0.232 0.231	0.645 0.640 0.581 0.582 0.484 0.484 0.434 0.434	0.345 0.350 0.376 0.375 0.370 0.370 0.325 0.335	0.860	0.283 0.275 0.1201 0.1224 0.0500 0.0493 0.0356 0.0361	0.363 0.368 0.189 0.1907 0.0911 0.0903 0.0644 0.0649	

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COMPONENTS :			ORIGINAL	MEASUREMEN	TS •	
1. Hydrogen; H ₂ ; [1333-74-0]			}			
2. 1,2,3,4-Tetrahydronaphthalene,			Oliphant, J.L.; Lin, HM.; Chao, K.C			
(Tetralin); $C_{10}H_{12}$; [119-64-2] 3. 1,1'-Methylenebisbenzene,			Fluid P	hase Equ	il. <u>1979</u> ,	3, 35-46.
(Diphenylmeth						
[101-81-5]						
				·		
VARIABLES: Temperature, p	ressure.		PREPARED	BY:		
liquid compos				С	L. Young	
		·				
EXPERIMENTAL VALUES:	Mole frac	ction in li	quid	Mole fr	action in	vapor,
T/K <i>P</i> /10 ⁵ Pa	$x_{\rm H_2}$	^x C ₁₀ H ₁₂ ^x	C13H12	y_{H_2}	$y_{C_{10}H_{12}}$	^y C ₁₃ H ₁₂
[
	0.01188		0.5016	0.9815	0.01532	0.00320
461.15 20.7	0.01171	0.4684	0.5198	0.9818	0.01462	0.00355
461.15 20.7 461.35 50.7	0.01168 0.0294		0.5195 0.4938	0.9820 0.9919	0.01436 0.00642	0.00363 0.00162
	0.0828		0.4938	0.9966	0.00265	0.00078
	0.1292		0.4356	0.9974	0.00204	0.00060
541.55 20.0	0.01457	0.3729	0.6125	0.8981	0.0652	0.0366
	0.0398	0.4396	0.5205	0.9531	0.0334	0.01345
541.55 51.1	0.0388	0.4441	0.5172	0.9533	0.0336	0.01313
	0.1195		0.4621	0.9816	0.01336	0.00505
	0.1147 0.1186		0.4649 0.4605	0.9801 0.9806	0.01438 0.01404	0.00551 0.00537
	0.1790		0.4325	0.9865	0.00964	0.00383
	0.1688		0.4402	0.9860	0.00995	0.00403
621.65 20.6	0.01515	0.448	0.537	0.598	0.255	0.1469
621.65 20.6	0.01513		0.540	0.597	0.255	0.1480
	0.0486		0.506	0.822	0.1139	0.0642
	0.0486 0.1444		0.512 0.439	0.819 0.927	0.1160 0.0476	0.0650 0.0253
621.45 152.0	0.1432		0.439	0.927	0.0478	0.0255
621.45 253.0	0.229	0.372	0.399	0.949	0.0329	0.01818
	0.225 0.228		0.402 0.406	0.951 0.949	0.0316 0.0326	0.01740 0.01842
021.45 255.0	0.220	0.300	0.406	0.949	0.0326	0.01842
		AUXILIARY	INFORMATIC			
			10 0117 017 111			
METHOD APPARATUS PROCED Flow apparatus wi		ionid and	1		F MATERIALS: s sample,	
gas components co					5 mole per	
into a mixing tub	e and the	n into a	1 -	-	_	[
cell in which the under gravity. Li					ich Chemic ity bette	al Company
removed from bott				e per cer		
vapor sample from				5 F01 001		
of samples found			1			
gas and estimatin	g amount	of solute	}			
volumetrically an metrically. Comp			1			
determined by GC.	Tempera	ture				
measured with the			ESTIMATED			
pressure with Bou	raon yaug	C •			$P/MPa = \pm 0$.02;
			δx _{H2} , δy	$H_2 = \pm 18$	> •	
			(estima	ated by c	compiler)	
			REFERENCE	S:		
						{
1			ł			}

COMPONENTS:	ORIGINAL MEASUREMENTS:		
 Hydrogen; H₂; [1333-74-0] 1,2,3,4-Tetrahydronaphthalene, [Tetralin); C₁₀H₁₂; [119-64-2] 1,1'-Methylenebisbenzene, (Diphenylmethane); C₁₃H₁₂; [101-81-5] 	Oliphant, J.L.; Lin, HM.; Chao, KC. <i>Fluid Phase Equil</i> . <u>1979</u> , 3, 35-46.		
EXPERIMENTAL VALUES: Mole fraction in T/K P/10 ⁵ Pa x _{H2} C ₁₀ H ₁₂ x	-		
701.05 30.2 0.01912 0.446 701.15 30.9 0.0212 0.409 700.75 50.4 0.0539 0.428 700.75 50.4 0.0538 0.428 701.05 151.0 0.202 0.392 701.05 151.0 0.203 0.398 701.05 253.0 0.328 0.311	0.5340.2510.4210.3280.5350.2520.4290.3280.5700.2740.3760.3490.5180.4970.2820.2210.5180.4950.2830.2230.4060.7610.13970.09930.4050.7600.14050.09930.3610.8280.09470.07730.3680.8350.09080.07420.3650.8350.09090.0745		

COMPONENTS :				ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]							
2. Hydrogen sulfide; H ₂ S;			Eakin, B.E.; DeVaney, W.E. Am. Inst. Chem. Eng. Symp. Ser.,				
	3-06-4]		~ 1	<u>1974</u> ,	70, 80-90.		,
3. Nonane	e; C ₉ H ₂₀ ;	[111-84-	-2]				
VARIABLES:				PREPARED I	BY:		
	Temperatu	re, pressu	ıre		C. L. 1	Young	
EXPERIMENT	AL VALUES:	<u> </u>		Mole ·	fractions		
			in liquid		2140 010110	in vapor	
T/K	p/MPa	^x H ₂	^x H ₂ S	^x C ₉ H ₂₀	y _{H₂}	^y H ₂ S	^y C ₉ H ₂₀
310.9	3.45 6.89 13.79	0.0265 0.0506 0.0927	0.0207 0.0212 0.0231	0.9528 0.9282 0.8842	0.9829 0.9902 0.9943	0.0167 0.0095 0.0056	0.00041 0.00029 0.00019
366.5	3.45 6.89 13.79	0.0348 0.0624 0.1188	0.0227 0.0237 0.0269	0.9425 0.9139 0.8543	0.9602 0.9773 0.9853	0.0348 0.0197 0.0129	0.00502 0.00302 0.00187
477.6	3.45 6.89 13.79	0.0490 0.0991 0.1859	0.0213 0.0227 0.0243	0.9297 0.8782 0.7898	0.8244 0.8880 0.9270	0.0680 0.0387 0.0218	0.1075 0.0733 0.0512
310.9	3.45 6.89 13.79	0.0202 0.0392 0.0846	0.1563 0.1541 0.1518	0.8235 0.8067 0.7636	0.8499 0.9225 0.9530	0.1498 0.0772 0.0468	0.00036 0.00025 0.00017
366.5	3.45 6.89 13.79	0.0212 0.0495 0.1042	0.1540 0.1462 0.1461	0.8248 0.8042 0.7497	0.7314 0.8534 0.9166	0.2647 0.1430 0.0819	0.00396 0.00365 0.00158
477.6	3.45 6.89 13.79	0.0232 0.0635 0.1570	0.1427 0.1627 0.1459	0.8341 0.7738 0.6971	0.3729 0.6400 0.8083	0.4866 0.2822 0.1603	0.1405 0.0778 0.0314
			AUXILIARY	INFORMATIO)N		
METHOD /APPA	ARATUS/PROCE	DURE:	<u></u>	SOURCE AND PURITY OF MATERIALS:			
cell fitt sampling	s steel roo ed with li ports. Pr don gauge.	iquid and essure me	gas asured	 Liquid Carbonic sample, purity 99.999 mole per cent. Matheson sample, purity better than 99 mole per cent. 			
equilibra Samples a	nto cell u ted and sa nalysed by nductivity column.	amples wit GC using	hdrawn. Ja	3. Phillips Petroleum sample, purity better than 99.6 mole per cent.			
				ESTIMATED δT/K =	ERROR: ±0.1; δp,	/MPa = +0	05;
					= ±0.001 (e	estimated	
				REFERENCE	S:	·····	
L				<u> </u>			

Miscellaneous Organic Fluids

			Miscellaneous	S Organic Flu	lds		563
COMPONENTS	:			ORIGINAL M	EASUREMENTS:		
1. Hydro	gen; H ₂ ;	[1333-74-	0]	Eakin, B	.E.; DeVar	ney, W.E.	,
 Hydrogen sulfide; H₂S; [7783-06-4] 1,3,5-Trimethylbenzene, (Mesitylene); C₉H₁₂; [108-67-8] 			Am. Inst <u>1974</u> , 70	. Chem. Er , 80-90.	ng. Symp.	Ser.,	
VARIABLES:				PREPARED B	¥:		
	Temperatu	re, press	ure		C. L. Y	loung	
EXPERIMENT	AL VALUES:			Mole fr	actions		
Т/К	p/MPa	<i>x</i> _{H₂}	^x H ₂ S in liquid	^x C ₉ H ₁₂	^y H ₂	^y H ₂ S in vapo	^y C ₉ H ₁₂
310.9	3.45 6.89 13.79	0.0124 0.0271 0.0525	0.0202 0.0203 0.0253	0.9674 0.9526 0.9224	0.9811 0.9889 0.9926	0.0187 0.0110 0.0073	0.00013 0.00014 0.00008
366.5	3.45 6.89 13.79	0.0174 0.0349 0.0702	0.0235 0.0273 0.0234	0.9590 0.9378 0.9064	0.9520 0.9719 0.9865	0.0465 0.026 4 0.0123	0.00156 0.00171 0.00113
477.6	3.45 6.89 13.79	0.0274 0.0575 0.1135	0.0188 0.0192 0.0218	0.9538 0.9233 0.8647	0.8103 0.9013 0.9384	0.1008 0.0455 0.0279	0.0889 0.0532 0.0338
310.9	3.45 6.89 13.79	0.0121 0.0266 0.0521	0.1547 0.1523 0.1400	0.8332 0.8211 0.8079	0.8632 0.9265 0.9596	0.1367 0.0733 0.0403	0.00015 0.00016 0.00008
366.5	3.45 6.89 13.79	0.0156 0.0288 0.0615	0.1418 0.1624 0.1656	0.8426 0.8089 0.7729	0.7154 0.8238 0.9091	0.2808 0.1739 0.0897	0.00379 0.00226 0.00118
477.6	3.45 6.89 13.79	0.0104 0.0414 0.0965	0.1468 0.1465 0.1518	0.8428 0.8121 0.7518	0.2707 0.6147 0.8071	0.6308 0.3378 0.1905	0.0985 0.0475 0.0241
			AUXILIARY	INFORMATION	 a		
METHOD/APP	PARATUS/PROC	EDURE:		SOURCE AND	PURITY OF N	MATERIALS:	
Stainless steel rocking equilibrium cell fitted with liquid and gas sampling ports. Pressure measured with Bourdon gauge. Components charged into cell under pressure, equilibriated and samples withdrawn. Samples analysed by GC using thermal Conductivity detector and Porapak P column.			<pre>99.99 2. Mathe than 3. Eastm boili ESTIMATED δT/K =</pre>	d Carbonic 9 mole per son sample 99 mole pe an Kodak s ng point l ERROR: ±0.1;	<pre>cent. a, purity pr cent. ample, no co-l63°C. MPa = ±0. estimated</pre>	better ormal	
				REFERENCES	5:		

COMPONENTS:				ORIGINAL MEASUREMENTS:			
1. Hydrog	gen; H,;	[1333-74-	•0]	Eakin, B.E.; DeVaney, W.E.			
	gen sulfic -06-4]	le; H ₂ S;		Am. Inst.	Chem. E	ng. Symp.	
-	-	clohexane,		<u>1974</u> , 70,	80-90.		
(isop	ropylcyclo	hexane); C	9H ₁₈ ;				
VARIABLES:		[69	6-29-7]	PREPARED BY	:		
Те	emperature	e, pressure	3		С. L.	Young	
EXPERIMENT	AL VALUES:			Mole fr	actions	-	
т/к	p/MPa	<i>x</i> _{H₂}	in liquid ^x H ₂ S	1 ^x C ₉ H ₁₈	y_{H_2}	in vapor ^Y H2S	^y C ₉ H ₁₈
	• ·	H 2	H ₂ S	C9H18	• H ₂	- H ₂ S	- C9H18
310.9	3.45 6.89 13.79	0.0171 0.0350 0.0662	0.0210 0.0194 0.0216	0.9619 0.9456 0.9122	0.9809 0.9901 0.9933	0.0188 0.0097 0.0066	0.00027 0.00016 0.00019
366.5	3.45 6.89 13.79	0.0211 0.0455 0.0872	0.0210 0.0189 0.0251	0.9579 0.9356 0.8877	0.9533 0.9802 0.9839	0.0431 0.0181 0.0140	0.00364 0.00164 0.00213
477.6	3.45 6.89 13.79	0.0322 0.0683 0.1344	0.0166 0.0223 0.0225	0.9512 0.9094 0.8431	0.8419 0.9031 0.9240	0.0643 0.0477 0.0265	0.0937 0.0492 0.0495
310.9	3.45 6.89 13.79	0.0154 0.0323 0.0617	0.1403 0.1446 0.1448	0.8443 0.8231 0.7935	0.8575 0.9226 0.9552	0.1421 0.0772 0.0447	0.00031 0.00019 0.00017
366.5	3.45 6.89 13.79	0.0171 0.0396 0.0801	0.1478 0.1485 0.1493	0.8351 0.8119 0.7705	0.7057 0.8375 0.9047	0.2887 0.1589 0.0931	0.00563 0.00364 0.00220
477.6	3.45 6.89 13.79	0.0138 0.0483 0.1160	0.1424 0.1549 0.1560	0.8438 0.7968 0.7280	0.3303 0.6114 0.7696	0.5525 0.3202 0.1912	0.1172 0.0684 0.0392
		·····	AUXILIARY	INFORMATION	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
ME THOD / APP	ARATUS / PROC	EDURE:		SOURCE AND	PURITY OF I	MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Stainless steel rocking equilibrium cell fitted with liquid and gas sampling ports. Pressure measured with Bourdon gauge. Components charged into cell under pressure, equilibriated and samples withdrawn. Samples analysed by GC using a therma conductivity detector and Porapak P column.			99.999 2. Mathes than 9 3. Philli better ESTIMATED EN	mole per on sample 9 mole per ps Petro than 99 RROR:	e, purity er cent.	better .e, purity er cent.	
				$\delta x, \delta y = \pm$ REFERENCES:		stimated k	oy ompiler)
				ł			

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Miscellaneous Organic Fluids

	IVIISCEIIaneo	ous (Organic Fluids		565
COMPONENTS:		- [0	RIGINAL MEASURE	MENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]			•		
2. Hydrogen sulfide; H_2S ; [7783-06-4]			Eakin, B.E.; DeVaney, W.E.		
3. Methane; CH ₄ ; [Am. Inst. Che	m. Eng. Symp. S	Ser.,
<pre>4. 1-Methylethylcy (isopropylcyclo [696-29-7]</pre>	clohexane, hexane); C ₉ H ₁₈ ;		<u>1974</u> , <i>70</i> , 80-	90.	
VARIABLES:		I	PREPARED BY:		
Temperature	, pressure		c.	L. Young	
EXPERIMENTAL VALUES:			······································		
			T/K = 310	.9	
p/MPa		3.45	6.89	13.79	
	<i>x</i> 0.	.011	0 0.0284	0.0613	
Mole fraction	$x_{\rm H_2}$ 0.	.140		0.1362	
in liquid	x_{H_2S} 0.	.030	1 0.0314	0.0339	
	x_{CH_4} 0.	818	1 0.7951	0.7686	
	^{<i>x</i>} C ₉ H ₁₈ 0.				
	2	587	0 0.7740	0.8664	
Mole fraction	- 4 -	.145	1 0.0809	0.0444	-
in vapor		267	6 0.1449	0.0890	
	^y C ₉ H ₁₈ 0.	.000	35 0.00028	0.000230	
cell fitted with sampling ports.	EDURE: ocking equilibrium liquid and gas Pressure measured	n	99.999 mol 2. Matheson s	Y OF MATERIALS: bonic sample, p e per cent. ample, purity b le per cent.	-
with Bourdon gauge Charged into cell	e. Components		3. No details	given	
equilibriated and	samples withdrawn	1.		-	• -
Samples analysed Conductivity deter Column.	Samples analysed by GC using thermal Conductivity detector and Porapak P		4. Phillips Petroleum sample, purity better than 99.9 mole per cent.		
		- [ESTIMATED ERROR:		
				$\delta p/MPa = \pm 0.0$ Ol (estimated h	
		┢	REFERENCES:		
			-		

COME	PONENTS:		ORI	GINAL MEAS	UREMENT	S:	
1.	Hydrogen; H ₂ ; []	L333-74-0]					
2.	Hydrogen sulfide	≥; H ₂ S; [7783-06	-4]	Eakin, B.	. E.;	DeVaney, W.	Ε.
3.	Methane; CH4; [7	74-82-8]	4	lm. Inst.	. Chem.	Eng. Symp.	Ser.,
4.	4. 1-Methylethylcyclohexane, (isopropylcyclohexane); C ₉ H ₁₈ ; [696-29-7]			1 <u>974</u> , 70	, 80-90).	
				Т/К =	366.5		
	p/MPa		3.45	6	.89	13.79	
		² ² H ₂	0.010	0.0.	0235	0.0754	
	Mole fraction	²² ² H ₂ S	0.140	в О.	1405	0.1412	
	in liquid	^ж сн ₄	0.031	3 0.	0317	0.0332	
		^x C ₉ H ₁₈	0.818	0.	7953	0.7503	
		y _{H2}	0.399	5 0.	6824	0.8104	
	Mole fraction	^y H ₂ S	0.259	2 0.	1445	0.0878	
	in vapor	^y CH ₄	0.334	7 0.3	1696	0.0993	
		^y C ₉ H ₁₈	0.006	5 0.0	0035	0.0025	

		2	Г/К = 477.6	
p/MPa		3.45	6.89	13.79
Mole fraction in liquid	^x H ₂ ^x H ₂ S ^x CH ₄ ^x C ₉ H ₁₈	0.0014 0.1437 0.0281 0.8268	0.0381 0.1476 0.0308 0.7835	0.1027 0.1514 0.0309 0.7150
Mole fraction in vapor	^y H ₂ ^y H ₂ S ^y CH ₄ ^y C ₉ H ₁₈	0.0325 0.5395 0.3103 0.1178	0.4444 0.3164 0.1685 0.0707	0.6700 0.1876 0.0976 0.0448

COMPONENTS			ORIGINAL·MEASU			
l. Hydr	ogen; H ₂ ;	[1333-74-0]	Yorizane,	M.; Sadamoto,	s.;	
2. Hydrogen sulfide; H ₂ S; [7783-06-4]			Masuoka, H.; Eto, Y.			
			Kogyo Kaga	ku Zasshi <u>1969</u>	, 72,	
3. Meth	anol; CH40	; [67-56-1]	2174-7.			
VARIABLES:			PREPARED BY:	<u></u>	<u> </u>	
		ure, pressure,		C. L. Young		
	gas comp	DOSITION		C. L. Dung		
EXPERIMENT	AL VALUES:	<u></u>		<u></u>		
T/K	<i>P/</i> MPa	Mole fraction	s in liquid	Mole fractio	ns in gas	
,	,	$x_{\rm H_2}$	x_{H_2S}	y_{H_2}	y _{H2S}	
				2		
273.15	1 01	0.003	0.043	0.925	0.075	
613.15	T.OT	0.006	0.107	0.813	0.187	
		0.002	0.205	0.702	0.298	
		0.003	0.379	0.400	0.600	
		0.002 0.002	0.617 0.688	0.237 0.163	0.763 0.837	
	3.04	0.002	0.043	0.974	0.026	
	5.04	0.007	0.161	0.928	0.072	
		0.007	0.195	0.924	0.076	
		0.009	0.197	0.904	0.096	
		0.007 0.009	0.327 0.409	0.781 0.760	0.219 0.240	
		0.010	0.685	0.672	0.327	
	5.07	0.012	0.050	0.988	0.012	
		0.014	0.149	0.962	0.038	
		0.014	0.194	0.945	0.055	
		0.010 0.013	0.221 0.353	0.945 0.868	0.055 0.132	
		0.015	0.401	0.854	0.146	
		0.018	0.675	0.796	0.204	
243.15	1.01	0.003	0.397	0.813	0.187	
		0.010	0.668	0.692	0.308	
				ont.)		
N/m			INFORMATION			
METHOD /APP.	ARATUS/PROCED	URE:	SOURCE AND PUR	ITY OF MATERIALS:		
Vapor-1	iquid equil	ibrium cell.	1. Purity	99.9 mole per	cent.	
Diagram	given in s	ource.				
(Origina	al in Japan	ese.)	2. Purity	99.0 mole per	cent.	
-	-		-			
			ESTIMATED ERRO	R:	······································	
			$\delta T/K = \pm 0$.1; δx_{H_2} , δx_{H_1}	$_{s} = \pm 0.001$	
				d by compiler)	-	
			REFERENCES:			
			1			

COMPONEN	NTS:		ORIGINAL N	MEASUREMENTS:		
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Hydrogen sulfide; H₂S; [7783-06-4] 3. Methanol; CH₄O; [67-56-1]</pre>			Yorizane, M.; Sadamoto, S.; Masuoka, H.; Eto, Y. Kogyo Kagaku Zasshi <u>1969</u> , 72, 2174-7.			
EXPERIME	ENTAL VALUES	:				
т/к	P/MPa	Mole fractions ^x H ₂	s in liquid ^x H ₂ S	Mole fract. ^Y H ₂	ions in gas ^Y H2S	
243.15	1.01	0.004	0.721 0.776	0.702	0.298 0.345	
	3.04	0.006 0.005 0.006	0.397 0.652 0.704	0.813 0.896 0.971	0.187 0.104	
	3.07	0.010 0.013 0.012	0.333 0.621 0.813	0.977 0.941 0.929	0.023 0.059 0.071	

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	Wiscellation	us Organic Fluids	505	
COMPONENTS: 1. Hydrogen, H_2 ; 2. Methylbenzene C_7H_8 ; [108-88 3. Hexacarbonylb phosphine) di $C_{30}H_{54}Co_2O_6P_2$ [12101-96-1]	<pre>, (toluene); -3] is (tributyl- cobalt;</pre>	ORIGINAL MEASUREMENTS: Kharchenko, A.A.; Legtyareva, L. Zhesko, T.E. Barinov, N.S. Zhur. Fiz. Khim. <u>1975</u> , 49, 2405		
VARIABLES: Pressure,	composition	PREPARED BY: C.L.	Young.	
EXPERIMENTAL VALUES:				
		= 328.15	N-1 (1)	
P _{H2} /atm	Conc. of (3)	H_2 Solubility, M	Mol (1) /mol (3)	
40 60 80 100 120 140 160 180	0.0	0.12 0.18 0.23 0.29 0.34 0.40 0.46 0.52		
40 60 80 100 120 140 160 180	l.5 mass% (0.0192 M)	0.16 0.24 0.32 0.38 0.46 0.53 0.59 0.66	2.1 3.6 4.3 5.1 6.1 6.6 7.0 7.5	
40 60 80 100 120	4 mass% (0.0512 M)	0.19 0.29 0.39 0.50 0.60	1.3 2.3 4.1 4.2 5.0	
	AUXILIA	RY INFORMATION	<u></u>	
METHOD/APPARATUS/PROC Method stated as high pressure me given as reference	an analytical thod and ref. (1)	_	<pre>mole per cent. eagent quality .ven. δM = ±8%.</pre>	
		REFERENCES: 1. Tsiklis, D.S. Technique of Investigation High Pressure Khimiya,Mosco	Physicochemical s at High and Ultra- s.	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333-74-0]	Kharchenko, A.A. Legtyareva, L.V.;		
2. Methylbenzene, (toluene); C ₇ H ₈ ; [108-88-3]	Zhesko, T.E.; Barinov, N.S. Zhur. Fiz. Khim. <u>1975,</u> 49,		
3. Hexacarbonylbis (tributyl- phosphine) dicobalt; C ₃₀ H ₅₄ CO ₂ O ₆ P ₂ ; [12101-96-1]	2405-6.		
EXPERIMENTAL VALUES:			
T/K	= 328.15		
P _{H2} /atm Conc. of (3) H	solubility, Mol (1)/mol (3) M		
140 4 mass % 160 (0.0512 M) 180	0.74 6.6 0.84 7.4 0.98 9.0		
40 8 mass % 60 (0,1025 M) 80 100 120 140 160	0.190.70.291.20.411.80.542.50.683.30.834.21.005.7		
<pre>mol (1)/mol (3) appears to b ing the amount of hydrogen of from the total amount of hydrogen NOTE: Table taken from Russ 49, 1409-10.</pre>	lissolved in the toluene		

COMPONENTS:	EVALUATOR:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Argon; Ar; [7440-37-1]</pre>	Colin L. Young, Department of Chemistry, University of Melbourne, Parkville, Victoria 3052, AUSTRALIA. May, 1980

CRITICAL EVALUATION:

Although this system has been studied by five different groups (1-5) there is a surprising lack of agreement between the various workers. The most extensive study is that of Calado and Streett (1), who studied coexisting vapor and liquid compositions at temperatures from 83 K to 141 K and pressures up to 52 MPa. Volk and Halsey (2) determined liquid phase compositions only, in the temperature range 87 to 140 K and pressures to 10 MPa. Mullins and Zeigler (3) studied coexisting vapor and liquid compositions in the temperature range 68 to 108 K and pressures to 12 MPa. Augood (4) made measurements at 87.4 K at two pressures of 18.4 and 11.6 MPa. Ostronov et al. (5) made measurements from 86 to 113 K at pressures between 1 and 4 MPa.

The very limited data of Augood (4) are consistent with those of Calado and Streett (1). The vapor composition given by Calado and Streett (1) are about 0.03 to 0.05 mole fraction higher than those of Mullins and Zeigler (3) but are sometimes higher and sometimes lower than those given by Ostronov <u>et al.</u> (5). There is reasonable agreement between the data of Volk and Halsey (2), and Calado and Streett (1) for the liquid compositions at 2 MPa but considerable differences at the higher pressures above 100 K. The liquid composition values of Calado and Streett (1) are smaller by about 0.005 than those of Mullins and Zeigler (3). There is fair agreement between the liquid phase compositions of Mullins and Zeigler (3) and Ostronov et al. (5).

The measurements of Calado and Streett (1) were made on ultra high purity samples using a well tried apparatus design and are probably the most accurate. However, in view of the differences between the various workers, the data of Volk and Halsey (2), Mullins and Zeigler (3), Ostronov <u>et al</u>. (5) and Calado and Streett (1) are all classified as tentative. Further measurements with carefully purified samples are needed.

References

1.	Calado, J. C. G.; Streett, W. B. Fluid Phase Equilibria
	<u>1979</u> , 2, 275.
2.	Volk, H.; Halsey, G. D. J. Chem. Phys. <u>1960</u> , 33, 1132.
3.	Mullins, J. C.; Zeigler, W. T. Intern. Adv. Cryog. Engng.
	<u>1960</u> , <i>10</i> , 171.
4.	Augood, D. R. Trans. Instn. Chem. Engnrs. 1957, 35, 394.
5.	Ostronov, M. G.; Shatskaya, L. V.; Finyagina, R. A.;
	Brodskaya, L. F.; Zhironova, N. A.
	Zhur. Fiz. Khim. <u>1977</u> , 51, 2396.

COMPONENTS:	·····		ORIGINAL MEASUREMENTS:				
	n; H ₂ ; [1333-	-74-0]	Augood, D. R. Trans. Instn. Chem. Engnrs.				
_	-						
2. Argon;	Ar; [7440-37-	-1]		-			
			<u>1957</u> , <i>35</i> , 394-4	408.			
VARIABLES:			PREPARED BY:				
	Pressure		C. L.	. Young			
EXPERIMENTAL V							
T/K	P/psig ⁺	<i>P/</i> MPa	Mole fraction	of hydrogen			
		·	in liquid, $x_{\rm H_2}$	in gas, y _{H2}			
87.4	2650 2650	18.37 18.37	0.187 0.181	0.941			
	1670	11.62	0.103	0.948			
	1670	11.62	0.091	0.912			
+	naia nound		inch gauge pressu	120			
	pard - bound	is per square	inch gauge presso	ITE			
	<u></u>		INFORMATION	······································			
		AUXILIARI					
METHOD/APPARA	TUS/PROCEDURE:		SOURCE AND PURITY OF	MATERIALS ;			
Static equ	ilibrium cell f	itted with	1. Electrolytic	sample containing			
magnetical:	ly operated sti	rrer.	0.09 mole per				
	librium had bee d samples of ga		2. British Oxyge	en Company sample.			
phases take	en. The argon	was					
condensed of estimated v	out and both co volumetrically.	Ratio of					
H_2/HD in 1:	iquid estimated	l by mass					
spectromet	cy.		COTMATE PROD				
			ESTIMATED ERROR: $\delta T/K = \pm 0.1; P/$	'MPa = +0]·			
			$\delta x_{\rm H_2}$, $\delta y_{\rm H_2} = 4$ % (e	compiler)			
			REFERENCES :				

COMPONENTS:					ORIGINAL MEASUREMENTS:				
1. Hy	drogen;	H ₂ ; [13	33-74-0];	Volk,	H.; Hals	ey, G. D).		
2. Argon; Ar; [7440-37-1]					em. Phys.	<u>1960</u> , 3	33, 1132-1139.		
VARIABL	ES:			PREPARED	BY:				
Temperature, pressure					Young				
EXPERIM	ENTAL VALUE	:S:		L					
T/K	P/bar	P [†] /bar	Mole fraction of hydrogen in liquid, ^x H ₂		<i>P/</i> bar	P [†] /bar	Mole fraction of hydrogen in liquid, ^x H ₂		
87.0 <i>P</i> =	22.51 24.91 28.01 31.97 37.39 37.75 41.91 45.22 47.22 54.22 57.87 64.27 66.53 68.87 71.38 74.16 77.04 80.22 83.67 87.23	24.54 26.96 30.24 34.44 40.23 40.58 45.02 48.61 50.69 58.22 62.19 69.19 71.48 73.98 76.67 79.63 82.70 86.09 89.74 93.49 of hydro	0.0253 0.0278 0.0308 0.0349 0.0402 0.0408 0.0451 0.0481 0.0499 0.0565 0.0595 0.0652 0.0671 0.0691 0.0712 0.0733 0.0758 0.0780 0.0804 0.0829 gen.	87.0 94.2 P [†]	91.26 14.39 16.04 18.25 21.01 24.83 28.80 30.39 31.99 35.90 40.80 42.29 46.62 52.31 55.07 59.29 61.05 69.19 69.37 = total	97.74 16.74 18.43 20.69 23.87 27.93 32.20 33.89 35.42 39.58 44.94 46.46 51.00 57.00 59.98 64.46 66.40 74.88 75.05	0.0860 0.0189 0.0210 0.0233 0.0268 0.0314 0.0365 0.0384 0.0405 0.0450 0.0450 0.0525 0.0578 0.0642 0.0642 0.0672 0.0711 0.0735 0.0810 0.0820 (cont.)		
	<u></u>		AUXILIARY	INFORMAT	ION				
METHOD	APPARATUS	S/PROCEDU			·	OF MATERIA	LS:		
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Tempera- ture measured with thermocouple and pressure measured with Bourdon gauge calibrated against a dead weight tester. Composition of liquid calculated from number of moles in gas phase and total number of moles.				SOURCE AND PURITY OF MATERIALS: No details given.					
						P/bar =	±0.05;		

,

COMPONENT'S :					ORIGINAL MEASUREMENTS:				
<pre>1. Hydrogen; H₂; [1333-74-0];</pre>					Volk, H.; Halsey, G. D.				
2. Argon; Ar; [7440-37-1]					m. Phys.	<u>1960</u> , 3	33, 1132-1139.		
EXPERI	MENTAL V	ALUES:							
T/K	P/bar	P [†] /bar	Mole fraction of hydrogen in liquid, ^x H ₂	т/к	P/bar	P^{\dagger} /bar	Mole fraction of hydrogen in liquid, ^x H ₂		
94.2	80.00 82.95	86.32 89.36	0.0915 0.0945	120.0	22.42	36.82 39.21	0.0418 0.0455		
100.0	95.51 13.68 15.10 16.79 18.89 21.68 25.53 30.72 31.17 34.08 43.49 45.02 50.02 50.14 56.02 59.43 63.47 66.11 73.68 74.53 85.64 87.28 23.25 25.66 28.73 32.65 38.06 38.24 42.48 47.74 54.51 63.74 63.51 63.74 63.75 85.51	102.39 17.69 19.16 20.92 23.15 26.11 30.10 35.42 35.76 38.82 42.88 48.47 50.65 55.33 61.57 65.09 69.26 71.98 79.77 80.53 91.97 93.63 31.76 34.34 37.52 41.64 47.22 47.40 51.97 57.52 64.81 74.68 76.74 78.91 81.47 93.22 97.58	0.1056 0.0197 0.0214 0.0236 0.0264 0.0306 0.0360 0.0428 0.0435 0.0475 0.0530 0.0600 0.0632 0.0676 0.0684 0.0760 0.0801 0.0801 0.0801 0.0801 0.0801 0.0878 0.0975 0.0975 0.0978 0.1095 0.1115 0.0372 0.0410 0.0458 0.0515 0.0515 0.0515 0.0515 0.0556 0.0662 0.0662 0.0662 0.0662 0.0662 0.0662 0.0662 0.0961 0.0961 0.0960 0.0986 0.1010 0.1042 0.1178 0.1229	130.0	27.34 30.65 34.88 36.07 37.33 40.82 44.91 49.98 56.19 64.12 76.41 25.99 28.59 31.71 36.64 40.32 44.83 45.68 45.68 45.68 45.68 45.68 45.68 45.68 45.68 45.68 45.23 52.23 57.09 62.85 24.96 27.54 29.30 32.21 32.21 35.90 39.22 39.92 41.46 43.76 44.36 52.92 55.18	42.13 45.71 50.27 51.57 53.54 56.61 61.07 66.30 73.05 81.64 95.83 50.20 53.16 56.67 62.24 66.36 71.43 72.33 72.40 73.63 79.08 79.08 79.08 79.08 79.08 79.08 79.77 70.39 72.40 73.85 77.71 78.53 80.26 82.94 83.63 91.01 93.35 95.90	0.0499 0.0552 0.0639 0.0660 0.0680 0.0740 0.0814 0.0902 0.1000 0.1129 0.1299 0.0558 0.0613 0.0670 0.0771 0.0845 0.0932 0.0932 0.0952 0.0952 0.0952 0.0975 0.1078 0.1078 0.1080 0.1169 0.1275 0.0615 0.0670 0.0723 0.0779 0.0796 0.0796 0.0824 0.0833 0.0943 0.0953 0.0943 0.0953 0.0990 0.1044 0.1295		
? = f	fugacity	of hydrog	gen.	$_{P}^{\dagger}$	= tota	l pressu	re.		

Inorganic Compounds

COMPONEN				lonzorviz				
]				ORIGINAL MEASUREMENTS:				
l. De	uterium;	D ₂ ; [7	782-39-0];	Volk,	H.; Hals	sey, G. I	D.	
2. Ar	gon; Ar	; [7440-	-37-1]	J. Che	m. Phys.	<u>1960</u> ,	33, 1132-1139.	
VARIABLE	s:		<u></u>	PREPARED	BY:		<u> </u>	
Temper	ature, p	ressure		С. Г.	Young			
EXPERIME	NTAL VALUE	S:						
т/к	<i>P/</i> bar	P [†] /bar	Mole fraction of deuterium	T/K	<i>P/</i> bar	P [†] /bar	Mole fraction of deuterium	
-/	- / Dur	- /242	in liquid,	-/ **	- / 242	5 7242	in liquid,	
			^{<i>x</i>} D ₂				x_{D_2}	
<u> </u>								
87.0	22.42 24.52	24.34 25.57	0.0317 0.0348	100.0	44.71 48.87	50.44 54.82	0.0734 0.0782	
}	27.12	29.34	0.0381		53.95	60.16	0.0860	
	30.42	32.85	0.0424		60.39	66.92	0.0970	
	34.73 40.31	37.15 43.44	0.0480 0.0557		68.94 80.90	75.84 88.25	0.1088 0.1236	
	48.75	52.54	0.0669		83.31	90.74	0.1270	
	51.26	55.16	0.0693	120.0	18.66	32.86	0.0409	
100.0	53.65 17.54	57.85 21.75	0.0721 0.0298		26.26 32.90	41.25 48.19	0.0574 0.0720	
	19.10	23.38	0.0322		35.64	51.16	0.0771	
	20.90	25.30	0.0353		39.01	55.02	0.0840	
	23.10 25.89	27.63 30.58	0.0388 0.0432		43.15 48.32	59.50 65.08	0.0920 0.1021	
	29.46	34.34	0.0489		53.54	70.69	0.1119	
	34.15	39.30	0.0564					
		P =	fugacity of o	leuteriu	m .			
		P [†] =	total pressu	æ.				
	<u></u>				·····	* <u> </u>		
			AUXILIARY	INFORMATI	ION			
		S/PROCEDU		SOURCE A	ND PURITY	OF MATERIA	ALS:	
			1. Tempera-					
			mocouple and Bourdon gauge					
Calibra	ated agai	inst a de	ad weight	No details given.				
lated		osition o	f liquid calcu- les in gas	•				
phase a	and total	l number	of moles.	[
l								
ļ				1	D ERROR:	77.47		
ļ					±0.1; δ	P/bar =	±0.05;	
				$\delta x_{D_2} < z$	±28.			
				REFERENC	ES:			
				1				
				ł				
1								
				ł				
				1				

HAD - LL

COMPONENTS	5:			ORIGINAL M	EASUREMEN	rs:	
l. Hyd:	rogen; H ₂ ;	: [1333-	74-01	Mullins	. J. C.;	Ziegler, V	л. Т.
		, , , , , , , , , , , , , , , , , , , ,				Cryogen. Eng	
2. Arg	on; Ar;	[7440-73-	11	1	0, 171-1	• •	
2. nrg	on, nr,	[/440 /5	-1	<u>1504</u> , 10	, ., .		
VARIABLES	•		······································	PREPARED B			
				Į			
Tempera	ture, press	sure		C. L. Yo	oung		
EXPERIMEN	TAL VALUES:	Mole fr of hyd		· · · · · · · · · · · · · · · · · · ·		Mole fra of hyd	
T/K	P/bar in	n liquid,	in vapor,	Т/К	<i>P/</i> bar	in liquid,	
		$x_{\rm H_2}$	${}^{\mathcal{Y}}\mathbf{_{H_{2}}}$			$x_{\rm H_2}$	${}^{\mathcal{Y}}$ H 2
86.95	60.87	_	0.9395	105.01	80.99		0.8347
86.97	121.89	-	0.9316	86.95	60.87	0.0636	-
86.94	101.53 81.06	-	0.9397 0.9459		101.60 81.06	0.1024 0.0847	-
	40.87	_	0.9479	86.94	40.87	0.0432	_
	20.25	-	0.9290		20.25	0.02143	-
94.21	121.93	-	0.8955	94.21	121.93	0.1458	-
94.20 94.21	101.67 81.06	-	0.9054 0.9119	94.20 94.21	101.67	0.1207	-
34.41	60.80	_	0.9143	94.21	81.06 60.80	0.0962 0.0720	-
	40.33	-	0.9056		40.33	0.0471	-
	20.40	-	0.8648	94.20	20.40	0.02301	-
99.95	61.21	-	0.8746	99.95	40.53	0.0506	-
99.96	40.53 20.29	_	0.8585 0.7888	99.97 99.94	20.29 121.32	0.02311 0.1644	-
99.90	121.32	-	0.8582	99.94	101.67	0.1351	-
	101.67	-	0.8688	99.96	81.06	0.1058	-
99.95	81.06	-	0.8754	99,94	61.48	0.0789	-
	61.48	-	0.8749	105.01	61.00	0.0827	-
105.01	61.00	-	0.8306	105.00	40.95	0.0529	-
105.00 105.01	40.95 20.53	-	0.8046 0.7065	105.01	20.53 121.17	0.02292 0.1801	-
105.00	121.17	-	0.8168	105.02	101.60	0.1473	_
105.02	101.60	-	0.8291	105.01	80.99	0.1138	-
<u>.</u>	<u></u>		AUXILIARY	INFORMATIO	N		
METHOD/AP	PPARATUS/PR	OCEDURE :		SOURCE AND	PURITY O	F MATERIALS:	
Single r	pass flow a	nparatus	with two	1. and	2. Com	mercial samp	les with
	nent equili					ed purities	
	ture measur					1 99.995 mol	.e per
	ice thermom	*			cent		
	l with Bour						
			iquid argon. romatography				
	in source.		romacography	1			
				1			
				ESTIMATED	EDDOD.		
				_		D/hom - +0	EQ. 2~
						$P/bar = \pm 0.$	5%; δ ^x H ₂
				< ±2%;	$\delta (1 - y_{H_2})$	< ±3%.	
				REFERENCES	5:	· · · · · · · · · · · · · · · · · · ·	
				1			

		norganio	compounds	577
COMPONENTS:			ORIGINAL MEASUR	EMENTS:
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Argon; Ar; [7440-37-1]</pre>			Finyagina, R Zhironova, N	
			Zhur. Fiz. K	him. <u>1977</u> , 51, 2396-2398
VARIABLES:			PREPARED BY:	
Tempera	ture, press	sure		C.L. Young
			J	
EXPERIMENTAL VALU	IES: P/atm	P/MPa	Mole fraction in liquid,	of hydrogen in gas,
	1700	17114	^x H ₂	^y _{H₂}
112.8	10	1.01	0.0041	0.224
]	12	1.22	0.0084 0.0128	0.350 0.434
	14 16	1.42 1.62	0.0128	0.493
	18	1.82	0.0225	0.538
	20	2.03	0.0258	0.574
	25	2.53	0.0367	0.639
	30 35	3.04 3.55	0.0475 0.0584	0.683 0.720
	40	4.05	0.0692	0.746
102	5	0.51	0.0022	0.300
	6	0.61	0.0030	0.412
	7 8	0.71 0.81	0.0047 0.0064	0.477 0.524
	9	0.91	0.0080	0.561
	10	1.01	0.0098	0.591
	12	1.22	0.0132	0.638
	14 16	1.42 1.62	0.0165 0.0198	0.675 0.706
	18	1.82	0.0232	0.730
	20	2.03	0.0266	0.754
	25	2.53	0.0350	0.800
	30 35	3.04 3.55	0.0434 0.0518	0.826 0.830
	40	4.05	0.0600	0.834
		AUXILIARY	INFORMATION	
METHOD /APPARATUS	PROCEDURE:	······································	SOURCE AND PURI	TY OF MATERIALS:
Recirculatin			1. Electr	olytic grade oil vapor ygen removed, dried
magnetic rec liquid and g	aseous samp	oles were		
analysed by sieve. Deta	GC using a ils in sour	5A Molecular	2. Grade per ce	A purity 99.987 mole nt.
			ESTIMATED ERROF	R :
			δT/K =	$\pm 0.01; \delta P = \pm 0.38;$
			δ (1-x _{H₂}), $\delta(1-y_{H_2}) = \pm 1$ %.
			REFERENCES:	

1. Hydrogen; H ₂ ; [1333-74-0] 2. Argon; Ar; [7440-37-1] EXPERIMENTAL VALUES: T/K P/atm P/MPa 93 5 0.51 0.0042 0.636 6 0.61 0.0055 0.667 7 0.71 0.0068 0.694 8 0.81 0.0088 0.718 9 0.91 0.0096 0.739 10 1.01 0.0107 0.758 12 1.22 0.0135 0.789 14 1.42 0.0162 0.815 16 1.62 0.0188 0.815 16 1.62 0.0188 0.835 16 1.62 0.0188 0.835 18 1.82 0.0215 0.851 20 2.03 0.242 0.865 25 2.53 0.310 0.887 30 3.04 0.0376 0.8899 35 3.55 0.0443 0.906 85.93 5 0.51 0.0051 0.828 6 0.61 0.0052 0.815 16 0.61 0.0051 0.887 30 3.04 0.0376 0.899 35 3.55 0.0443 0.906 40 4.05 0.0510 0.916 85.93 5 0.51 0.0051 0.828 6 0.61 0.0062 0.845 7 0.71 0.0074 0.858 8 0.81 0.0086 0.871 9 0.91 0.0096 0.871 9 0.91 0.0096 0.881 10 1.01 0.0107 0.892	aya, L.F
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	51,
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
T/K P/atm P/MPa in liquid, x_{H_2} in gas, y_{H_2} 93 5 0.51 0.0042 0.636 6 0.61 0.0055 0.667 7 0.71 0.0068 0.694 9 0.91 0.0096 0.739 10 1.01 0.0107 0.758 12 1.22 0.0135 0.789 14 1.42 0.0162 0.815 16 1.62 0.0188 0.835 18 1.82 0.0215 0.851 20 2.03 0.0242 0.865 25 2.53 0.0310 0.887 30 3.04 0.0376 0.899 35 3.55 0.0443 0.906 40 4.05 0.0510 0.916 85.93 5 0.51 0.0051 0.828 6 0.61 0.0062 0.845 7 0.71 0.0074 0.858	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	

Inorganic Compounds

COMPONE	NTC .	<u> </u>		OBTOTNAL	MEACUIDENES	100 ·			
			- •	ORIGINAL MEASUREMENTS:					
1. Hy	ydrogen; H	I ₂ ; [1333-74-	-0]	Calado, J. C. G.; Streett, W. B.					
2. AI	rgon; Ar;	[7440-37-1]		Fluid Phase Equilibria					
				<u>1979</u> , 2, 275-282.					
VARIABL	.ES:	<u> </u>		PREPAREI	D BY:				
	Tempera	ature, pressu	re		с	. L. Young			
EXPERIM	ENTAL VALUES								
		Mole frac hydro	ogen			Mole frac hydro			
T/K	P/MPa	in liquid,		т/к	<i>P/</i> MPa	-	in gas,		
1		^{<i>x</i>} H ₂	y_{H_2}			^{<i>x</i>} н ₂	y_{H_2}		
83.09	10.34	0.0865	0.9820	84.50	35.30	0.3022			
	13.93	0.1131	0.9764	04:50	39.64	0.3476	0.8170		
	17.24 21.03	0.1378 0.1630	0.9698 0.9527		43.09 46.54	0.3934 0.4508	0.7770 0.7260		
1	28.48	0.2212	0.9366		48.40	0.4902	0.6968		
	31.03	0.2404	0.9180		49.23	0.5142	0.6835		
83.40	33.09 4.83	0.2549 0.0403	0.9065 0.9836	85.65	49.92 1.38	0.5495 0.0026	0.6584 0.9427		
03.40	8.27	0.0706	0.9830	00.00	2.21	0.0130	0.9688		
1	10.34	0.0876	0.9798		3.65	0.0354	0.9828		
1	13.79	0.1152	0.9740 0.9670		4.20 4.83	0.0404 0.0466	0.9800 0.9764		
	17.44 20.68	0.1426 0.1676	0.9585		5.79	0.0563	0.9802		
]	24.34	0.1922	0.9467		6.89	0.0674	0.9800		
	27.78	0.2144	0.9333 0.9200		8.38 9.44	0.0806 0.0908	0.9808 0.9745		
	31.03 34.47	0.2393 0.2722	0.9200		10.89	0.1036	0.9722		
	39.30	0.3166	0.8590		13.10	0.1226	0.9760		
83.74	45.30	0.4005	0.7623 0.7680		17.37 20.75	0.1577 0.1852	0.9652 0.9502		
84.05	46.54 49.71	0.4158 0.4992	0.6890		23.86	0.2128	0.9393		
	50.68 51.43	0.5190	0.6762 0.6532		28.37	0.2540 (con	0.9057		
 	51.43	0.6246					L.)		
			AUXILIARY			·····			
METHOD,	APPARATUS/PR	OCEDURE:		SOURCE	AND PURITY	OF MATERIALS:			
Reci	culating v	vapor flow app	paratus	1. and	12. Lind	de Division of	Union		
fitte	ed with mag	netically ope	erated	Carbide Co. samples, ultra high					
pump.	. Pressur	e measured wi	ith	purity grade with minimum purity					
manga	anin pressu	re gauge.		of 99.999 mole per cent.					
Tempe	erature mea	sured with pl	atinum						
resis	stance ther	mometer. Sa	mples						
of 1i	guid and g	as analysed u	sing						
1	•	ivity gas ana	-						
1	lls in ref.			ESTIMAT	ED ERROR:				
	LIS IN LEL.	(1).		δT/K =	= ±0.2;	$SP/MPa = \pm 0.05$;		
				δx_{H_2}	$\delta y_{H_2} = \pm 0$	0.005 (may be	larger		
					ne	ear critical p	oint).		
1				REFEREN					
1				1. Str	eett, W.	B.; Calado,	J. C. G.		
1				J.	Chem. The	ermodynamics			
Į				197	<u>8, 10, 10</u>	089.			
				1					

Z. AIG	on; Ar;	2; [1333-74- [7440-37-1]	0]	Fluid Pl	J. C. G. hase Equi , 275–282		W. B.
EXPERI	MENTAL VAI	LUES:	<u></u>	I <u></u>	. <u></u>		<u></u>
		Mole fra hydr				Mole fra	ction of ogen
T/K	P/MPa	in liquid,		T/K	P/MPa	in liquid,	
		<i>^x</i> H ₂	y_{H_2}			<i>^x</i> H ₂	y_{H_2}
85.65	· 31.03	0.2796	0.8765	104.11		0.4340	0.6930
	35.58	0.3284	0.8375		23.59	-	0.6582
	40.95	0.4004	0.7765	111.46	1.72	0.0157	0.0544
	41.78 43.16	0.4066 0.4278	0.7620 0.7507		2.83 4.41	0.0311 0.0565	0.6648 0.7490
	44.82	0.4590	0.7260		6.41	0.0884	0.7870
	46.47	0.4917	0.6740		9.03	0.1352	0.7990
	47.57	-	0.6333		11.03	0.1744	0.7890
90.16	24.27	0.2492	0.9056		14.13	0.2440	0.7533
	27.85	0.2973	0.8605		16.06	0.3071	0.7138
	33.30 36.54	0.3884 0.4311	0.7863 0.7270		17.58 18.75	0.3664 0.4427	0.6762
	37.58	0.4714	0.7068	122.73	3.45	0.0375	0.4406
	38.26	-	0.6795	122.10	4.20	0.0480	0.4986
95.77	1.38	0.0132	0.7877		5.93	0.0802	0.5768
	2.07	0.0213	0.8735		6.45	0.0933	0.5875
	3.45	0.0397	0.9383		7.72	0.1235	0.6089
	5.38	0.0621	0.9513		8.93	0.1501	0.6118
	7.58 9.17	0.0891 0.1025	0.9613 0.9497		10.34 11.03	0.1891 0.2158	0.6050 0.5900
	10.27	0.1142	0.9503		12.06	0.2449	0.5811
	13.10	0.1495	0.9407		12.55	0.2655	0.5654
	14.96	0.1734	0.9243		13.41	0.2854	0.5383
	18.48	0.2223	0.8965		14.27	0.3487	
	20.41	0.2514	0.8645	134.91	4.83	0.0520	0.3110
	21.99	0.2774	0.8550		5.27	0.0682	0.3309
	24.48 25.79	0.3245 0.3459	0.8060 0.7703		5.65 6.27	0.0744 0.0804	0.3425 0.3579
	27.44	0.3914	0.7553		6.55	0.0930	0.3751
	28.96	0.4458	0.7070		6.89	0.1099	0.3768
	29.54	0.4486	0.6910		7.31	0.1147	0.3889
	30.40	0.5375	0.6442		7.86	0.1332	0.3963
104.11	1.10	-	0.6002		8.34	0.1510	0.3961
	1.52	0.0172	0.6892		8.93	0.1692	0.3947
	1.72	0.0177 0.0226	0.7028 0.7367		9.24 9.65	0.1929 0.2177	0.3895 0.3667
	2.07 2.90	0.0336	0.7990		10.14	0.2577	0.2606
	4.07	0.0482	0.8495	141.42	5.10	0.0442	0.1769
	6.20	0.0787	0.8925		5.51	0.0532	0.2003
	8.69	0.1142	0.9053		6.03	0.0680	0.2202
	11.44	0.1572	0.8900		6.48	0.0838	0.2357
	14.00	0.1965	0.8590		7.03	0.1129	0.2441
	17.44	0.2664	0.8170 0.7397		7.41 7.86	0.1247	0.2481
	20.96	0.3600	0.1391		1.00	0.1445	-

COMPONENTS:	
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2.

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1.	Hydrogen;	H ₂ ;	[1333-74-0]
	or Deuterium;	D2;	[7782-39-0]

Neon; Ne; [7440-01-9]

EVALUATOR:

Colin L. Young, Department of Chemistry, University of Melbourne, Parksville, 3052: Vic. AUSTRALIA: June, 1980

The deuterium and neon system has been studied by Simon (1,2) at the triple point of neon. The limited nature of the measurements make evaluation difficult but the same worker's data on the neon and hydrogen system (3) are not consistent with data thought to be reliable (see below). Therefore the data are classified as doubtful. Brouwer *et al.* (4) have studied the liquid-liquid and solid-liquid phase boundaries of the neon-deuterium system.

The hydrogen and neon system has been studied by Simon (3), Streett and Jones (5), Heck and Barrick (6) and by Van't Zelfde and Dokoupil (7).

The data of Heck and Barrick (6) cover vapor-liquid equilibrium from 26 to 42.5 K whereas those of Streett and Jones (5) cover the temperature range 24.6 to 33.7 K. These two sets of data are in good agreement and are classified as tentative.

The data of Simon (3) were presented in graphical form and are not consistent with the data Streett and Jones (5) and are not considered further here. There are considerable inconsistencies between the data of Van't Zelfde and Dokoupil (7) and those of Streett and Jones (5). The former worker's data are claimed to be more accurate but are restricted to a much smaller pressure range. The experimental method of Van't Zelfde and Dokoupil (7) is generally less reliable than that of Streett and Jones (5) or of Heck and Barrick (6) and the evaluator suggests that the more recent data of Van't Zelfde and Dokoupil are in error. The error may be partly due to impurities in the gases (to which the method is very sensitive) or may be due to a systematic error in the volume of the apparatus.

REFERENCES:

- 1. Simon, M. Physica, 1963, 29, 1079
- 2. Simon, M. Phys.Lett 1962 2, 234
- 3. Simon, M. Phys.Lett <u>1963</u>, 5, 319
- Brouwer, J.P.; Hermans, L.J.F.; Knapp, H.F.P.; Beennakker, J.J.M. *Physica*, <u>1964</u>, 30, 1409.
- 5. Streett, W.B.; Jones, C.H. J. Chem. Phys. 1965, 42, 3989
- 6. Heck, C.H.; Barrick, P.L. Advan. Crogenic. Eng. 1965, 11, 349
- 7. Van't Zelfde, P.; Dokoupil, Z. Physica, 1974, 74, 423.

COMPONENTS:			ORIGINAL MEASUREMENTS:			
1. Deuterium; nD ₂ ; [7782-39-0]			Simon, M.			
2. Neon;	Ne; [7440-01-9]	Physica <u>1963</u> , 29, 10	79-1086.		
VARIABLES:			PREPARED BY:			
Pressure			С. L. 3	Young		
EXPERIMENTAL	. VALUES:					
т/к	P/cmHg	P/kPa	Mole fractio in liquid, ^x Ne	on of neon in vapor, ^Y Ne		
24.56	98.2 108.33 111.62 114.16 115.78 116.13 116.15 116.15 116.15 116.15 110.87 84.15 32.51 98.1 105.7 112.5 115.75 115.75 115.7 99.8 67.5 50.5 32.51	130.92 144.43 148.81 152.20 154.36 154.83 154.85 154.85 154.85 154.85 154.85 147.81 112.19 43.34 130.79 140.92 149.99 154.32 154.3 133.1 90.0 67.3 43.34	0.0000 0.0645 0.1015 0.1480 0.2118 0.2641 0.3110 0.4897 0.6104 0.8208 0.8724 0.9337 1.0000 	- - - - - - - - - - - - - - - - - - -		
••••••••••••••••••••••••••••••••••••••	- <u>, ,, ,,,,,,,,,,,,,,,,,,,,,,,,</u> ,,,,,,,,,	AUXILIARY	INFORMATION			
METHOD /APPAR	ATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:			
METHOD APPARATUS/PROCEDURE: Static equilibrium cell. Temperature measured with Platinum resistance thermometer. Composition at dew and bubble points estimated from a knowledge of total volume and amount of substance in systems. Details in source and ref. (1).			 Prepared by electrolysis of heavy water. Mass spectrometry indicated about 1% of HD. 			
			ESTIMATED ERROR: $\delta T/K = \pm 0.003; \delta^P/cm$ $\delta x_{Ne}, \delta y_{Ne} = \pm 1$ %. REFERENCES: 1. Mathot, V.; Stave Young, J. A.; Pan Trans. Faraday Soc 1488.	eley, L. A.; rsonage, N. G.		

COMPONENT	'S :			ORIGINAL 1	MEASUREMEN	TS:	
		H ₂ ; [1333-7		Heck, C. K.; Barrick, P. L. Adv. Cryogen. Engng. <u>1965</u> , 11, 349-355.			
VARIABLES Tempera	S: ature, pr	essure		PREPARED BY: C. L. Young			
EXPEDIMEN	NTAL VALUE			I			
T/K	P/bar	Mole fra of hydr in liquid, ^x H ₂	ogen	т/к	P/bar	Mole fra of hydr in liquid, ^x H ₂	ogen
26.00	$\begin{array}{c} 0.72\\ 2.15\\ 2.28\\ 2.87\\ 3.07\\ 3.41\\ 3.68\\ 3.84\\ 3.88\\ 3.92\\ 4.03\\ 4.05\\ 4.11\\ 4.13\\ 4.11\\ 4.11\\ 4.11\\ 4.11\\ 4.11\\ 4.09\\ 3.92\\ 1.32\\ 2.89\\ 3.57\\ 3.78\\ 4.44\\ 4.57\end{array}$	0.0000 - - 0.0224 0.0409 0.0413 0.0412 0.0469 - 0.7680 0.8120 0.8220 0.8420 0.8630 0.9115 1.0000 0.0000 - 0.0137 - 0.0311	0.0000 0.6370 0.6580 0.7190 - 0.7580 - - - - 0.7950 0.8010 0.8270 0.8210 0.8210 0.8210 0.8400 0.8550 0.9035 1.0000 0.5030 0.5910 0.6650	28.00	5.43 5.84 5.93 5.96 6.01 6.03 5.81 5.76 2.24 2.26 3.26 4.12 6.09 6.79 6.93 6.99 7.02 7.68 7.80 7.84	0.0691 0.6010 0.6510 0.6740 0.7980 0.8400 0.9578 1.0000 0.0000 	
			AUXILIARY	INFORMATIO			
Vapor r Liquid gas chr measure tempera resista:	ecircula and vapo omatogra d by Bou ture mea	rdon gauge a sured with p mometer. D	alysed by ure nd latinum	 Max mil Mati imp ESTIMATEI δT/K = 1 	imum imp lion. heson re- urity 80 DERROR: ±0.05; 0 ±0.1 al	OF MATERIALS; urity 10 par search grade parts per m SP/bar = ±0. pove 10 bar;	. maximum illion.
				REFERENCE 1. Her: Adv	ES: ring, R.	N.; Barric n. Engng. <u>1</u>	

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COMPON	COMPONENTS:			ORIGINAL MEASUREMENTS:				
l. Нус	1. Hydrogen; H ₂ ; [1333-74-0]			Heck, C. K.; Barrick, P. L. Adv. Cryogen. Engng.				
2. Neon; Ne; [7440-01-9]			<u>1965</u> , 1	<u>1965</u> , <i>11</i> , 349-355.				
EXPERI	MENTAL VA	LUES:		<u></u>				
T/K	P/bar	Mole fra of hydr in liquid,	ogen	т/к	K P/bar	Mole fraction of hydrogen in liquid, in vapor,		
	·	<i>x</i> _{H₂}	^y H ₂	·	·	^х _{Н2}	^y _{H₂}	
30.00	7.98 8.24	0.4400 0.6270	0.6960	34.66 37.64	16.0 10.1	0.5220	0.5600	
	8.49 8.55 8.56 8.54 8.50 8.38 8.36 8.31	0.7160 0.7890 0.8310 0.8540 0.8720 0.9137 - 0.9372	0.7430 0.7880 0.8200 0.8400 0.8550 - 0.8980		11.6 13.3 14.0 15.4 16.2 18.0 19.0 21.1	0.0182 0.0439 	0.1060 0.1900 0.2230 0.2740 0.3060 0.3500 0.3640 0.3980	
34.66	8.29 8.11 6.04 7.45 8.00 9.84	1.0000 0.0000 0.0178 0.0243	0.9218 1.0000 0.0000 0.1780 0.2120 0.3410	39.57	13.7 16.5 17.0 19.0 21.3 21.7	0.0000 0.0428 0.0503 0.0896 0.1590 0.1690	0.0000 0.1390 0.1510 0.2100 0.2550 0.2620	
	9.84 10.23 11.8 13.1 14.5 14.9 15.6	0.0560 0.1100 0.1980 0.3070 0.4330	0.3480 0.3630 0.4180 0.4600 0.5070 0.5160 0.5410	42.50	20.8 21.9 23.9 24.1 24.6 25.1	0.0000 0.0176 0.0511 0.0627 0.0693	0.0000 0.0369 0.0817 0.0920 0.0933	

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Streett, W. B.; Jones, C. H. J. Chem. Phys. <u>1965</u> , 42, 3989-3994.
2. Neon; Ne; [7440-01-9]	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of hydrogen T/K P/bar in liquid in vapor, ^x H ₂ ^y H ₂	Mole fraction of hydrogen T/K P/bar in liquid in vapor, ^x H ₂ ^y H ₂
24.59 1.74 0.0133 0.7364 2.15 0.0171 0.7840 2.15 - 0.7843	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6.72 0.1640 0.7130 6.76 0.1729 0.7133 6.77 0.2246 0.7100 6.77 0.2260 0.7102 (cont.)
a Indicates pressure at which 3 phase	s are present.
AUXILIARY	INFORMATION
METHOT /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Recirculating vapor flow apparatus with magnetic pump at ambient temperature. Samples analysed by thermal conductivity. Temperature measured with platinum resistance thermometer. Pressure measured using Bourdon gauge. Details in source.	No details given.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.01 \text{ (up to 10 bar)}; \pm 0.1 \text{ (above 10 bar)}; \\ \delta x_{H_2}, \delta y_{H_2} = \pm 0.001.$ REFERENCES:

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-				ORIGINAL MEASUREMENTS:			
)))	drogen;	H ₂ ; [1333-7	4-0]	Streett, W. B.; Jones, C. H.			
					n. Phys.	1965, 42,	3989-3994.
2. Neo	on; Ne;	[7440-01-9]			, i		
EXPERI	MENTAL VA	Mole fra				Mole fra	
r/ĸ	P/bar	of hydr in liquid,		ጥ/к	P/bar	of hydi in liquid,	
1 / IC	r/Dar	x_{H_2}	^y H ₂	1/1	1/Dai	^π H ₂	^y H ₂
		H 2	⁰ H ₂			H 2	⁵ H ₂
29.00	6.77	0.2243	-	31.51	10.87	0.6971	0.7307
	6.78	0.3248	0.7135		10.98	0.7681	0.7740
	6.78 6.78	0.4093 0.5018	0.7154 0.7211		10.98	0.8505	0.8396
	6.83	0.5552	0.7255		10.64 10.65	0.9441 0.9436	0.9334 0.9325
	6.88	0.6000	0.7319		10.03	0.9719	0.9645
	6.94	0.6375	0.7402	33.73	7.27	0.0308	0.2793
	6.98	0.6940	0.7586		9.34	0.0723	0.4109
	7.10	0.7318	0.7733		11.03	0.1254	0.4830
	7.14	0.7640	0.7873		12.58	0.2486	0.5370
	7.15	0.7933	0.8027		13.65	0.4203	0.5782
	7.16 7.12	0.8168	0.8184		13.82	0.4735	0.5899 0.5914
	7.12	0.8509 0.9183	0.8423 0.9008		13.84 13.89	0.4766 0.4847	0.5914
	6.92	0.9620	0.9495		13 99	0.4860	0.5941
31.51	4.14	0.0099	0.1908	28.65	6.51 ^a	0.1708	0.7265
	5.48	0.0291	0.3784		6.51	0.1695	-
	7.75	0.0803	0.5428		6.51	0.4682	
	9.20	0.1814	0.6054	28.80	6.67 ^a	0.1955	0.7175
	9.83	0.3254	0.6295		6.67	0.1968	-
	10.20 10.24	0.4693 0.4827	0.6504 0.6560		6.67 6.67	0.4282 0.4282	-
	10.48	0.4827	0.6721	28.91	6.76 ^a	0.2323	-
	10,58	0.5970	0.6976		6.76	0.3771	-
	10,70	0.6304	0.6847				
¹ Indic	cates pre	essure at whi	ch 3 phases	are pre	esent.		

COMPONEN	TS:			ORIGINAL MEASUREMENTS:			
l. Hyd	lrogen; 1	H ₂ ; [133]	3-74-0]	Van't Zelfde, P.; Dokoupil, Z.			
2. Neo	n; Ne;	[7440-01	-9]	Physic	a <u>1974</u> ,	74, 423-	434.
VARIABLE	s:		······	PREPARED	BY:		
Temperature, pressure				С	. L. You	ng	
EXPERIME	NTAL VALUE	S:			- <u></u>		
т/к	P/mmHg	P/kPa	Mole fraction of hydrogen in liquid, $x_{\rm H_2}$	т/к	P/mmHg	P/kPa	Mole fraction of hydrogen in liquid, ^x H ₂
$\begin{array}{c} 20.38\\ 20.44\\ 20.68\\ 21.46\\ 22.06\\ 22.71\\ 23.19\\ 24.00\\ 24.24\\ 24.66\\ 24.93\\ 25.76\\ 25.82\\ 25.88\\ 25.90\\ 25.95\\ 26.64\\ 27.05\\ 23.83\\ 24.10\\ 24.37\\ 24.60\\ 24.59\end{array}$	40 47 72 101 143 255 278 342 377 499 511 520 529 537 672 758 305 336 368 368 384 388	5.3 6.3 9.6 13.5 19.1 23.7 34.0 37.1 45.6 68.1 69.3 70.5 68.1 69.3 70.6 89.6 101.1 40.7 49.1 50.2 51.7 51.7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	24.54 24.88 25.00 25.19 25.36 25.67 25.94 20.41 21.49 22.23 23.06 23.84 24.94 24.96 25.07 25.42 25.86 26.55	392 421 438 464 465 474 576 106 149 191 254 330 420 445 446 2513 581 712	52.3 56.1 57.9 58.4 61.9 62.0 63.2 72.1 76.8 14.1 19.9 25.5 33.9 44.7 56.0 59.3 59.5 61.6 68.4 77.5 94.9	0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0020
			AUXILIARY	INFORMATI	ON	<u> </u>	
METHOD /A	PPARATUS/P	ROCEDURE			ND PURITY (E MATERIA	16.
ĺ			cell fitted	1. Purity 99.9 mole per cent.			
	-		transducer.]	_		per cent.
		h known a			····· ·		L
compone	ents. B	ubble poi	nts deter-				
ŀ		ge in slo					
	-	ature cur					
Details	s or appa	ratus in	ref. (1).				
				ESTIMATE	D ERROR:		
				δτ/κ	$= \pm 0.01;$	δP/kΡa	$a = \pm 0.4.$
				Le Do	an't Zelf	hroten, Z.	Omar, M. H.; H. G. M.; 241.

<pre>1. Hydrogen; H₂; [13] 2. Neon; Ne; [7440-0]</pre>			P.; Dok 74, 423-	oupil, Z. 434.	
				, <u></u>	
EXPERIMENTAL VALUES: T/K P/mmHg P/kPa	Mole fraction of hydrogen in liquid, ^x H ₂	т/к	P∕mmHg	P/kPa	Mole fraction of hydrogen in liquid, ^x H ₂
20.38 225 30.0 20.42 228 30.4 20.42 249 33.2 20.98 261 34.8 21.62 283 37.7 22.30 338 45.1 22.33 331 44.1 23.06 391 52.1 23.77 472 62.9 24.39 551 73.5 24.46 524 69.9 24.51 557 74.3 24.53 556 74.1 24.53 555 74.0 24.53 552 73.6 24.54 530 70.7 24.54 530 70.7 24.54 525 70.0 24.54 525 70.0 24.54 525 70.0 24.54 525 70.0 24.54 515 68.7 24.54 515 68.7 24.54 5506 67.5 24.67 514 68.5 24.67 514 68.5 24.67 514 68.5 24.69 526 70.1 24.88 551 73.5 25.02 567 75.6 25.66 654 87.2	$\begin{array}{c} 0.0043\\$	25.85 25.88 25.96 20.46 21.61 22.30 23.23 23.71 24.32 24.55 25.15 25.36 25.56 25.83 20.58 21.67 22.32 23.92 24.42 24.48 24.48 24.48 24.48 24.48 24.48 24.48 24.48 24.48 24.48 24.5 5.00 25.01 25.01 25.01 25.84	694 696 688 710 289 350 392 459 467 474 567 640 686 702 352 471 547 6125 756 724 7751 761 7591 702 742 759 835	92.5 92.8 91.7 94.7 38.5 46.7 52.3 61.2 62.3 63.2 83.2 74.8 75.6 85.3 91.5 93.6 97.3 46.9 62.8 72.9 82.1 96.7 100.8 103.2 83.2 103.8 103.2 83.2 100.8 103.2 83.2 100.8 103.2 83.2 100.5 92.1 93.6 98.9 100.1 106.0 111.3	$\begin{array}{c} 0.0043\\ 0.0043\\ 0.0043\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0074\\ 0.0087\\$

COMPO	NENTS:			EVALUATOR:
1.			[1333-74-0]	Colin L. Young, School of Chemistry, University of Melbourne,
2.	Nitrogen;	N ₂ ;	[7727-37-9]	Parkville, Victoria 3052, Australia.
l				August 1980.

CRITICAL EVALUATION:

This system has been studied by several groups but apart from the work of Streett and Calado (1) there has been no work over a wide range of temperature and pressure. Streett and Calado (1) studied the system from 63 to 110 K and at pressures up to 57 MPa. The first reported measurements on this system were those of Verschoyle (2) who studied four isotherms between 63 and 88 K in the pressure range 0.012 to 22.8 MPa. Although the results are less precise than those of Streett and Calado (1) they are in fair agreement. The measurements of Tsin and coworkers (3), (4) between 78 and 117 K were presented in graphical form and are not considered further. Gonikberg $et \ al.$ (5) studied this system between 79 and 109 K up to pressures of 18 MPa. Their results are in fair agreement with the measurements of Streett and Calado (1). The liquid phase data of Akers and Eubanks (6) for the three isotherms they studied (83, 100, 122 K) are in good agreement with the data of Streett and Calado (1) but their vapor phase data are in fairly poor agreement. Streett and Calado (1) suggested this was partly due to the relatively low purity of Akers and Eubanks (6) samples. The evaluator is inclined to agree as impurities in the samples would be expected to have widely different physical properties from those of the major components (except for argon as an impurity in the nitrogen). There are considerable discrepancies between the data of Augood (7) and Streett and Calado (1) at 67 and 78 K. This is not entirely unexpected in view of the scatter and low precision of Augood's data which are classified as doubtful. Dokoupil and coworker (8), (9) studied the solid-gas equilibrium in the temperature range 35 to 60 K and some vapor compositions up to 75 K. This work is not considered further here as it falls outside the scope of solubility. Yorizane et αl . (11) studied this system at 77.35 K and the data are in reasonable agreement with those of Streett and Calado (1). However, their results show considerable scatter. Maimoni (12) studied this system at 90 and 95 K. The data are limited and show considerable scatter and are therefore classified as doubtful.

The data of Streett and Calado (1) are classified as tentative. Their measurements were carried out in a well-tried apparatus design with ultra pure samples. However their technique does not allow very accurate measurements to be made in the lower pressure region (below 1 MPa).

(cont.)

COMPONENTS :	EVALUATOR:					
<pre>1. Hydrogen; H₂; [1333-74-0] 2. Nitrogen; N₂; [7727-37-9]</pre>	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, Australia. August 1980					
CRITICAL EVALUATION:						
References:						
 Streett, W. B.; Calado, J. C. C 1089. 	G. J. Chem. Thermodynamics <u>1978</u> , 10,					
2. Verschoyle, T. T. H. Phil. Trans 189.	B. Roy. Soc. London A <u>1931</u> , 230,					
3. Ruhemann, M.; Tsin, N. M. Phys.	Z. USSR <u>1937</u> , 12, 389.					
4. Steckel, F. A.; Tsin, N. M. 2hi	ur. Khim. Prom. <u>1939</u> , 16, 24.					
5. Gonikberg, M. G.; Fastowsky, W. Physiochim. URSS 1939, 11,						
	lv. Cryogenic Engng. <u>1960</u> , 3, 275.					
7. Augood, D. R. Trans. Instn. Chen	n. Engnrs. <u>1957</u> , 35, 394.					
8. Dokoupil, Z.; Van Soest, G.; S 1955, <i>A5</i> , 182.	Swenker, M. D. P. Appl. Sci. Res.					
9. Omar, M. H.; Dokoupil, Z. Physi	ca <u>1962</u> , 28, 33.					
10. Dokoupil, Z. Adv. Cryogenic Engr	<i>g.</i> <u>1961</u> , <i>6</i> , 446.					
<pre>11. Yorizane, M.; Yoshimura, S.; M Eng. Conf., Heywood Temple London, <u>1968</u>, p.57.</pre>	Masuoka, H. Proc. 1st Inst. Cryogenic Industrial Publ. Ltd.,					
12. Maimoni, A. Am. Inst. Chem. Eng	. J. <u>1961</u> , 7, 371.					

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H_2 ; [1333-74-0]	Verschoyle, T. T. H.
1. nydrogen; n ₂ ; [1333-74-0]	
2. Nitrogen; N ₂ ; [7727-37-9]	Phil. Trans. A <u>1931</u> ,230, 189-220.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES: Mole fraction of	Mole fraction of
hydrogen T/K ^P /bar in liquid, in vapor	hydrogen , T/K ^P /bar in liquid, in vapor,
x _H y _H	<i>x</i> _H <i>y</i> _H
88.16 17.24 0.024 0.770	68.14 225.79 0.307 0.881
88.14 27.11 0.053 0.833 88.13 41.58 0.092 0.853	68.12 227.79 0.311 0.854 63.15 12.31 0.020 0.987
88.14 56.83 - 0.862	63.17 12.35 0.019 -
88.14 81.06 0.207 0.866	63.16 12.37 0.025 0.984
88.15 105.38 0.283 0.821	63.15 17.32 0.027 0.980
78.1317.420.0230.90578.1437.070.0730.930	63.16 27.05 0.041 0.981 63.17 26.78 0.057 0.984
78.13 56.30 0.119 0.937	63.17 36.78 0.057 0.984 63.17 46.72 0.075 0.982
78.13 80.96 0.175 0.922	63.15 56.24 0.083 0.984
76.13 115.11 0.248 0.895	63.15 56.33 0.085 0.974
78.14 149.32 0.334 0.840 68.12 17.42 0.033 0.973	
68.1217.420.0330.97368.1426.930.0460.976	63.16 90.74 0.121 - 63.14 90.77 0.120 0.963
68.12 36.46 0.066 0.976	63.16 199.98 0.143 0.948·
68.15 46.50 0.076 0.979	63.15 120.01 0.147 0.957
68.1056.620.0940.97368.1090.740.1540.955	63.16 120.02 0.152 -
68.10 90.74 0.154 0.955 68.12 90.86 0.147 0.953	63.15 120.05 0.146 0.968 63.16 149.30 0.163 -
68.10 120.04 0.181 0.944	63.17 149.35 0.172 0.957
68.12 149.36 0.219 0.922	63.16 149.36 0.173 -
68.14149.390.2200.90868.14178.740.2520.903	63.15 149.39 0.168 -
68.14 178.74 0.252 0.903 68.11 206.54 0.296 0.870	
68.12 213.07 0.296 0.883	
AUXILIA	RY INFORMATION
METHOF /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell fitted with liquid and vapor sampling ports and	 Commercial sample passed over hot copper and through silica gel at
magnetically operated stirrer.	liquid air temperature.
Pressure measured on pressure balance (dead weight gauge). Temperature	2. Frepared by action of Sourain
measured with platinum resistance	nitrite on ammonium sulfate, chemi-
thermometer. Gas analysed by com-	cally purified by passing through
pustion and absorption. Some detai	ls chromic acid and hot copper.
in source.	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.02; \delta P/bar = \pm 0.05; \delta x_{H_2},$
	$\delta y_{H_2} = \pm 0.005.$
	REFERENCES:

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COMPONENTS :			ORIGINAL MEASUREMENTS:		
l. Hydroge	en; H ₂ ; [1333	3-74-0]	Gonikberg, M.; Fastowsky, W.;		
			Gurwitsch, J.		
2. Nitrogen; N ₂ ; [7727-37-9]			Acta Physicochimica URSS 1939, 11,		
			865-881.		
VARIABLES:			PREPARED BY:	<u></u>	
	Temperature,	pressure	C. L. Yc	oung	
EXPERIMENTAL	VALUES:		Mole fraction c	of hydrogen	
T/K	P/kg cm ⁻²	<i>P/</i> MPa	in liquid,	in gas,	
			^{<i>x</i>} _{H₂}	y_{H_2}	
79.0	1.2	0.12	0.0	0.0	
79.0	18.9	1.85	0.042	0.910	
79.0	34.4	3.37	0.069 0.107	0.936	
79.0 79.0	53 69	5.2 6.7	0.158	0.936	
79.0	81	7.9	0.173	0.913	
79.0	98	9.6	0.199	0.915	
79.0	103	10.1	0.213	0.902 0.889	
79.0 78.95	111 124	10.9 12.2	0.224 0.266	-	
78.9	124	12.4	0.271	-	
79.0	148	14.5	0.337	0.820	
79.0	158	15.5	0.364 0.457	0.805 0.697	
79.0 86.1	181 2.5	17.8 0.25	0.000	0.000	
86.1	24.1	2.36	0.052	0.830	
86.1	45.0	4.41	0.098	0.865	
86.0 86.1	69 80	6.8 7.8	0.160	0.870	
86.05	106	10.4	0.255	0.841	
86.05	113	11.1	0.269	-	
86.1 86.1	126	12.4 13.1	0.337 0.375	0.801 0.770	
86.1	134 141	13.8	0.430	0.566	
	·····	AUXILIARY	(cont.)		
METHOD /APPARA	TUS/PROCEDURE:	<u></u>	SOURCE AND PURITY OF MATERI	ALS:	
Recirculat	ing vapor flow	apparatus.			
	ed by method c				
-	using a gas d		No details giv	en.	
balance.	Details of ap	paratus in			
source ref	erence.				
			ESTIMATED ERROR:		
			$\delta T/K = \pm 0.07; \delta P/MPa$	= ±0,02 up to	
			5 MPa, ±0.1 above 5 MP		
			$\delta x_{\rm H_2}, \ \delta y_{\rm H_2} = \pm 2.0$ %.		
			REFERENCES:		
			1. Stock, A.; Ritter,	G.	
			Z. Phys. Chem. <u>1926</u>		
			l		

Inorgan	ic C	Comp	ounds
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COMPONENT	c .		ORIGINAL MEASUREMEN	NTC •
COMPONENT		3-74-0]	Gonikberg, M.; Fas	
I. Hydrog	en, n ₂ , [155.)-/4-0]	Gurwitsch, J.	scowsky, w.,
2. Nitrog	en; N ₂ ; [772]	7-37-9]	Acta Physicochimico	u URSS <u>1939</u> , 11,
			865-881.	
EXPERIMEN	TAL VALUES:			
T/K	$P/kg \text{ cm}^{-2}$	P/MPa	Mole fraction o	
17K	r/kg Cm -	r/MPa	in liquid, ^x H ₂	in gas, ^y H ₂
				<u></u>
95.4	5.5	0.54	0.000	0.000
95.35 95.35	13.5 25.7	1.32 2.52	0.027 0.042	0.516 0.692
95.4 95.4	43.8 63	4.30 6.2	0.102 0.162	0.730 0.733
95.45 95.35	79 94	7.7 9.2	0.221 0.277	0.727 0.722
95.4 95.35	113 119	11.1 11.7	0.394 0.417	0.691 0.635
95.35 109.0	120 13.3	11.8	0.432 0.000	0.473 0.000
109.0	19.6 35.0	1.92 3.43	0.018	0.207 0.423
109.0	46.4 59	4.55	0.103 0.156	0.489
109.05	80	7.8	0.284	0.457

COMPONENTS:		·	ORIGINAL MEASUREMENTS	:
l. Hydro	gen; H ₂ ; [[1333-74-0]	Augood, D. R.	
2. Nitro	gen; N ₂ ; [7727-37-9]	Trans. Instn. Ci	hem. Engnrs.,
	-		1957, 35, 394-40	08
VARIABLES:			PREPARED BY:	
Pressure		C. L. Young		
EXPERIMENTA	L VALUES:		l	······
			Nole freshier	f huðra son
т/к	P/psig ⁺	P/MPa	Mole fraction of in liquid, $x_{\rm H_2}$	in gas, y _{H2}
77.7	2580	17.89	0.451	0.882
	2430 2250	16.86 15.62	0.407 0.473	0.835
	2225 1660	15.44 11.55	0.411 0.307	0.870 0.920
	1260 400	8.79 2.86	0.217 0.071	- 0.923
	380	2.72	0.063	0.942
67.0	1270 1250	8.86 8.72	0.035 0.039	0.971
		AUXILIARY	INFORMATION	
METHOD/APPA	RATUS/PROCEDUR	E:	SOURCE AND PURITY OF	MATERIALS;
		ell fitted with	1. Electrolytic	
	ally operate uilibrium ha		0.09 mole per	
establis	hed samples	of gas and The nitrogen	2. British Oxyger	Company sample.
was cond	ensed out an			
Ratio of	H,/HD in li	quid estimated		
by mass :	spêctrometry	•	ESTIMATED ERROR:	
			$\delta T/K = \pm 0.1; P/$	
			$\delta x_{\rm H_2}, \ \delta y_{\rm H_2} = 4\%$	estimated by compiler)
			REFERENCES:	

COMPONENTS: 1. Hydro			OBTOTIVAL MELOURS STORE	
T HARD	gen; H ₂ ; [13	22-74-01	ORIGINAL MEASUREMENTS:	nka I C
-			Akers, W. W.; Euba	
2. Nitrogen; N ₂ ; [7727-37-9]		Adv. Cryogenic Engn	g. <u>1960</u> , 3,	
			275-293.	
_				
VARIABLES:		PREPARED BY:		
Temperature, pressure		C. L. Young		
EXPERIMENTA	AL VALUES:			
			Mole fraction	
T/K	P/psia	<i>P/</i> MPa	in liquid, ^x H ₂	in gas, ^y H2
			H ₂	³ H ₂
83.15	315	2.17	0.0487	0.8655
	500	3.45	0.0763	0.8948 0.8700
	1400 2000	9.65 13.79	0.2300 0.3446	0.8700
99.82	315 500	2.17 3.45	0.0377 0.0741	0.5509 0.6686
	800	5.52	0.1384	0.72795
	1100 1400	7.58 9.65	0.2116 0.3030	0.7175 0.6530
122.04	500	3.45	0.0261	0.0821
		AUXILIARY	INFORMATION	
METHOD /APPA	ARATUS/PROCEDURE:	AUXILIARY	INFORMATION SOURCE AND PURITY OF MATH	ERIALS;
	ARATUS/PROCEDURE: ating vapor flo			ERIALS:
Recircula	ating vapor flo		SOURCE AND PURITY OF MATH	ERIALS: .7 mole per cent.
Recircula fitted war temperate	ating vapor flo ith magnetic pour ure. Cell mag	ow apparatus ump at ambient de of type 303	SOURCE AND PURITY OF MATH	
Recircula fitted wards temperatu stainless	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres	ow apparatus ump at ambient de of type 303 ssure measured	SOURCE AND PURITY OF MATH	
Recircula fitted with temperatu stainless with Bound	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and	ow apparatus ump at ambient de of type 303 ssure measured temperature	SOURCE AND PURITY OF MATH	
Recircula fitted wa temperatu stainless with Boun measured	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan	SOURCE AND PURITY OF MATH	
Recircula fitted was temperatu stainless with Boun measured thermocou	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample	ow apparatus ump at ambient de of type 303 ssure measured temperature onstantan es of both	SOURCE AND PURITY OF MATH	
Recircula fitted with temperatu stainless with Bound measured thermocouphases and	ating vapor flo ith magnetic po ure. Cell mad s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato-	SOURCE AND PURITY OF MATH	
Recircula fitted wi temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried.	.7 mole per cent.
Recircula fitted wi temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: δT/K = ±0.06; δP/M	.7 mole per cent.
Recircula fitted with temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \delta P/N$ $\delta x_{H_2}, \delta y_{H_2} = \pm 2$ %.	.7 mole per cent.
Recircula fitted with temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: δT/K = ±0.06; δP/M	.7 mole per cent.
Recircula fitted wi temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \delta P/N$ $\delta x_{H_2}, \delta y_{H_2} = \pm 2$ %.	.7 mole per cent.
Recircula fitted with temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \delta P/N$ $\delta x_{H_2}, \delta y_{H_2} = \pm 2$ %.	.7 mole per cent.
Recircula fitted wi temperatu stainless with Boun measured thermocou phases an graphy us	ating vapor flo ith magnetic po ure. Cell mac s steel. Pres rdon gauge and with copper-co uples. Sample nalysed by gas sing a thermal	ow apparatus imp at ambient de of type 303 ssure measured temperature onstantan es of both chromato- conductivity	SOURCE AND PURITY OF MATH 1 and 2. Purity 99 Dried. ESTIMATED ERROR: $\delta T/K = \pm 0.06; \delta P/N$ $\delta x_{H_2}, \delta y_{H_2} = \pm 2$ %.	.7 mole per cent.

Hydrogen and Deuterium Solubilities above 200kPa

.

COMPONENTS :			ORIGINAL MEASUREMENTS:		
ł	u. [1335	-74-01			
 Hydrogen; 			Maimoni, A.		
2. Nitrogen; N ₂ ; [7727-37-9]			Am. Inst. Chem. Engnrs. J.		
			<u>1961</u> , <i>3</i> , 371-375.		
				i	
VARIABLES:			DEDADED BY		
VARIABLES .			PREPARED BY:		
Tem	perature, pr	essure	C. L.	Young	
			l		
EXPERIMENTAL VAL	JUES:		Mole fractio	n of hydrogen	
	_		in liquid,	in gas,	
т/к	P/lbs in ⁻²	P/MPa	^x H ₂	y_{H_2}	
90.00	52.14	0.3595	0	0	
90.02	259.0	1.7857	-	0.7324	
90.02 90.01	196.76 188.20	1.3566	0.0248 0.0232	0.6732 0.6619	
90.01	171.91	1.2976 1.1853	0.0232	0.6367	
90.02	164.42	1.1336		0.6247	
90.03	142.74	0.9842	-	0.5791	
90.04 89.99	148.07 122.35	1.0209 0.8436	0.0164 0.0119	0.5903 0.5217	
90.01	88.96	0.6134	-	0.3753	
90.01	146.00	1.0066	0.0159	0.5855	
90.06 90.04	354.19 666.51	2.4421 4.5954	0.0534 0.1115	0.7800 0.8304	
95.00	78.43	5.4076	0	0	
95.02	160.87	1.1092	0.0149	0.4492	
95.00 94.99	380.24 657.44	2.6217 4.5329	0.0566 0.1121	0.7005 0.7643	
		AUXILIARY	INFORMATION		
METHOD /APPARATUS	/PROCEDURE :		SOURCE AND PURITY OF MATH	FRIATS	
Recirculating		annaratuc	1. Purified by pass:		
The vapor was			vated charcoal a	t liquid 🛛 🗍	
-			nitrogen temperat		
double acting	_	-	99.970 mole per of spectrometry.	cent by mass	
situated outs		-	2. Purified by passing over acti-		
cryostat. I		_	vated charcoal at	t dry ice	
analysed by C	optical inter	ferometry.	temperature. Pu		
Temperature m	easured with	thermo-	mole per cent by metry.	mass spectro-	
couples and p	ressure with	dead			
weight piston	gauge.		ESTIMATED ERROR:		
			$\delta T/K = \pm 0.02; \delta^P/N$	$IP_{a} = \pm 0.002$	
			$\delta x_{\rm H_2}, \ \delta y_{\rm H_2} = \pm 0.001$		
			REFERENCES:		
				[

		÷	ORIGINAL MEASUREMENTS:	~~~~	
<pre>l. Deuterium; D₂; [7752-39-0]</pre>			Maimoni, A.		
2. Nitro	gen; N ₂ ; [7727.	-37-9]	Am. Inst. Chem. Engnrs. J.		
			1961, 3, 371-375.		
			<u>1,01</u> , 0, 0,1 0,00		
VARIABLES: Temperature, pressure			PREPARED BY:	<u></u>	
			с. г	. Young	
EXPERIMENTA	AL VALUES:		L	·····	
			Mole fraction	of deuterium	
m /17	P/lbs in ⁻²	P/MPa	in liquid,	in gas,	
т/к	P/105 1n -	Р/мра	²⁰ D ₂	^y D ₂	
90.00	52.14	0.3595	0	0	
89.99	172.86	1.1918	0.0250	0.6403	
90.05 89.99	112.29 351.57	0.7742 2.4240	0.0122 0.0639	0.4910 0.7819	
90.05	613.40	4.2292	0.1214	0.8268	
90.00	1011.59	0.6975	0.2169	0.8264	
95.00	78.43	0.5408	0	0	
95.01 95.00	987.71 517.83	6.8100 3.5703	0.2160 0.9077	0.7678 0.7446	
		AUXILIARY	INFORMATION		
METHOD /APPA	ARATUS/PROCEDURE:	<u> </u>	SOURCE AND PURITY OF MAT	TERIALS:	
Recircula	ating vapor flow	annaratus	1. Purified by pas	sing over acti-	
			vated charcoal		
-	r was recirculate	-	nitrogen temper	ature. Purity	
	cting mercury pis		99.61 mole per spectrometry.	cent by mass	
Situatod	outside the low				
Cryostat. Liquid and gas samples				alma a	
	. Liquid and ga	-	2. Purified by pas		
cryostat.	. Liquid and ga by optical inter	s samples	2. Purified by pas vated charcoal temperature. P	at dry ice urity 99.974	
cryostat. analysed	by optical inter	s samples ferometry.	2. Purified by pas vated charcoal temperature. P mole per cent b	at dry ice urity 99.974	
Cryostat. Analysed Femperatu	by optical inter ure measured with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P	at dry ice urity 99.974	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry.	at dry ice urity 99.974	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry.	at dry ice urity 99.974 y mass	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry.	at dry ice urity 99.974 y mass MPa = ±0.002;	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry. ESTIMATED ERROR: $\delta T/K = \pm 0.02; \delta P/$ $\delta x_{D_2}, \delta y_{D_2} = \pm 0.00$	at dry ice urity 99.974 y mass MPa = ±0.002;	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry. ESTIMATED ERROR: δT/K = ±0.02; δP/	at dry ice urity 99.974 y mass MPa = ±0.002;	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry. ESTIMATED ERROR: $\delta T/K = \pm 0.02; \delta P/$ $\delta x_{D_2}, \delta y_{D_2} = \pm 0.00$	at dry ice urity 99.974 y mass MPa = ±0.002;	
cryostat. analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry. ESTIMATED ERROR: $\delta T/K = \pm 0.02; \delta P/$ $\delta x_{D_2}, \delta y_{D_2} = \pm 0.00$	at dry ice urity 99.974 y mass MPa = ±0.002;	
Pryostat. Analysed Temperatu Couples a	by optical inter ure measured with and pressure with	s samples ferometry. thermo-	2. Purified by pas vated charcoal temperature. P mole per cent b spectrometry. ESTIMATED ERROR: $\delta T/K = \pm 0.02; \delta P/$ $\delta x_{D_2}, \delta y_{D_2} = \pm 0.00$	at dry ice urity 99.974 y mass MPa = ±0.002;	

COMPONENTS :		<u> </u>	ORIGINAL MEASUREMENT		
	H ₂ ; [1333-	74-01			
1. nyurugen,	M2, [1335-	/4=0]	Yorizane, M.; Yoshimura, S.; Masuoko, H.; Toyama, A.		
2. Nitrogen; N ₂ ; [7727-37-9]			Proc. ICECI, <u>1968</u> , p.59. Heywood Temple, London.		
VADIADIEC.					
VARIABLES: Temperature, pressure		sure	PREPARED BY: C.L.	Young	
EXPERIMENTAL VAL	UES:				
T/K	P/atm	P/MPa	Mole fraction in liquid	of hydrogen in vapor	
			^x H ₂	^x H ₂	
77.35	5	0.51	-	0.749	
	10 20	1.01 2.03	0.018 0.036	0.858 0.913	
	30	3.04	0.036	0.913	
	50	5.07	0.107	0.933	
	70 90	7.09 9.12	0.156 0.190	0.925 0.911	
	100	10.13	0.196	0.911	
	110	11.15	0.214	0.889	
	130	13.17	0.337	0.876	
	150 150	15.20 15.20	0.347 0.362	0.843 0.831	
			<u></u>		
		AUXILIARY	INFORMATION		
METHOD APPARATUS	/PROCEDURE:		SOURCE AND PURITY OF	F MATERIALS:	
Vapor recycle with magnetic measured with thermometer a with Bourdon liquid sample expanded to 2 ature, analys in source.	pump. Temp platinum re nd pressure gauge. Vapo d simultaneo 00 cm ³ at ro	perature esistance measured or and ously and oom temper-		ties 99.99 mole cent or better.	
			, 		
			ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta P$, MPa; ± 0.1 above	$/MPa = \pm 0.03 \text{ up to } 7.5$ 7.5 MPa; δx_{H_2} , δy_{H_2}	
				d by compiler).	
			REFERENCES :		

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Hydrogen; H ₂ ; [1333	3-74-0]	Streett, W.B.; Calado, J.C.G.		
2. Nitrogen; N ₂ ; [7727-37-9]		J. Chem. Thermodynamics, <u>1978</u> , 10, 1089-1100.		
VARIABLES:		PREPARED BY:		
Temperature, pressu	re	C.L. Yo	ung	
EXPERIMENTAL VALUES: T/K	Pressure /MPa	Mole fraction in liquid ^{\$\vee{H}_2\$}	of hydrogen in gas ^y H2	
63.19 70.35	19.17 20.82 25.30 27.85 30.61 33.57 35.99 39.02 42.33 46.40 49.64 52.05 53.36 57.22 1.45 3.52 5.93 8.27 12.13 15.51 19.37 24.68 26.41 27.44	0.201 0.214 0.211 0.255 0.276 0.294 0.298 0.325 0.352 0.372 0.407 0.434 0.471 0.536 0.032 0.068 0.105 0.138 0.197 0.242 0.290 0.383 0.414 0.447	0.916 0.898 0.890 0.884 0.877 0.869 0.853 0.815 0.785 0.771 0.735 0.696 0.961 0.967 0.962 0.954 0.936 0.897 0.874 0.808 0.783 0.771	
	AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCED Recirculating vapor flo fitted with magneticall pump. Pressure measure pressure gauge. Temper measured with platinum thermometer. Samples o analysed using a therma gas analyser.	w apparatus y operated d with manganir ature resistance f liquid gas	moles per cent.	btained from the on Carbide Corp.	
		ESTIMATED ERROR: $\delta T/K = \pm 0.01; \ \delta P/I$ $\delta x, \delta y = \pm 0.001.$ REFERENCES:	MPa = ±0.05;	

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Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS		ORIGINAL M	MEASUREMENTS
 Hydrogen; H₂; 	[1333-74-0]	Streett,	W.B.; Calado, J.C.G.
2. Nitrogen; N ₂ ;	[7727-37-9]	J. Chem. 1089-1100	Thermodynamics, <u>1978</u> ,10,).
EXPERIMENTAL VALUE	ES :		
T/K	Pressure /MPa	Mole fraction in liquid,	in gas,
		[∞] н ₂	y _{H2}
70.35	28.68 29.30	0.487 0.536	0.725 0.690
77.55	1.03 2.07 3.44 4.48 7.03 8.62 10.48 13.79 14.55 15.58 17.10 18.62 19.30	0.026 0.046 0.064 0.140 0.173 0.214 0.286 0.306 0.335 0.373 0.433 0.474	0.886 0.914 0.931 0.928 0.921 0.919 0.918 0.873 0.862 0.840 0.820 0.762
83.67	19.44 11.27 12.72 13.86 14.34 14.96 15.31	0.273 0.325 0.360 0.384 9.410 0.429	0.731 0.826 0.798 0.765 0.747 0.711
90.79	15.68 1.86 2.48 3.45 4.55 6.07 7.31 9.17 10.55 11.86 12.76	0.465 0.034 0.047 0.072 0.099 0.144 0.178 0.237 0.289 0.349 0.349 0.407	0.683 0.685 0.748 0.794 0.816 0.823 0.822 0.803 0.779 0.776 0.746 0.698
100.00	1.45 2.07 2.96 4.14 5.34 6.34 7.48 8.55 9.45 10.34	0.018 0.031 0.056 0.090 0.128 0.158 0.207 0.248 0.301 0.361	0.338 0.490 0.587 0.656 0.682 0.688 0.689 0.674 0.645 0.606
110.30	2.38 3.17 3.90 4.69 5.07 5.72 6.17 6.62 7.55 7.79	0.029 0.055 0.080 0.107 0.125 0.153 0.172 0.202 0.260 0.286	0.253 0.361 0.426 0.463 0.477 0.489 0.491 0.486 0.456 0.421

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] Carbon monoxide; CO; [630-08-0] 	Colin L. Young Department of Chemistry, University of Melbourne, Parkville, 3052, Victoria, <u>AUSTRALIA</u> : September, 1980.

The most extensive study of this system has been undertaken by Tsang and Streett (1) who reported seven isotherms in the temperature range 70 to 125K up to pressures of 53 MPa. They located the mixture critical line over the same temperature range. Verschoyle (2) reported the first work on this system and reported four isotherms, 68.2K, 73.2K, 83.2K and 88.2K in the pressure range 1.7 to 22.8 MPa. He also made some measurements in the vapor-solid region at 58.2 and 63.2K at pressures up to 18 MPa.

Ruhemann and Tsin (3) investigated this system at three temperatures, 78, 83 and 90K at pressures up to 5 MPa. However, their data were presented in graphical form and are not considered further here. Dokoupil *et al* (4) studied the vapor-solid region in the temperature range 32 to 70K and pressures up to 5MPa but did not study liquidvapor equilibrium in detail and their results are not considered further. Augood (5) studied this system at the isolated temperature of 81.4K at two pressures and his results deviate somewhat from the data of Tsang and Streett (1) and are classified as doubtful.

Akers and Eubanks (6) studied three isotherms at 83, 100 and 122 K up to pressures of 24 MPa and Yorizane *et al* (7) studied three isotherms \cdot at 77.2, 103 and 123 K up to pressures of 15 MPa. The latter work was not extensive. The data of Verschoyle (2) Akers and Eubanks (6), Tsang and Streett (1) and Yorizane *et al* (7) are all in fair agreement in the overlapping ranges of temperature and pressure. The data of Tsang and Streett (1) are probably the most reliable and are classified as tentative. Compared with Tsang and Streett's data (1) those of Akers and Eubanks (6) were obtained on gases of lower purity, the data of Yorizane *et al* (7) are limited and of lower precision and the data of Verschoyle were determined fifty years ago with consequent lower precision in analysis.

REFERENCES:

- 1. Tsang, C.Y.; Streett, W.B. in press
- 2. Verschoyle, T.T.H. Phil. Trans. 1931, A230, 189.
- Ruhemann, M.; Tsin, N. Phys. Z. Sovietunion, <u>1937</u>, 12, 389. C A.<u>1938</u>, 32, 2416.
- Dokoupil, Z.; Van Soest, G.; Swenker, M.D.P. Appl. Sci. Res. 1955, A5, 182.
- 5. Augood, D.R. Trans. Instn. Chem. Engnrs. 1957, 35, 394.
- 6. Akers, W.W.; Eubanks, L.S.; Adv. Cryogenic. Engng. 1960, 3, 275.
- Yorizane, M.; Yoshimura, S.; Masouka, H.; Toyama, A. Proc. ICECI, p.57. Heywood Temple Industrial Publ. London, <u>1968</u>

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COMPONENTS:			ORIGINAL MEASUREMENTS:	
l. Hydrog	en; H ₂ ; [1333	-74-0]	Verscholye, T. T.	н.
2. Carbon	monoxide; CO;	[630-08-0]	Phil. Trans. <u>1931</u> ,	, A230, 189-220.
VARIABLES:			PREPARED BY:	
Т	emperature, pre	ssure	(L. Young
EXPERIMENTAL			l	·····
EXPERIMENTAL	ALUES:		Molo fraction	n of hydrogen
T/K	P/atm	P/MPa	in liquid,	in vapor,
			[∞] H ₂	^{<i>y</i>} H ₂
88.15	2.18	0.221	0.00	0.00
88.13	17.2	1.74	0.036	0.840
88.15 88.15	22.1 31.4	2.24 3.18	0.052 0.071	0.866 0.888
88.15	55.4	5.61	0.126	_
88.15	55.8	5.65	0.129	0.893
88.14	55.9	5.66	0.134	0.902
88.16 88.13	89.3 89.6	9.05 9.08	0.203 0.217	0.888 0.887
88.15	128.0	12.97	-	0.867
88.16	128.1	12.98	0.304	-
88.12	128.2	12.99	0.303	0.848
83.14 83.15	166.7 181.3	16.89 18.37	0.410 0.454	0.771 0.704
83.15	1,18	0,120	0.00	0.00
83.13	17.2	1,74	0.027	0.899
83.13	51.2	5,19	0.102	0.931
83.14 83.14	51.2 89.5	5.19 9.07	0.125 0.195	0.932 0.918
83.16	89.3	9.07	0.170	0.920
83.13	109.6	11.11	0,206	0.906
83.13 83.13	109.8 109.8	11.13 11.13	0.210 0.228	0.907 0.904
			(cont	.)
METHOD APPAR	ATUS/PROCEDURE:		SOURCE AND PURITY OF M	ATERIALS
				ALERIALD,
liquid and	uilibrium cell : d vapor sampling lly operated st:	g ports and		ole passed over hot ough silica gel at perature.
Pressure i	measured with p	ressure	2. Prepared by th	e action of
balance (dead weight gaug	ge).		on sodium formate.
Temperatu	re measured with	n platinum		M Sourum rormaco.
-	e thermometer.	Gas	Distilled.	
			Ì	
	by combustion ar		ESTIMATED ERROR:	
tion. So	ome details in s	source.	$\delta T/K = \pm 0.02; \delta P/$	'MPa = ±0.005;
			$\delta x_{\rm H_2}, \ \delta y_{\rm H_2} = \pm 0.00$	
			REFERENCES :	
			}	

Inorganic Compounds

2. Carbo	n monoxide; CC): [630-08-0]	Phil. Trans. 1931	. A 230. 189-220.
EXPERIME	NTAL VALUES:			
T/K	<i>P</i> /atm	P/MPa		n of hydrogen in vapor,
1/1	1/a Liii	+/mra	in liquid, ^x H ₂	y_{H_2}
			n ₂	- n ₂
83.15	128.1	12.98	0.254	0.888
83.13	128.1	12.98	0.249	0.889
83.18 83.13	166.7	16.89	(0.292)	0.840
83.15	166.8 176.4	16.90 17.87	0.329 0.344	0.843 0.831
83.13	186.1	18.86	0.368	0.808
83.14	190.9	19.34	0.381	0.805
83.15	195.8	19.84	0.401	0.795
83.13 83.14	200.6 200.6	20.33 20.33	0.415 0.411	0.777 0.767
83.15	205.4	20.33	0.435	0.766
83.11	205.4	20.81	0.430	(0.800)
83.13	205.4	20.81	0.422	(0.735)
83.17	210.4	21.32	0.448	0.759
83.11 83.15	215.1 215.2	21.80 21.81	0.470 (0.389)	0.737 0.725
83.12	220.9	22.38	0.486	0.694
83.13	224.8	22.78	0.541	0.663
73.15	0.33	0.033	0.00	0.00
73.17 73.14	17.3	1.75	0.033	0.967
73.14	22.2 31.5	2.25 3.19	-	0.954 0.964
73.14	31.8	3.22	0.056	0.975
73.15	50.9	5.16		0.970
73.14	51.0	5.17	0.084	0.967
73.17 73.14	79.7 80.1	8.08 8.12	0.120	0.963 0.964
73.14	80.1	8.12	0.120	0.959
73.17	113.7	11.52	0.165	0.948
73.15	113.8	11.53	0.154	0.955
73.14	113.9	11.54	0.166	0.951
73.14 73.16	128.0 142.5	12.97 14.44	-	0.942 0.935
73.12	142.5	14.44	0.206	0.930
73.15	152.4	15.44	ų	0.931
73.19	176.4	17.87	0.218	0.917
73.14 73.12	176.4	17.87	0.230	0.920
73.12	186.2 186.2	18.87 18.87	0.236 0.229	0.914 0.916
73.12	205.4	20.81	0.257	0.902
73.12	205.6	20.82	0.250	0.912
73.15	224.8	22.78	0.265	0.893
73.16	224.9	22.79	0.275	0.890
58.19 58.17	17.02 21.69	1.725 2.198	0.030 0.033	0.979 0.982
68.15	26.61	2.696	0.042	0.976
58.15	31.67	3.209	0.049	0.986
58.11	41.26	4.181	-	0.987
58.15	41.41	4.196	0.062	0.985
58.15 58.14	41.45 79.86	4.200 8.092	0.063	0.975 0.977
58.14	79.80	8.092	0.102	0.977
58.16	118.29	11.986		0,962
58.15	118.38	11.995	0.138	0.965
58.15	152.17	15.419	0.158	(0.968)
58.15 68.15	152.33	15.435	0.163	0.946 0.939
58.14	190.97 215.16	19.350 21.801	0.188 0.202	0.939

COMPONENTS:			ORIGINAL MEASUREMENTS	:	
l. Hydrogen	и; H ₂ ; [1333-	-74-0]	Augood, D. R.		
1	onoxide; CO		Trans. Instn. Chem. Engnrs.		
[630-08-0]				-	
			<u>1957</u> , <i>35</i> , 394-408.		
VARIABLES:	······································	- <u></u>	PREPARED BY:		
Pressure			с. г.	Young	
EXPERIMENTAL V	ALUES:				
	+		Mole fraction	of hydrogen	
т/к	P/psig ⁺	<i>P/</i> MPa	in liquid, $x_{\rm H_2}$	in gas, y _{H2}	
		. <u></u>			
81.4	2620	18.17	0.312	0.913	
	2600 1430	18.03 9.96	0.334 0.184	0.941 0.940	
	1380	9.62	0.174	0.912	
+ psi	g - pounds p	per square in	ich gauge pressure		
		AUXILIARY	INFORMATION		
METHOD/APPARATI	JS/PROCEDURE :		SOURCE AND PURITY OF 1	MATERIALS:	
Static equi	librium cell f y operated sti	itted with	1. Electrolytic sa 0.09 mole per d	ample containing cent HD.	
After equil	ibrium had bee samples of ga	en	2. British Oxygen		
liquid phase	es taken. The	carbon	2. Brittian oxygen	company bampro.	
	s condensed ou estimated volu				
Ratio of H ₂ , by mass spec	/HD in liquid	estimated			
			ESTIMATED ERROR:		
			$\delta T/K = \pm 0.1; \delta P/MH$		
			δx_{H_2} , $\delta y_{H_2} = 4$ %	(estimated by compiler)	
			REFERENCES :		

COMPONENTS: 1. Hydro			ORIGINAL MEASUREMENTS:		
inguro	gen; H ₂ ; [13	33-74-01	Akers, W. W.; Eubanks, L. S.		
2. Carbon monoxide; CO;					
);	Adv. Cryogenic Engng. <u>1960</u> , 3,		
[630-	08-0]		275-293.		
VARIABLES:	<u> </u>		PREPARED BY:		
	Temperature,	pressure			
	remperature,	p2 000 01 0	C. L.	Young	
EXPERIMENT	AL VALUES:	<u></u>		<u> </u>	
- 4-	.	-	Mole fraction in liquid,	of hydrogen in gas,	
т/к	P/psia	P/MPa	^x H ₂	^y H ₂	
			••• Z		
83.15	315	2.17	0.0398	0.9084	
	500 1400	3.45 9.65	0.0609 0.1745	0.9320 0.9143	
	2000	13.79	0.2490	0.8790	
99.82	315 500	2.17 3.45	0.0389 0.0674	0.6803 0.7619	
	800	5.45	0.1163	0.7844	
	1100	7.58 9.65	0.1727 0.2399	0.7848	
122.04	1400 500	3.45	0.0449	0.7739 0.2260	
	800	5.52	0.1382	0.3349	
		AUXILIARY	INFORMATION		
METHOD /APPA	ARATUS/PROCEDURE:	AUXILIARY	INFORMATION SOURCE AND PURITY OF MAT	ERIALS:	
	ARATUS/PROCEDURE: lating vapor fl	· · · · · · · · · · · · · · · · · · ·	SOURCE AND PURITY OF MAT		
Recircul fitted w	lating vapor fl with magnetic p	ow apparatus pump at ambient	· · · · · · · · · · · · · · · · · · ·		
Recircul fitted v temperat	lating vapor fl with magnetic p ture. Cell ma	ow apparatus pump at ambient de of type 303	SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried.	e per cent.	
Recircul fitted w temperat stainles	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre	ow apparatus oump at ambient de of type 303 essure measured	SOURCE AND PURITY OF MAT	e per cent. eaction of formic	
Recircul fitted w temperat stainles	lating vapor fl with magnetic p ture. Cell ma	ow apparatus oump at ambient de of type 303 essure measured	SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from re	e per cent. eaction of formic ic acid. Dried.	
Recircul fitted v temperat stainles with Bou measured	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c	ow apparatus pump at ambient de of type 303 ssure measured temperature constantan	SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from re acid and sulfur	e per cent. eaction of formic ic acid. Dried.	
Recircul fitted w temperat stainles with Bou measured thermoco	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c puples. Sampl	ow apparatus oump at ambient de of type 303 essure measured temperature onstantan es of both	SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from re acid and sulfur	e per cent. eaction of formic ic acid. Dried.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-co puples. Sampl analysed by gas	ow apparatus bump at ambient de of type 303 ssure measured temperature onstantan es of both chromato-	SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from re acid and sulfur	e per cent. eaction of formic ic acid. Dried.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	 SOURCE AND PURITY OF MAT Purity 99.7 mol Dried. Prepared from reacid and sulfur Purity about 97 ESTIMATED ERROR: 	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre- urdon gauge and d with copper-co ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	 SOURCE AND PURITY OF MAT Purity 99.7 mol Dried. Prepared from reacid and sulfur Purity about 97 ESTIMATED ERROR: 	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	
Recircul fitted w temperat stainles with Bou measured thermoco phases a graphy u	lating vapor fl with magnetic p ture. Cell ma ss steel. Pre urdon gauge and d with copper-c ouples. Sampl analysed by gas using a thermal	ow apparatus bump at ambient de of type 303 assure measured temperature constantan es of both chromato- conductivity	<pre>SOURCE AND PURITY OF MAT 1. Purity 99.7 mol Dried. 2. Prepared from r acid and sulfur Purity about 97 ESTIMATED ERROR:</pre>	e per cent. eaction of formic ic acid. Dried. mole per cent.	

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Carbon monoxide; CO; [630-08-0] VARIABLES: Temperature, pressure			ORIGINAL MEASUREMENTS: Yorizane, M.; Yoshimura, S.; Masuoko, H.; Toyama, A. Proc. ICECI <u>1968</u> , p.59. Heywood, Temple, London.	
			PREPARED BY: C.L. Young	
EXPERIMENTAL VAL	IIFS.		1	
T/K	P/atm	P/MPa	Mole fraction in liguid ^x H ₂	of hydrogen in vapor, ^y H ₂
123.15 103.15 77.35	$\begin{array}{c} 30\\ 40\\ 50\\ 60\\ 62\\ 62.7\\ 10\\ 20\\ 30\\ 40\\ 50\\ 75\\ 100\\ 123.5\\ 6\\ 11\\ 21\\ 31\\ 46\\ 51\\ 75\\ 100\\ 125\\ 150\\ \end{array}$	3.04 4.05 5.07 6.08 6.28 6.35 1.01 2.03 3.04 4.05 5.07 7.60 10.13 12.48 0.61 1.11 2.13 3.14 4.66 5.17 7.60 10.13 12.67 15.20	0.047 0.084 0.167 0.200 0.247 - - - - - - - - - - - - - - - - - - -	$\begin{array}{c} 0.140\\ 0.235\\ 0.288\\ -\\ -\\ 0.291\\ 0.293\\ 0.270\\ 0.528\\ 0.637\\ 0.692\\ 0.710\\ 0.726\\ 0.673\\ 0.563\\ 0.887\\ 0.928\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.954\\ 0.941\\ 0.929\\ 0.909\\ \end{array}$
		AUXILIARY	INFORMATION	
METHOD APPARATUS Vapor recycle vith magnetic measured with thermometer a with Bourdon liquid sample expanded to 2 ature, analys in source.	equilibrium pump. Temp platinum re nd pressure gauge. Vapo d simultaneo 00 cm ³ at ro	erature sistance measured r and usly and om temper-	<pre>better. 2. Purity 99.6 oxygen and : principle in ESTIMATED ERROR:</pre>	9 mole per cent or 7 mole per cent nitrogen being

COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS:
2. Carbon monoxide; CO; [630-08-0]	Tsang, C. Y.; Streett, W. B. in press
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES: Mole fraction	Mole fraction
of hydrogen T/K P/MPa in liquid, in vapor, ^x H ₂ ^y H ₂	of hydrogen T/K P /MPa in liquid, in vapor ${}^{x}_{H_{2}}$ ${}^{y}_{H_{2}}$
70.0 0.49 0.0110 0.9500 0.79 0.0152 0.9696 1.46 0.0260 0.9804 2.15 0.0349 0.9864 3.49 0.0546 0.9901 4.90 0.0704 0.9878 6.28 0.0871 0.9864 7.59 0.1012 0.9818 9.80 0.1243 0.9654 10.78 0.1327 0.9612 11.86 0.1433 0.9577 13.98 0.1624 0.9491 15.78 0.1764 0.9406 19.18 0.2030 0.9301 22.38 0.2270 0.9155 25.02 0.2468 0.9018 28.09 0.2716 0.8881 30.58 0.2900 0.8798 32.63 0.3053 0.8666 33.44 0.3112 0.8602 34.89 0.3222 0.8547 35.74 0.3314 0.8482 37.94 0.3502 0.8335	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY METHOD /APPARATUS / PROCEDURE :	INFORMATION SOURCE AND PURITY OF MATERIALS:
Recirculating vapor flow apparatus fitted with magnetically operated pump. Pressure measured with manganin pressure gauge. Temperature measured with platinum resistance thermometer. Samples of liquid gas analysed using a thermal conductivity gas analyser.	 Matheson ultra high purity sample, purity 99.999 mole per cent or better. Matheson sample, purity 99.99 mole per cent. Passed through cold trap at boiling point of nitrogen. ESTIMATED ERROR: δT/K = ±0.02; δP/MPa = ±0.5%; δx_{H2}, δy_{H2} = ±0.005 (but may be as large as ±0.02 near critical point). REFERENCES: 1. Streett, W. B.; Calado, J. C. G. J. Chem. Thermodyn. <u>1978</u>, 10, 1089.

COMPOR	NENTS:			ORIGINA	L MEASURI	ements :	
 Hydrogen; H₂; [1333-74-0] Carbon monoxide; CO; [630-08-0] 				TS	ang, C. 1	Y.; Streett	с, W. B.
				in press			
EXPERI	EXPERIMENTAL VALUES:				<u>,</u>		
		Mole fra of hydr	ogen			Mole fra of hydr	
т/к	<i>Р/</i> МРа	in liquid, ^x H ₂	in vapor, ^y H ₂	т/к	₽/MPa	in liquid, ^x H ₂	in vapor, ^y H ₂
77.3	11.13 12.31	0.1743 0.1914	0.9362 0.9313	105.0	2.21	0.0364 0.0541	0.5504 0.6177
85.0	13.94 15.99 18.90 22.15 24.90 26.99 29.13 29.67 30.14 0.52 0.78 1.45 2.86 4.20 4.94 5.63 7.01 8.38 10.10	0.2155 0.2410 0.2851 0.3334 0.3814 0.4270 0.5176 0.5176 0.5458 0.0090 0.0142 0.0266 0.0543 0.0814 0.0957 0.1084 0.1364 0.1977	0.9200 0.9053 0.8804 0.8520 0.8178 0.7378 0.7218 0.6983 0.6970 0.8181 0.8730 0.9110 0.9218 0.9230 0.9233 0.9194 0.9167 0.9053	115.0	3.57 4.62 5.62 6.64 7.73 9.15 9.75 10.56 11.22 11.56 11.73 1.71 1.95 2.26 2.92 3.62 4.20 4.98	0.0731 0.1034 0.1322 0.1644 0.2015 0.2329 0.2556 0.2813 0.3248 0.3248 0.3698 0.4026 0.4314 0.0084 0.0159 0.0249 0.0249 0.0444 0.0663 0.0859 0.1142	0.6628 0.6953 0.7101 0.7138 0.7155 0.7048 0.6964 0.6642 0.6262 0.5966 0.5726 0.1095 0.1838 0.2596 0.3684 0.3684 0.4393 0.4765 0.5087
95.0	$11.84 \\ 13.86 \\ 15.42 \\ 17.02 \\ 18.41 \\ 19.44 \\ 20.09 \\ 20.79 \\ 21.07 \\ 0.91 \\ 1.47 \\ 2.83 \\ 4.22 \\ 5.62 \\ 7.01 \\ 8.40 \\ 9.53 \\ \end{bmatrix}$	0.2321 0.2760 0.3122 0.3537 0.3936 0.4312 0.4610 0.5103 0.5358 0.0120 0.0240 0.0543 0.0240 0.0543 0.1221 0.1560 0.1933 0.2255	0.8919 0.8702 0.8506 0.7941 0.7694 0.7452 0.7067 0.6930 0.5894 0.7231 0.8086 0.8311 0.8380 0.8369 0.8309 0.8207	125.0	5.80 6.36 7.02 7.50 8.04 8.59 8.68 2.98 3.30 3.63 3.95 4.47 4.71 4.92 5.07 5.19	0.1447 0.1680 0.1964 0.2257 0.2553 0.2945 0.3068 0.3195 0.0217 0.0330 0.0461 0.0594 0.0820 0.0953 0.1050 0.1131 0.1219	0.5319 0.5400 0.5273 0.5048 0.4784 0.4659 0.4559 0.1065 0.1487 0.1860 0.2130 0.2446 0.2572 0.2617 0.2650 0.2661
105.0	10.51 11.83 13.17 14.61 14.93 1.21 1.51 1.90	0.2522 0.2972 0.3464 0.4264 0.4635 0.0121 0.0197 0.0291	0.8099 0.7877 0.7565 0.7088 0.6719 0.3010 0.4056 0.4972		5.32 5.45 5.51 5.61 5.74	0.1303 0.1402 0.1457 0.1550 0.1680	0.2674 0.2645 0.2611 0.2579 0.2530

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COMPONENTS:			ORIGINAL MEASUREMENT	S:		
l. Hydro	gen; H ₂ ; [1333-74-0]	Augood, D. R.			
2. Nitro	gen oxide, ([10102-43-9]	Nitric oxide);	Trans. Instn. C	hem. Engnrs.,		
NO;	[10102-43-9]		<u>1957</u> , 35, 394-4	08.		
VARIABLES:			PREPARED BY:			
	Pressu	ire	C. L.	Young		
EXPERIMENTA	L VALUES:		L			
т/к	P/psig ⁺	P/MPa	Mole fraction in liquid, x _{H2}	of hydrogen in gas, y _{H2}		
119.5	2540 2240 1620	17.61 15.55 11.27	0.017 0.009 0.005	0.991 0.992 _		
		AUXILIARY	INFORMATION			
METHOD/APPA	RATUS/PROCEDURI	5:	SOURCE AND PURITY OF	MATERIALS:		
Static equilibrium cell fitted with magnetically operated stirrer. After equilibrium had been established samples of gas and liquid phases taken. The nitric oxide was condensed out and both components estimated volumetrically. Ratio of H /HD in liquid estimated by mass spectrometry.			0.09 mole per 2. Prepared by th Johnstone and	he method of		
			REFERENCES: Johnstone, H.L.;	(estimated by compiler)		

COMPONENTS:	EVALUATOR:
 Hydrogen; H₂; [1333-74-0] Carbon dioxide; CO₂; [124-38-9] 	Colin Young Department of Chemistry University of Melbourne Parkville, Victoria. 3052 <u>AUSTRALIA</u> September, 1980

This system has been extensively investigated by Tsang and Streett (1) who measured vapor-liquid equilibrium isotherms at ten temperatures between 220K and 290K at pressures up to 172 MPa. Their measurements were carried out with high purity samples in an apparatus of proven reliability. The results of Kaminishi and Toriumi (2), who studied six isotherms between 233.15K and 298.15K at pressures up to 20 MPa, are in good agreement with the more extensive data of Tsang and Streett (1) although the mole fractions of hydrogen in the liquid phase from reference (2) are slightly smaller than those obtained by interpolation of the data of Tsang and Streett (1).

Spano *et al* (3) studied this system at six temperatures ranging from 219.9K to 289.9K at pressures up to 20 MPa. At the three lowest temperatures there is good agreement with the data of Kaminishi and Toriumi (2) and Tsang and Streett (1) but there are significant deviations at the higher temperatures. The hydrogen mole fractions in the liquid phase are smaller in the work of Spano *et al* (3) than in that of the two other groups (1) and (2).

The data of Yorizane *et al* (4), which are restricted to 273.15K and pressure up to 37 MPa give interpolated liquid phase hydrogen compositions which are slightly smaller than those of Tsang and Streett (1) and agree better with the slightly smaller values of Kaminishi and Toriumi (2).

Augood (5) reported data at the single temperature of 239.7K which are in fair agreement with interpolated values from the measurements of Spano *et al* (3) but his data are not considered further in view of their very limited nature.

The earliest reported measurements of vapor-liquid equilibrium for this system are those of Abdullayev (6) who studied the system at 298.2K and pressures between 8 and 20 MPa. The results, which were presented in graphical form, differ widely from any other data on this system and are rejected. Similarly the data of Mills and Miller (7), who reported two isotherms at 288.2K and 281.2K at pressures up to 11 MPa, are rejected. Their data were presented only in graphical form and deviate somewhat from the data given in reference (1), (2), (3) and (4). The results of Greco *et al* (8) were presented in graphical form and appear to agree with the data of Tsang and Streett (1) within a few percent. However in view of the uncertainty in the graphical presentation the data are not considered further here.

The data of Spano *et al* (3), Tsang and Streett (1) Kaminishi and Toriumi (2) and Yorizane *et al* (4) are all classified as tentative. The solubility of hydrogen in carbon dioxide at the highest temperatures varies by several per cent between these workers but there is insufficient evidence to make a definite choice between the four sets of data.

REFERENCES:

- 1. Tsang, C.Y.; Streett, W.B. in press
- Kaminishi, G.; Toriumi, T.; J. Chem. Soc. Japan. Ind. Chem. Sec. <u>1966</u>, 69, 175.
- 3. Spano, J.O.; Heck, C.K.; Barrick, P.L. J. Chem. Engng. Data, <u>1968</u>, 13, 168.

References (continued).

- 4. Yorizane, M.; Yoshimura, S.; Masouku, H. Kagaku Kogaku, <u>1970</u>, 34, 953.
- 5. Augood, D.R.; Trans. Instn. Chem. Engnrs. 1957, 35, 394.
- 6. Abdullayev, Y.A. Zh. Fiz. Khim. 1939, 13, 986.
- 7. Mills, J.R.; Miller, F.J.L. Can. Chem. Process. Ind. <u>1945</u>, 29, 651.
- Greco, G.; Casale, C.; Negri, G. Comp. rend. Congr. intern. chim. ind. 27 Congr. Brussels, <u>1954</u>, 251.

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COMPONENTS :			ORIGINAL MEASUREMENTS:		
1. Hydroge	n; H ₂ ;[1333-7	74-0]	Augood, D. R.		
	dioxide; CO,;		Trans. Instn. Chem. Engnrs.		
	2		<u>1957</u> , <i>35</i> , 394-40		
VARIABLES:	<u> </u>		PREPARED BY:	<u> </u>	
	Pressure		С. L. Ус	oung	
		······································	l		
EXPERIMENTAL '	VALUES:				
Т/К	P/psig ⁺	Р/МРа	Mole fraction o in liquid, ${}^{x}_{\mathrm{H}_{2}}$	of hydrogen in gas, y _{H2}	
239.7	2780 2720 2680	19.27 18.86 18.58	0.064 0.071 0.062	0.910 0.871 0.873	
		nds per squar			
		nus per squar			
			INFORMATION		
	TUS/PROCEDURE :				
METHOD/APPARAT Static equi magnetically equilibrium		AUXILIARY itted with rrers. After blished	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s	ATERIALS: sample containing cent HD.	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen	ATERIALS: sample containing cent HD.	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen	ATERIALS: sample containing cent HD.	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR: δT/K = ±0.1; δP/D	MATERIALS: sample containing cent HD. Company sample. MPa = ±0.1;	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con yolumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR:	MATERIALS: sample containing cent HD. Company sample. MPa = ±0.1;	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR: δT/K = ±0.1; δP/D	MPa = ±0.1; estimated by	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/T$ $\delta x_{H_2}, \delta y_{H_2} = 4$ % (6)	MPa = ±0.1; estimated by	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/T$ $\delta x_{H_2}, \delta y_{H_2} = 4$ % (6)	MPa = ±0.1; estimated by	
METHOD/APPARAT Static equi magnetically equilibrium samples of o taken. The carbon o and both con volumetrical	TUS/PROCEDURE: librium cell f y operated sti had been esta gas and liquid dioxide was co nponents estim lly. Ratio of	AUXILIARY itted with rrers. After blished phases ndensed out ated H ₂ /HD in	INFORMATION SOURCE AND PURITY OF M 1. Electrolytic s 0.09 mole per 2. British Oxygen ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/T$ $\delta x_{H_2}, \delta y_{H_2} = 4$ % (6)	MPa = ±0.1; estimated by	

COMPONENTS:		ORIGINAL MEAS	UREMENTS:
 Hydrogen; H₂; 	1333-74-0]		, G.; Toriumi, T.
	CO ₂ ; [124-38-9]	Kogyo Kag	aku Zasshi, <u>1966</u> , 69,
		175-172.	
VARIABLES: Temperature,	pressure	PREPARED BY:	C.L. Young
Temperaturer	Freedoard		Controlling
EXPERIMENTAL VALUES:		Mole francia	var on of hydrogen
T/K	<i>P/</i> MPa	in liquid,	in vapor
		^ж н2	y _{H2}
298.15	9.64	0.044	0.041
293.15	12.41 9.64	0.099 0.044	0.191 0.213
293.15	14.57	0.109	0.321
	19.50	0.179	0.260
283.15	7.45 9.64	0.044	0.246
	14.57	0.086	0.439
	19.51	0.134	0.469
273.15	5.08 9.64	0.011 0.043	0.212 0.478
	10.18	0.045	0.483
	14.53	0.081	0.568
	19.51 19.99	0.118	0.606 . 0.603
253.15	5.27	0.016	0.522
	10.18	0.038	0.696
	15.09 20.00	0.061 0.084	0.753 0.775
233.15	5.27	0.014	0.746
	10.18 15.09	0.029 0.046	0.835
	20.00	0.061	0.864 0.875
, 			
	AUXILIAR	Y INFORMATION	
METHOD / APPARATUS / PROCED	URE:	SOURCE AND PU	RITY OF MATERIALS;
			han 99.5 mole per cent.
Static equilibrium Pressure measured w	cell with agitatom ith Bourdon gauge.		
After equilibrium e	stablished sample	· ·	1
removed and analyse		(
and gravimetric tec dioxide absorbed in		-	
ide solution.	1 - 2		
		ESTIMATED ERR	OR:
		$\delta T/K = \pm$	$0.05; \delta P/MPa = \pm 0.01;$
		$^{\circ x}$ H ₂ $^{\circ y}$	$H_2 = \pm 0.003.$
			ed by compiler).
		REFERENCES:	

COMPONENTS :	······································	ORIGINAL MEASI	IREMENTS .		
1. Hydrogen; H ₂ ;	[1333-74-0]	Spano, J.O.; Heck, C.K.; Barrick, P.L.			
2. Carbon Dioxid	le; CO ₂ ; [124-38-9]		ngng. Data, <u>1968</u> , 13,		
		168-171			
VARIABLES:		PREPARED BY:			
Temperat	ure, pressure		C.L. Young		
		<u> </u>	······		
EXPERIMENTAL VALUES:					
T/K	p/10⁵Pa	Mole fractic in liquid,	on of hydrogen in gas,		
-/	p/ 10 1 u	^x H ₂	^x H ₂		
•			** 2		
219.9	10.8	0.0013	0.428		
	21.6 35.9	0.0044	0.693		
	52.8	0.0081 0.0128	0.800 0.852		
	70.6	0.0175	0.852		
	73.2	-	0.885		
	102.8	0.0258	0.9090		
	154.4	0.0385	0.9267		
	198.3	0.0487	0.9335		
229.9	16.6	-	0.420		
:	25.8	0.0056	0.6140		
	31.8 36.5	0.0077	-		
	45.7	0.0092 0.0121	-		
	46.5	-	0.765		
	66.6	-	0.822		
	73.3	0.0216	0.832		
	87.1	-	0.850		
	106.9 121.6	- 0.0365	0.864		
	161.6	0.0477	0.878 0.896		
	203.0	0.0586	0.9046		
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PRO	CEDURE:	SOURCE AND PU	RITY OF MATERIALS;		
Flow cell descri	bed in detail in	1. Minimu	m purity 99.999 mole per		
	rature measured with	cent.	in party ssass more per		
	nce thermometer and				
	d with Bourdon gauge.		m purity 99.99 mole per		
	atus in source and charged with	cent.			
	or recirculated and				
vapor and liquid	samples withdrawn				
and analysed by	gas chromatography.				
			OR: $\delta T/K = \pm 0.1$; $\delta P/bar =$		
			$OR: 017K = \pm 0.1; 07/Dat = 0.0 10.0 MPa), \pm 0.3 (up to 0.0 MPa)$		
		30.0 MPa)	; δx_{H_2} , $\delta y_{H_2} = \pm 1$ % or		
			Lichever is greater.		
		0.0002 WI			
		REFERENCES :			
		1. Herrin	g, R.N.; Barrick, P.L.		
		Trat A	dv. Cryogenic Engng. <u>1965</u> ,		
		10, 15			
		J	······································		

Inorganic Compounds

$\begin{array}{c} \text{COMPONENTS:} \\ 1. & \text{Hydrogen; } \text{H}_2; & [1333-74-0] \\ 2. & \text{Carbon Dioxide; } \text{CO}_2; & [124-38-9] \\ \hline \\ & & & & & & \\ \hline \\ \text{ZALSS} \\ & & & & & \\ \hline \\ & & & & & \\ \hline \\ & & & &$
2. Carbon Dioxide; CO ₂ ; [124-38-9] Barrick, P.L. J. Chem. Engng. Data. 1968, 168-171. EXPERIMENTAL VALUES: Mole fraction of hydrogen in liquid, in gas, x_{H_2} YH2 YH2 244.9 20.8 0.0027 244.9 20.8 0.0027 13.0 0.0159 0.634 80.5 0.0276 0.733 113.0 0.0407 0.789 161.0 0.0589 0.826 161.0 0.0589 0.826 161.0 0.0732 0.841 259.9 31.0 - 0.174 23.2 0.0732 0.841 259.9 31.0 - 0.174 123.2 - 0.675 135.0 0.0668 0.711 156.7 0.0700 0.712 135.0 0.6598 0.695 135.0 0.6688 0.711 156.7 0.0700 0.712 203.2 0.0927 0.745 274.9 49.9 0.0027 0.745 135.0 0.6588 0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\begin{array}{c c c c c c c c c c c c c c c c c c c $
EXPERIMENTAL VALUES: T/K $p/10^{5}$ Pa Mole fraction of hydrogen in liquid, in gas, x_{H_2} y_{H_2} 244.9 20.8 0.0027 - 21.8 - 0.265 38.0 0.0100 0.523 52.6 0.0159 0.634 80.5 0.0276 0.733 113.0 0.0407 0.789 161.0 0.0589 0.826 165.2 0.0605 0.828 201.1 0.0727 0.839 203.2 0.0732 0.841 259.9 31.0 - 0.174 259.9 32.7 0.0047 0.206 50.7 0.0146 0.420 73.9 0.0269 0.550 92.6 0.0363 0.618 123.2 - 0.675 135.0 0.0598 0.695 153.5 0.0668 0.711 156.7 0.0700 0.712 203.2 0.0927 0.745 274.9 49.9 0.0097 0.180 95.0 0.0405 0.442 123.1 0.0588 0.518 160.5 0.0860 - 166.0 - 0.588 177.3 0.1000 - 1 192.0 - 0.610
$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
160.5 0.0860 - 166.0 - 0.588 177.3 0.1000 - 192.0 - 0.610
166.0 - 0.588 177.3 0.1000 - 192.0 - 0.610
177.3 0.1000 - 192.0 - 0.610
192.0 - 0.610
200.6 0.115 -
289.9 65.8 0.01 <u>3</u> 0 0.102
90.0 0.0258 0.176
102.3 0.0490 0.280
153.7 0.110 0.391 162.1 0.121 0.400
175.3 0.139 0.422
182.9 - 0.425

COMPONENTS:		OPTOTNAL MELOW	TINEC .
		ORIGINAL MEASUREM	
1. Hydrogen; H ₂ ;	[1333-74-0]	Yorizane, M.; Masuoka, H.	Yoshimura, S.;
2. Carbon dioxid	e; CO ₂ ; [124-38-9]		
		Kagaku Kogak	u <u>1970</u> ,34, 953-7.
VARIABLES:		PREPARED BY:	
Pressure		c.	L. Young
		}	
EXPERIMENTAL VALUES:	<u></u>		
		Mole fractio	n of hydrogen
T/K	P _{total} /MPa	in liquid,	in vapor
	00042	<i>x</i> _{H₂}	y_{H_2}
273.15	6.08 10.44	0.047	0.283 0.474
	13.88	0.0789	0.563
	18.34	0.104	0.596
	23.30 27.76	0.156 0.180	0.625 0.649
	30.30	0.214	0.651
	31.31	0.223	-
	33.94	0.286	0.604
	35.46 36.27	0.317 0.321	0.580 0.534
	37.49	0.472	0.478
	AUXILIARY	INFORMATION	
METHOD /APPARATUS / PRO		T	OF MATERIALS
METHOD /APPARATUS / PRO		INFORMATION SOURCE AND PURITY	OF MATERIALS:
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY	OF MATERIALS: ails given.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY	
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY	
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR:	ails given.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: &T/K = ±0.1	ails given. .; δP/MPa = ±0.03;
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ δx_{H_2} , δy_{H_2}	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ δx_{H_2} , δy_{H_2}	ails given. .; δP/MPa = ±0.03;
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta x_{H_2}, \delta y_{H_2}$ (estimated	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta x_{H_2}, \delta y_{H_2}$ (estimated	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta x_{H_2}, \delta y_{H_2}$ (estimated	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta x_{H_2}, \delta y_{H_2}$ (estimated	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.
Vapor recycle equ magnetic pump. 7 with platinum res and pressure meas gauge. Vapor and simultaneously an at room temperatu	CEDURE: uilibrium cell with Temperature measured sistance thermometer sured with Bourdon 1 liquid sampled nd expanded to 200 cm ³ ure, analysed using	SOURCE AND PURITY No deta ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta x_{H_2}, \delta y_{H_2}$ (estimated	ails given. .; δ <i>P/</i> MPa = ±0.03; = ±1-2%.

3 |

COMPONEN	TS:			ORIGINAL M	EASUREMEN	ITS :	
[H_; [1333-74	-01			Streett, W.	в
 Hydrogen; H₂; [1333-74-0] Carbon dioxide; C0,; [124-38-9] 				isany,	C. 1.,	Dereett, w.	Б.
2. Carl	bon diox:	ide; CO ₂ ; l	124-38-9]	ir	ı press		
VARIABLE	S:	····		PREPARED B	Y:		
	Temp	erature, pres	sure			C. L. Young	
	<u>F</u>						
EXPERIME	NTAL VALUE	S:					,
			fraction ydrogen			Mole fr of hyd	
т/к	P/MPa	in liquid,		, т/к	<i>P/</i> MPa	in liquid,	in vapor,
		x_{H_2}	y_{H_2}			^{<i>x</i>} H ₂	$y_{\rm H_2}$
	- <u></u>	·····					
220.0	0.93 1.00	0.0015	0.2898 0.3445	225.0	1.47 2.16	0.0039 0.0068	0.4372 0.5997
	1.07	0.0028	0.3871		2.78	0.0089	0.6757
	1.18 1.27	0,0032	0.4309 0.4642		3.56 4.85	0.0117 0.0159	0.7409 0.7965
	1.35	0.0035	0.5025		7.00	0.0218	0.8507
	2.23 3.51	0.0067 0.0112	0.6755 0.7810		10.65 14.22	0.0312 0.0393	0.8890 0.9036
	5.13	0.0159	0.8369		21.15	0.0567	0.9178
	7.13 11.01	0.0218 0.0297	0.8737 0.9055		27.88 34.69	0.0740 0.0914	0.9225 0.9232
	14.00	0.0361	0.9162		41.44	0.1073	0.9240
	15.46 16.93	0.0394 0.0427	0.9189 0.9213		48.37 55.35	0.1235 0.1390	0.9228 0.9209
	18.79	0.0463	0.9209		69.99	0.1690	0.9131
	20.99 24.34	0.0514 0.0593	0.9260 0.9299		79.48 91.26	0.1877 0.2112	0.9070 0.9036
	26.44	0.0647	0.9307	235.0	1.49	0.0039	0.2127
	27.59 31.50	0.0663 0.0721	0.9303 0.9307		2.14 3.38	0.0069 0.0121	0.4228 0.6088
225.0	35.40 1.18	0.0838 0.0023	0.9315 0.3102		5.22	0.0185	0.7286
225.0						(co	nt.)
AUXILIARY				INFORMATION	1		
METHOD /APPARATUS / PROCEDURE :				SOURCE AND	PURITY C	OF MATERIALS:	
	-	vapor flow ap		1		ra high puri	
1	-	metically op		purit bette		9 mole per c	ent or
	pump. Pressure measured with						
_	manganin pressure gauge. Tempera- ture measured with platinum resis-					ple, purity	99.99
ł		-		mole	per cen	t or better.	
1	tance thermometer. Samples of liquid gas analysed using a thermal						
conductivity gas analyser.				ESTIMATED	CRROR .		
	conductivity gas analyset.					$\delta P/MPa = \pm 0$.58:
						0.005 (but ma	
						near critica	
			:	REFERENCES			
						B.; Calado	
				J. C	them. Th	ermodyn. <u>197</u>	<u>8</u> , 10,
				1089			
L		······································					

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COMPON	IENTS:			ORIGINA	L MEASUR	EMENTS:	=a
l. Hyd	lrogen; H	2; [1333-74	-0]	Tsang,	с. ч.;	Streett, W.	в.
2. Car	bon dioxi	de; CO₂; [124-38-9]	in	press		
				<u>,</u>			
EXPERI	MENTAL VA	LUES:					
		Mole fr of hyd				Mole fra of hydr	
т/К	<i>P/</i> MPa	in liquid	l, in vapor,	T/K	<i>P/</i> MPa	in liquid,	
		^{<i>x</i>} H ₂	y_{H_2}			^ж н ₂	^y H ₂
235.0	7.06	0.0243	0.7806	250.0	88.39	0.4317	0.7030
	10.46	0.0342	0.8322		91.61	0.4680	
	14.03 20.73	0.0450 0.0659	0.8562 0.8755	260.0	3.37 5.58	0.0081 0.0208	0.2083 0.4511
	27.71	0.0881	0.8828		7.23	0.0284	0.5382
	35.22	0.1123	0.8868		10.53	0.0450	0.6348
	41.38	0.1307	0.8864		13.49	0.0596	0.6787
	55.17	0.1707	0.8813		21.62	0.1044	0.7342
	73.10 93.03	0.2184 0.2728	0.8704 0.8562		28.15 34.70	0.1414 0.1777	0.7483 0.7483
	117.61	0.3371	0.8343		41.71	0.2197	0.7370
	137.35	0.3928	0.8102		48.44	0.2640	0.7217
	152.00	0.4365	0.7877		55.59	0.3199	0.6965
	165.58	0.4884	0.7556		62.04	0.3908	0.6471
	168.96 171.79	0.5062 0.5264	0.7455 0.7328	270.0	65.64 4.38	0.4768 0.0118	0.5773 0.1768
237.0	132.08	0.4067	0.7949	270.0	5.31	0.0191	0.2749
	138.00	0.4281	0.7837		7.08	0.0301	0.3971
	144.90	0.4530	0.7698		10.62	0.0564	0.5282
	148.35	0.4731	0.7524		13.86	0.0817	0.5852
	150.28 152.07	0.4789 0.4908	0.7486 0.7390		17.44 21.93	0.1095 0.1388	0.6201 0.6440
	154.90	0.5049	0.7300		25.26	0.1706	0.6496
	156.97	0.5238	0.7190		27.97	0.1956	0.6475
	158.83	0.5401	0.7046		34.76	0.2457	0.6399
.	160.41	0.5566	0.6921		39.99	0.2950	0.6157
245.0	83.68	0.3251	0.7918		44.14	0.3560	0.5751
	89.58 96.65	0.3521 0.3882	0.7776 0.7600	280.0	45.69 7.44	0.3967	0.5332 0.2891
	101.54	0.4155	0.7441	200.0	9.15		0.3612
	105.06	0.4379	0.7303		11.27		0.4251
	108.51	0.4657	0.7094		13.80	0.1100	0.4731
	111.83	0.5010	0.6789		18.35	0.1580	0.5166
250.0	113.23 2.31	0.5262 0.0044	0.6603 0.1589		20.30 22.62	0.1791 0.2000	0.5255 0.5264
230.0	3.04	0.0086	0.3196		24.56	0.2195	
	3.63	0.0124	0.4090		26.01	0.2358	0.5194
	5.20	0.0186	0.5501		27.45	0.2536	0.5133
	6.98	0.0262	0.6371		29.25	0.2745	0.5039
	10.29 13.85	0.0396 0.0545	0.7179 0.7585		31.19 31.96	0.3043 0.3270	0.4740 0.4472
	17.28	0.0545	0.7822	290.0	8.53	0.0405	0.1988
	25.44	0.1058	0.8044		9.49	0.0528	0.2342
	31.54	0.1332	0.8105		11.29	0.0804	0.2867
	35.34	0.1488	0.8116		11.72		0.2969
	49.66	0.2121	0.8060		13.88	0.1226	0.3296
	62.81 75.88	0.2724 0.3412	0.7834 0.7541		15.65 17.27	0.1449 0.1670	0.3460 0.3525
	83.22	0.3887	0.7300		18.95	0.1920	0.3327
	86.54	0.4147	0.7126		19.71	0.2065	0.3241
			· · · · · · · · · · · · · · · · · · ·	•			

ORIGINAL MEASUREMENTS:		
Augood, D. R.		
Trans. Instn. Chem. Engnrs.,		
<u>1957</u> , <i>35</i> , 394-408.		
PREPARED BY:		
C. L. Young		
J		
Mole fraction of hydrogen in liquid, x_{H_2} in gas, y_{H_2}		
0.015 0.990 0.011 0.990		
INFORMATION		
<pre>SOURCE AND PURITY OF MATERIALS; 1. Electrolytic sample containing 0.09 mole per cent HD. 2. Prepared in Kipp's apparatus liquefied in carbon dioxide/ acetone bath. Non-condensible impurities removed. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \ \delta P/MPa = \pm 0.1;$ $\delta x_{H_2}, \ \delta y_{H_2} = \pm 4$% (estimated by compiler) REFERENCES:</pre>		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Yorizane, M.; Sadamoto, S.;
	Masuoka, H.; Eto, Y.
2. Hydrogen sulfide; H_2S ;	Kogyo Kagaku Zasshi <u>1969</u> , 72,
[7783-06-4]	2174-7.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
T/K P/MPa	Mole fraction of hydrogen in liquid,
	w _{H2}
	** 2
	0.012
273.15 3.04 5.07	0.012 0.020
258.15 1.01 2.03	0.003 0.006
3.04	0.008
5.07 243.15 1.01	0.016 0.002
2.03	0.003
3.04 4.05	0.005 0.008
5.07	0.010
AUXILIAR	INFORMATION
METHOD APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Vapor-liquid equilibrium cell.	1. Purity 99.9 mole per cent.
Diagram given in source.	
(Original in Japanese.)	2. Purity 99.0 mole per cent.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 0.001$
	(estimated by compiler).
	REFERENCES :

1 I.

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COMPONENTS:			ORIGINAL MEASUREMENT	S:		
l. Hydro	gen; H ₂ ; [1	333-74-0]	Augood, D.R. Trans. Instn. Chem. Engnrs., 1957, 35, 394-408.			
		2; [7446-09-5]				
		2				
			<u></u> ,,			
VARIABLES:			PREPARED BY:			
Те	mperature, pr	essure	с. г.	Young		
		<u></u>	1			
EXPERIMENTA	L VALUES:					
т/к	P/psig ⁺	P/MPa	Mole fraction in liquid, x_{H_2}	of hydrogen in gas, y _{H2}		
293.2	2775 2760	19.24 19.13	0.028 0.030	0.985 0.988		
	1500	10.44	0.017	0.982		
263.2	2770 1860	19.20 12.93	0.019 0.015	0.981 0.979		
	1500	10.44	0.016	0.969		
		AUXILIARY	INFORMATION			
METHOD/APPA	RATUS/PROCEDURE:		SOURCE AND PURITY OF	MATERIALS:		
	quilibrium ce ally operated	ll fitted with stirrer.	1. Electrolytic a 0.09 mole per	sample containing cent HD.		
After equ	uilibrium had hed samples of	been	2. Brotherton sar			
liquid pl	hases taken.	The sulfur out and both		-		
component		volumetrically.				
	spectrometry.					
			ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P$	/MPa = ±0.1:		
			$\delta x_{\rm H_2}, \ \delta y_{\rm H_2} = 4\%$			
			REFERENCES:			

COMPONENTS :		EVALUATOR:
<pre>1. Hydrogen; H₂; [1]</pre>	_	Colin L. Young, Department of Physical Chemistry, University of Melbourne,
2. Ammonia; NH ₃ ; [76	664-41-7]	Parkville, Victoria 3052, Australia.
		October 1980

CRITICAL EVALUATION:

The most extensive data on this system are those of Wiebe and coworkers (1), (2) who studied the system over the temperature range 273 K to 373 K and at pressures up to 101 MPa. Their data are thought to be reliable and are classified as tentative. Ipat'ev and Theodorovich (3) studied this system at 298.15 K up to pressures of 25 MPa and from 258 K to 298 K at a pressure of 10.1 MPa. Their mole fraction data at 298 K are significantly lower than those of Wiebe and coworkers (1), (2) and are rejected from further consideration. The data of Zeininger (4) were presented in small graphical form and are rejected for the present purpose.

Reamer and Sage (5) studied the phase behaviour of this system but only made measurements on the composition of the gas phase. They presented a table of coexisting liquid and gas phase compositions but the liquid phase compositions were based on the data of Wiebe and Tremearne (1). Krichevskii and Khazanova (6) and Krichevskii and Efremova (7) also studied the gas phase compositions in this system. Their results are not considered further.

The limited data of Augood (8) at 293.2 K and 239.7 K are consistent with the data of Wiebe and coworkers (1), (2) but of lower precision. The data of Hiese (9) at 298.15 K at pressures up to 20.2 MPa are consistent with those of Wiebe and Tremearne (1).

Lawson and Black (10) have determined the solubility of a mixture of three volumes of hydrogen and one of nitrogen in liquid ammonia at pressures up to 15 MPa over the temperature range of 243 K to 295 K. Their results indicate that the two gases behave independently and that the mole fraction in the liquid phase of either gas is proportional to its partial pressure. Their results are consistent with those of Wiebe and coworkers (1) and (2). The low pressure measurements of Gelperin *et al.* (11) over the temperature range 203 K to 273 K, and of Moore and Otto (12), over the temperature range 203 K to 303 K are also consistent with the results of Wiebe and coworkers (1), (2) if it is assumed that the mole fraction of hydrogen in the liquid phase is a linear function of pressure.

References:

- 1. Wiebe, R.; Tremearne, T. H. J. Am. Chem. Soc. <u>1934</u>, 56, 2357.
- 2. Wiebe, R.; Gaddy, V. L. J. Am. Chem. Soc. 1937, 59, 1984.
- 3. Ipat'ev, V. V.; Theodorovich, V. P. Zh. Obshch. Khim. 1932, 2, 305.
- 4. Zeininger, H. Chem.-Ing.-Tech. 1973, 45, 1067.
- 5. Reamer, H. H.; Sage, B. H. J. Chem. Engng. Data 1959, 4, 152.
- 6. Krichevskii, I. R.; Khazanova, N. E. Zh. Fiz. Khim. 1939, 13, 1690.
- 7. Krichevskii, I. R.; Efremova, G. D. Zh. Fiz. Khim. 1952, 26, 1117.
- 8. Augood, D. R. Trans. Instn. Chem. Engnrs. 1957, 35, 394.
- 9. Hiese, F. Ber. Bunsenges. Phys. Chem. 1972, 76, 938.
- Larson, A. T.; Black, C. A. J. Am. Chem. Soc. <u>1925</u>, 47, 1015 and Ind. Eng. Chem. <u>1925</u>, 17, 715.
- 11. Gel'perin, I. I.; Trubitsyn, B. A.; Kalinina, S. Ye.; Bezyulev, V. V. Khim. Prom. <u>1974</u>, 8, 619.
- 12. Moore, R. G.; Otto, F. D. Can. J. Chem. Engng. 1972, 50, 355.

COMPONENTS:	*		ORIGINAL M	EASUREMENTS:		
	rogen; H ₂ ; onia; NH ₃ ;	[1333-74-0] [7664-41-7]	Wiebe, R.; Tremearne, T. H. J. Am. Chem. Soc. <u>1934</u> , 56, 2357-60.			
VARIABLES: Tempera	ture, press	ure	PREPARED B			
EXPERIMENT	AL VALUES:		L			
T/K	lC P/bar	p^2 Mole fraction of hydrogen in liquid, $10^2 x_{H_2}$	т/к	l(P/bar	D ² Mole fraction of hydrogen in liquid, l0 ² x _{H2}	
298.15 323.15	50.7 101.3 202.7 405.3 608.0 810.6 1013.3 50.7 101.3 182.4 202.7 405.3 608.0 810.6 1013.3	0.338 0.745 1.503 2.816 3.921 4.887 5.679 0.386 1.015 1.963 2.184 4.244 5.965 7.415 8.667	348.15	101.3 202.7 405.3 608.0 810.6 1013.3 101.3 202.7 405.3 608.0 810.6 1013.3	1.227 3.050 6.290 9.052 11.391 13.380 1.177 4.158 9.652 14.544 18.824 22.777	
		AUXILIARY	INFORMATION	N		
METHOD /API	PARATUS/PRO		······································	PURITY OF M	ATERIALS -	
METHOD /APPARATUS/PROCEDURE: Mixtures equilibrated in rocking autoclave. Pressures measured with piston gauges. Liquid phase analysed by condensing sample in liquid air and removing nitrogen by Toepler pump and then estimating amount volumetrically.			 Purity 99.9 mole per cent, major impurity nitrogen. Contained 0.02 mole per cent of water. 			
			$\delta x_{H_2} = 3$ REFERENCES 1. Wieł	t0.1; δP/b t0.2-0.3%. : pe, R.; Tr Am. Chem. S	ar = ±0.1 or less; remearne, T. H. coc. <u>1933</u> , 55,	

COMPONENTS:	
1. Hydrogen; H ₂ ; [1333-74-0]	ORIGINAL MEASUREMENTS: Weibe, R.; Gaddy, V.L.
2. Ammonia; NH ₃ ; [7664-41-7]	J. Am. Chem. Soc. <u>1937</u> ,59,1984-7
VARIABLES:	PREPARED BY:
Pressure	C.L. Young
EXPERIMENTAL VALUES:	
m /1/	
T/K P/bar	10^2 x mole fraction of hydrogen in liquid,
	$10^2 x_{H_2}$
	0.500
273.15 101.32 202.65	0.506 0.986
405.30 607.95	1.815 2.518
810.60	3.116
1013.25	3.644
AUXILIARY	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref.
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref.
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref. l.
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref. 1. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1; \delta x_{H_2} = \pm 0.5$ (estimated by compiler).
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref. 1. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1; \delta x_{H_2} = \pm 0.5$ (estimated by compiler). REFERENCES:
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref. 1. ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/bar = \pm 0.1; \delta x_{H_2} = \pm 0.5$ (estimated by compiler).
METHOD/APPARATUS/PROCEDURE: Rocking equilibrium cell. Pressure measured with dead weight tester. Liquid samples analysed by stripping out nitrogen at low pressure and low	<pre>SOURCE AND PURITY OF MATERIALS: No details given but thought to be of high purity as in ref. 1. ESTIMATED ERROR:</pre>

	ORIGINAL MEASUREMENTS:			
74-0]	Augood, D. R.			
	Trans. Instn. Chem. Engnrs.,			
,]				
	<u>1957</u> , 35, 394-408.			
	DDDDADDD DV			
		<i>.</i>		
re	C. L. Youn	a		
		<u> </u>		
'MPa	Mole fraction of in liquid, $x_{\rm H_2}$ i	hydrogen n gas, y _{H2}		
9.06		0.900 0.921		
5.61		0.954		
9.13		0.973 0.987		
1.51		0.972		
AUXILIARY	INFORMATION			
	SOURCE AND PURITY OF MATE	RIALS:		
tted with rer.				
and	2. Imperial Chemical Industries sample.			
	ESTIMATED ERROR:			
	δx_{H_2} , $\delta y_{H_2} = \pm 4\%$ (est	δx_{H_2} , $\delta y_{H_2} = \pm 4$ % (estimated by compiler)		
	REFERENCES:			
	MPa .06 .06 .06 .13 .51 .51 .51 AUXILIARY tted with rer. and ammonia was ponents Ratio of	Augood, D. R. Augood, D. R. Trans. Instn. Chem 1957, 35, 394-408. PREPARED BY: re C. L. Youn MPa Mole fraction of in liquid, x _{H2} i 0.06 0.014 0.06 0.014 0.06 0.013 0.13 0.005 0.61 0.004 0.51 0.003 Part inch gauge press AUXILIARY INFORMATION AUXILIARY INFORMATION Source AND PURITY OF MATE tted with rer. and ammonia was ponents Ratio of by mass ESTIMATED ERROR: $\delta T/K = \pm 0.1; \delta P/MPa = 0.1; \delta $		

COMPONENTS :			ORIGINAL MEASUREME	:NTS:		
1. Hydroge	en, H ₂ ; [1333	-74-0]	Heise, F.,			
2. Ammonia	a, NH3; [7664	-41-7]	Ber. Bunsenge	s, Phys. Chem. 19	72, 76,	
		-	938-943.			
]	
VARIABLES:			PREPARED BY:	<u></u>		
	Temperatur	e, pressure	с. г.	Young		
				······································		
EXPERIMENTAL	VALUES:					
т/к	P/bar		on of hydrogen			
		in liquid, ^x H ₂	in vapor, ^y H2			
		H ₂	5 H 2			
298.15	28.90	0.00166	0.6145			
	53.45 100.2	0.00370	0.8751			
	100.7	0.00769	-			
·····	202.15	0.01555	0.9304			
					i i	
•						
		······································				
		AUXILIARY	INFORMATION			
METHOD /APPA	ARATUS/PROCEDUI	RE:	SOURCE AND PURITY	OF MATERIALS;		
Static roo	king equilibri l gas samples i	ium cell.		essheim sample, be mole per cent.	etter	
equilibriu	m established.	. Samples		Holtz sample, p	urity	
liquid nit	by freezing out rogen trap.	Details in	better than	99.8 mole per ce by gas chromatogi	ent as	
source and	l ref. l.			by gas chiomatog	Labuy	
			ESTIMATED ERROR:			
			$\delta T/K = \pm 0.1; \delta$ bar; ± 0.6 abov	$P/bar = \pm 0.3$ belove 100 bar; δx_{H_0}	ow 100	
			$\delta y_{\rm H_{2}} = \pm 2\%$ (est	imated by compile	er).	
			REFERENCES:			
				Dissertation,		
			Gottengen,			
					[

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Hydrogen; H ₂ ; [1333-74-0]	Moore, R.G.; Otto, F.D.
2. Ammonia; NH ₃ ; [7664-41-7]	Can. J. Chem. Engng. <u>1972</u> , 50, 355-60.
VARIABLES:	PREPARED BY:
Temperature	C.L. Young
EXPERIMENTAL VALUES:	
т/к	10 ⁴ x Mole fraction of hydrogen $*$ in liquid, 10 ⁴ x_{H_2}
203.2 213.2 223.2 233.2 243.2 253.2 263.2 273.2 283.2 293.2 303.2	0.1185 0.1573 0.2018 0.2528 0.3119 0.3808 0.4616 0.5565 0.6685 0.8007 0.9567
*at a partial pressure	of 101.3 kPa cont.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Recirculating flow apparatus fitted with magnetic pump. Amine saturated with hydrogen for a minimum of 8 hr. Samples of liquid withdrawn and amine frozen out, hydrogen released collected in calibrated gas buret. Amount of amine determined gravi- metrically.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Matheson sample, purity 99.999 mole per cent. Dried. 2. Matheson sample, purity 99.95 mole per cent. Dried. ESTIMATED ERROR:</pre>
	$\delta T/K = \pm 0.1; \delta x_{H_2} = \pm 4\%.$ (estimated by compiler).
	REFERENCES :

Hydrogen and Deuterium Solubilities above 200kPa

COMPONENTS	5:		OF	IGINAL MEASURE	EMENTS:	
1. Hyd	drogen; H ₂	; [1333-74-	0]	Moore, R.G	., Otto, F.	D.
2. Amr	nonia; NH3	; [7664-41-7]	Can. J. Ch	em. Engng. 1	1972, 50,
	•	•	-	355-60.		· ·
<u></u>						
		DATA take	n from dep	osited docu	ment	
		Total pressure	Partial of hydro	pressure	Solubil- ity +	Mole frac ion of
т/ ^о с	т/к	P/atm	P/atm	P /MPa	TCA	hydrogen
-25.01	248.14	7.55	6.06	0.614	0 2027	x _{H2} 0.002155
-24.50	248.14	7.54	6.00	0.614	0.2837 0.2843	0.002155
-24.53	248.62	7.59	6.06	0.614	0.2756	0.002094
24.31	248.84	16.36	14.81	1.501	0.6669	0.005064
-24.95	248.20	16.35	14.86	1.506	0.6935	0.005266
-24.67	248.48 248.76	14.42 14.64	12.90 13.10	1.307 1.327	0.5907 0.5996	0.004486 0.004553
·24.39	249.04	14.57	13.01	1.318	0.5977	0.004539
-23.83	249.32	14.51	12.93	1.310	0.5857	0.004448
24.39	248.76	16.60	15.06	1.526	0.7101	0.005393
24.39	248.76	16.58	15.04	1.524	0.6885	0.005228
-35.61 -35.61	237.54 237.54	13.99 13.99	13.10 13.10	1.327 1.327	0.4820 0.4777	0.003660 0.003628
-38.07	235.08	18.07	17.29	1.752	0.5904	0.004484
38.07	235.08	18.07	17.29	1.752	0.6053	0.004597
19.89	293.04	15.66	7.23	0.733	0.7634	0.005797
19.89	293.04	15.66	7.23	0.733	0.7621	0.005787
·59.83 ·60.46	213.32 212.69	17.02 19.17	16.80 18.96	1.702 1.921	0.3472 0.3828	0.002637 0.002908
.62.16	210.99	17.19	17.01	1.724	0.3338	0.002535
62.16	210.99	17.19	17.01	1.724	0.3303	0.002509
-62.29	210.86	17.37	17.18	1.741	0.3332	0.002531
-62.04 -61.09	211.11 212.06	18.62 15.70	18.44 15.50	1.362 1.571	0.3696 0.3098	0.002808 0.002353
0.19	273.34	15.76	11.50	1.165	0.8378	0.006361
0.19	273.34	21.52	17.25	1.748	1.2692	0.009634
0.19	273.34	21.52	17.25	1.748	1.2625	0.009583
0.13 0.11	273.28 273.26	18.93 18.93	14.67	1.486 1.487	1.0732	0.008147 0.008142
21.96	295.11	17.74	14.68 8.74	0.886	1.0725 0.9450	0.007175
21.96	295.11	17.74	8.74	0.886	0.9595	0.007285
	e of hydrog gram of amm	gen (cm ³) rec Nonia	luced to 1	01.3 kPa and	d 273.15K di	ssolved

,

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Gel'perin, I. I.; Trubitsyn, B. A.;			
2. Ammonia; NH ₃ ; [7664-41-7]	Kalinina. S. Ye.; Bezyulev, V. V.			
	Khim. Prom. <u>1974</u> , 8, 619-20.			
VARIABLES:	PREPARED BY:			
Temperature	C. L. Young			
Temperature				
EXPERIMENTAL VALUES:	I			
T/K $K^{\$}/atm g cm^{-3}$ 10 ⁴ × Mole	e fraction of hydrogen * at			
	l atmosphere partial pressure 10 ^{"x} H ₂			
273.15 14.8	0.514			
248.15 22.5	0.338 0.295			
243.15 25.8 233.15 30.9	0.246			
223.15 42.3	0.179 0.112			
203.15 68.0	0.112			
<pre>* calculated by compiler assuming molar volume of hydrogen at 101.325 kPa and 273.15 K is 22.4 dm³. ⁵ solubility coefficient in equation</pre>				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Measurements made in high pressure				
cell up to 17.0 MPa. Results only				
given in terms of K but it was stated				
Henry's law was obeyed up to a mole	No details given.			
fraction of 0.005 of hydrogen.				
Samples analysed by freezing ammonia				
in liquid nitrogen and estimating				
hydrogen volumetrically. Hydrogen				
removed and ammonia estimated	ESTIMATED ERROR:			
volumetrically. Details in	$\delta T/K = \pm 0.2; \delta x_{H_2} = \pm 2\%.$			
source.	11 2			
	BEEFFENON			
	REFERENCES:			

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COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Hydrogen; H ₂ ; [1333-74-0]	Hu, JH.; MacWood, G. R.			
2. Diborane; B ₂ H ₆ ; [19287-45-7]	J. Phys. Chem. <u>1956</u> , 60, 1483-6.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C. L. Young			
EXPERIMENTAL VALUES: Mole fraction	Mole fraction			
of hydrogen T/K P/bar in liquid, in gas,	of hydrogen T/K P/bar in liquid, in gas,			
$x_{\rm H_2}$ $y_{\rm H_2}$	$x_{\rm H_2}$ $y_{\rm H_2}$			
	···· Z ···· Z			
115.49 8.89 0.02590 0.9994	146.19 20.93 0.09307 0.9948			
112.3410.270.029690.9996112.4311.600.033650.9998	146.55 25.78 0.11338 0.9953 146.75 32.87 0.14406 0.9954			
113.82 15.34 0.04435 0.9998	146.01 42.47 0.18326 0.9960			
114.5121.280.061820.9998113.4621.690.062850.9998	158.43 4.09 0.01954 0.9295 158.32 10.07 0.05106 0.9755			
112.66 26.96 0.07501 0.9998	158.30 15.15 0.07634 0.9823			
112.85 34.58 0.08694 0.9998	158.15 21.51 0.10854 0.9862			
112.0842.540.096670.9999123.836.830.023300.9986	158.33 28.58 0.14541 0.9895 158.35 34.58 0.17622 0.9900			
123.95 14.61 0.04842 0.9992	159.26 42.04 0.21377 0.9915			
123.92 20.24 0.06841 0.9994	169.55 7.89 0.04337 0.9279			
124.2425.920.084690.9994124.4634.510.111800.9994	169.86 14.79 0.08427 0.9650 169.88 21.69 0.12433 0.9719			
124.23 42.68 0.13554 0.9994	169.97 29.12 0.17083 0.9780			
134.947.120.028340.9976134.9313.740.053810.9980	169.69 36.29 0.21139 0.9805 169.71 42.54 0.24527 0.9816			
135.13 20.86 0.08230 0.9985	181.56 8.42 0.04900 0.8527			
134.80 27.52 0.10757 0.9984	181.68 14.28 0.08921 0.9137			
134.95 34.19 0.13073 0.9987 134.95 43.02 0.16129 0.9988	181.42 20.39 0.13143 0.9435 181.55 27.24 0.17661 0.9540			
145.91 5.55 0.02458 0.9834	181.55 36.29 0.23562 0.9610			
145.66 9.25 0.04152 0.9886	181.73 42.24 0.27194 0.9630			
	INFORMATION			
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
High pressure cell connected to vapor	1. Electrolytic sample.			
recirculating pump. Pressure measured with Bourdon gauge calibrated	2. Purity 99.9 mole per cent.			
against dead weight balance.				
Temperature measured with thermocouple	•			
Hydrogen analysed volumetrically by stripping the liquid phase mixture.				
Details in source.				
	ESTIMATED ERROR: $\delta T/K = \pm 0.3; \delta P/bar = \pm 0.03; \delta x_{}$			
	$\delta T/K = \pm 0.3; \delta P/bar = \pm 0.03; \delta x_{H_2}$ = $\pm 0.0001; \delta y_{H_2} = \pm 0.0001$			
	(estimated by compiler).			
	REFERENCES:			
1				

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COMPONENTS: 1. Hydrogen; H ₂ ; [1333-74-0] 2. Nitrogen; N ₂ ; [7727-37-9] 3. Carbon monoxide; CO; [630-08-0]					ORIGINAL MEASUREMENTS: Akers, W.W.; Eubanks, L.S. <i>Adv. Cryogenic Engng.</i> <u>1960</u> , 3, 275-293.			
VARIABLES: Temper	ature, pr	essure,	composi	tion	PREPARED BY:	C.L. Youn	ıg	
EXPERIMENTAL VALUES: Mole fra							fractic	
т/к	P/psia	<i>P/</i> MPa	1 ² H2	n liqu ^x N ₂	^x CO	y _{H2}	n vapor, ^Y N ₂	^y co
80.37	315	2.17	0.0398 0.0404 0.0447 0.0460 0.0469 0.0487	0.748 0.827 0.877	B3 0.2070 70 0.1270 76 0.0805	0.9084 0.8865 0.8671 0.8662 0.8658 8655	0.0416 0.0181	0.0916 0.0719 0.0242 0.0169 0.0108 0
	500	3.45	0.0609 0.0658 0.0672 0.0694 0.0706 0.0726 0.0745 0.0755 0.0761 0.0763	0.217 0.312 0.403 0.478 0.619 0.718 0.817	70 0.7158 20 0.6186 30 0.5264 34 0.4490 95 0.3060 35 0.2060 76 0.1063	0.9320 0.9250 0.9198 0.9050 0.9020 0.9073 0.9018 0.8987 0.8964 0.8948	0 0.0158 0.0285 0.0401 0.0495 0.0583 0.0710 0.0819 0.0932 0.1052	0.0680 0.0592 0.0517 0.0449 0.0385 0.0344 0.0272 0.0194 0.0104 0
	1400	9.65	0.1745 0.1815 0.1828 0.1943 0.1950 0.2094 0.2190	0.226	22 0.7050 55 0.5292 50 0.5190 96 0.3110	0.9143 0.9080 0.9067 0.8956 0.8950 0.8831 0.8765	0 0.0168 0.0201 0.0470 0.0483 0.0810 0.1049	0.0857 0.0752 0.0732 0.0574 0.0567 0.0359 0.0186
			AUX	ILIARY	INFORMATION			
Recircu fitted tempera stainle with Boo measured thermoco phases a using a	ARATUS/PROC lating va with magn ture. Ce ss steel. urdon gau d with co ouples. analysed thermal tails in	por flow etic pum ll made Presson ge and pper-con Samples by gas of conduct:	np at am of type ire meas temperat nstantan of both chromato	bient 303 ured ure graphy	SOURCE AND PI 1. and 2. 3. ESTIMATED ERI $\delta T/K = \pm 0.$ δx , $\delta y = \pm$ REFERENCES:	Purity cent. Prepare of form ic acid about 9 ROR: 06; δ <i>P/M</i>	99.7 mol d from r ic acid . Dried 7 mole p	eaction and sulfur- . Purity er cent.

COMPONENTS:				ORIGINAL MEASUREMENTS:					
1. Hydrogen; H ₂ ; [1333-74-0]				Akers, W.W.; Eubanks, L.S.					
 Nitrogen; N₂; [7727-37-9] Carbon monoxide; CO; [630-08-0] 				Adv. Cryogenic Engng. <u>1960</u> , 3, 275-293.					
EXPERIMENTAL VALUES: Mole frac									
T/K	P/psia	<i>P/</i> MPa	х _{Н2}	n liqui ^x N2	^x CO	^y H ₂	n vapor, ^y N ₂	^y co	
80.37	1400	9.65	0.2231	0.6864	0.0905	0.8731 0.8700	0.1159 0.1300	0.0110	
	2000	13.79	0.2490 0.2815 0.3000 0.3317 0.3446	0 0.2270 0.3500 0.5644 0.0654	0.3500	0.8790 0.8508 0.8356 0.8090 0.7977	0 0.0440 0.0743 0.1550 0.2023	0.1210 0.1052 0.0901 0.0360 0	
99.82	315	2.17	0.0389 0.0393 0.0398 0.0400 0.0397 0.0392 0.0385 0.0380 0.0377	0 0.0811 0.1970 0.2980 0.5493 0.7102 0.8651 0.9413 0.9623	0.7632 0.6620 0.4110 0.2506 0.0964 0.0207	0.6803 0.6682 0.6504 0.6357 0.5919 0.5680 0.5563 0.5519 0.5509	0 0.0392 0.0958 0.1390 0.2563 0.3315 0.4037 0.4393 0.4491	0.3197 0.2925 0.2538 0.2253 0.1518 0.1005 0.0400 0.0088 0	
	500	3.45	0.0674 0.0689 0.0707 0.0720 0.0739 0.0744 0.0745 0.0744 0.0744 0.0741	0 0.0766 0.1908 0.2968 0.5201 0.6576 0.6761 0.8342 0.8455 0.9259	8 0.7385 8 0.6312 0.4050 5 0.2680 0.2494 2 0.0914 5 0.0801	0.7619 0.7483 0.7318 0.7190 0.6974 0.6868 0.6851 0.6740 0.6732 0.6686	0 0.0335 0.0797 0.1133 0.1886 0.2352 0.2422 0.2985 0.3023 0.3314	0.2381 0.2182 0.1885 0.1677 0.1140 0.0780 0.0727 0.0275 0.0245 0	
99.82	800	5.52	0.1163 0.1281 0.1342 0.1366 0.1378 0.1381 0.1383 0.1384	0 0.1342 0.3074 0.4826 0.6556 0.7230 0.8313 0.8616	0.5584 0.3808 0.2066 0.1389 0.0304	0.7844 0.7708 0.7539 0.7398 0.7290 0.7256 0.7213 0.72795	0 0.0492 0.1099 0.1627 0.2120 0.2340 0.2693 0.2721	0.2156 0.1800 0.1362 0.0975 0.0590 0.0404 0.0094 0	
	1100	7.58	0.1727 0.1860 0.2030 0.2074 0.2102 0.2114 0.2116	0 0.0717 0.3452 0.4995 0.6817 0.7611 0.7884	2 0.4518 5 0.2931 7 0.1081 - 0.0275	0.7848 0.7760 0.7448 0.7317 0.7208 0.7181 0.7175	0 0.0257 0.1237 0.1790 0.2443 0.2727 0.2825	0.2152 0.1983 0.1315 0.0893 0.0349 0.0092 0	
	1400	9.65	0.2399 0.2527 0.2662 0.2792 0.3001 0.3030	0 0.0663 0.1634 0.2965 0.6522 0.6970	0.5704 0.4243 0.0477	0.7739 0.7578 0.7357 0.7090 0.6565 0.6530	0 0.0330 0.0813 0.1476 0.3247 0.3470	0.2261 0.2092 0.1830 0.1434 0.0188 0	
122.04	500	3.45	0.0449 0.0426 0.0395 0.0356 0.0332 0.0288 0.0261	0 0.1486 0.3279 0.5083 0.6088 0.8242 0.9739	0.6326 0.4561 0.3580 0.1470	0.2260 0.1974 0.1660 0.1357 0.1204 0.0945 0.0821	0 0.1395 0.3090 0.4791 0.5738 0.7768 0.9179	0.7740 0.6631 0.5250 0.3852 0.3058 0.1287 0	

COMPONENTS:					ORIGINAL MEASUREMENTS:			
 Hydrogen; H₂; [1333-74-0] Nitrogen; N₂; [7727-37-9] Carbon monoxide; CO ; [630-08-0] 					Akers, W.W.; Eubanks, L.S. <i>Adv. Cryogenic Engng.</i> <u>1960</u> , <i>3</i> , 275-293.			
EXPERIMENTAL VALUES:			Mole fractions in liquid			Mole fractions in vapor		
T/K	P/psia	P/MPa	^ж н ₂	^x N ₂	^x co	<i>y</i> _{H₂}	^y N ₂	^y co
122.05	500	5.52	0.1382 0.1387 0.2256	0.1330	0.8618 0.7283 0.4214**	0.3349 0.3095	0 0.1120	0.6651 0.5785
			** Cri	tical po	int.			

COMPONENTS :	ODICINAL VEACUDENTING.				
	ORIGINAL MEASUREMENTS:				
1. Hydrogen; .H ₂ ; [1333-74-0]	Larson, A. T.; Black, C. A.				
2. Nitrogen; N ₂ ; [7727-37-9]	Ind. Eng. Chem. <u>1925</u> , 17, 715-6.				
3. Ammonia; NH ₃ ; [7664-41-7]					
VARIABLES:	PREPARED BY:				
Temperature, pressure, composition	C. L. Young				
iemperature, pressure, composition	C. D. Toung				
EXPERIMENTAL VALUES:	± *				
Absorr T/K ^P total ^{/MPa P} H ₂ ^{/P} N ₂	ption Coefficients [#] Mole fractions [*] H ₂ N ₂ x H ₂ x N ₂				
total' $H_2' N_2$	H ₂ N ₂ H ₂ N ₂				
	1.62 0.73 0.00123 0.00055				
	1.90 0.84 0.00144 0.00064 2.07 0.94 0.00157 0.00071				
270.2	2.35 1.08 0.00178 0.00082				
	2.61 1.15 0.00198 0.00087 2.70 1.19 0.00205 0.00090				
	3.19 1.46 0.00242 0.00111				
	3.30 1.35 0.00250 0.00102 3.66 1.46 0.00277 0.00111				
	3.66 1.46 0.00277 0.00111 3.85 1.63 0.00292 0.00124				
	4.43 1.83 0.00335 0.00139				
	4.84 2.02 0.00366 0.00153 5.28 2.28 0.00400 0.00173				
295.2	7.54 3.21 0.00570 0.00243				
	4.70 1.89 0.00356 0.00143 5.12 2.09 0.00388 0.00159				
	5.12 2.05 0.00300 0.00135 5.20 2.44 0.00469 0.00185				
	5.30 2.58 0.00476 0.00196				
	3.22 3.33 0.00621 0.00252 9.42 3.61 0.00711 0.00274				
<pre># cm³ of gas (measured at 101.32 per gram of ammonia. * calculated by compiler.</pre>	25 kPa and 273.15 K) dissolved				
AUXILIARY	INFORMATION				
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:				
Static equilibrium cell. Pressure	No details given except				
measured with Bourdon gauge.	that nitrogen contained				
Liquid samples taken and added to	a trace of argon.				
excess acid. Hydrogen and					
nitrogen estimated by volumetric					
method and combustion of hydrogen.					
	ESTIMATED ERROR: $\delta T/K = \pm 0.2; \delta^P_{total}/MPa = \pm 0.05;$				
	$\delta x_{H_2} \simeq \delta y_{N_2} = \pm 1\%$ (estimated by				
	compiler).				
	REFERENCES.				
	l				

SYSTEM INDEX

Underlined page numbers refer to evaluation text and those not underlined to compiled tables. All compounds are listed as in Chemical Abstracts. For example, toluene is listed as benzene, methyl- and dimethylsulfoxide is listed as methane, sulfinylbis-. Since hydrogen is usually one of the components it is omitted in the listing.

А

Ω		
Acetamide Acetic acid Acetic acid, chloro- (aqu Acetic acid, ethyl ester Acetic acid, methyl ester Acetic acid, 2-methylprop Acetic acid, pentyl ester Acetone Alcohols (Cl2-Cl6 aliphati D-Alinine Aluminium chloride (aqueous) Aminoethane Aminopropane 2-Aminopropane N, N'-bis-(3-Aminopropyl)-	<pre>yl ester see 2-propanone c) (quaternary) c) (ternary) us) see ethanamine see 1-propanamine see 2-propanamine ethylenediamine see 1,3-propanediamine,</pre>	$\begin{array}{c} 95\\ \underline{227}, 228, 229\\ 91\\ \underline{230}, 233, 234\\ \underline{230}, 232\\ \underline{231}, 235\\ \underline{231}, 236\\ 473, 474\\ 471, 472\\ 103\\ \underline{30}, 54\\ \underline{30}, 53\end{array}$
	N-(2-aminoethyl)-N-(3-aminopr	opyl)-
<pre>N-(3-Aminopropyl)-1,3-pro Ammonia (ternary) Ammonia Ammonia Ammonia (ternary) Ammonium chloride (aqueou Ammonium hydroxide Ammonium nitrate Ammonium sulfate Amyl acetate Aniline Animal oil Argon Argon</pre>	<pre>see 1,3-Propanediamine, N-(3-aminopropy1)- + deuterium + hydrogen deuteride</pre>	$\begin{array}{r} 296\\ 299\\ 622, \ 623 - \overline{629}\\ 634\\ \underline{28}, \ 43, \ 44\\ \underline{28}, \ 42\\ \underline{28}, \ 42\\ \underline{571}, \ 572 - \overline{580} \end{array}$
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