ANALYTICAL CHEMISTRY DIVISION COMMISSION ON SOLUBILITY DATA

# SOLUBILITY DATA SERIES

Volume 4

# ARGON

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# SOLUBILITY DATA SERIES

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# SOLUBILITY DATA SERIES

Volume 4

ARGON

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Robert Maxwell Publisher at Pergamon Press

## 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-in-scope re-Views 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.

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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 critically-evaluated 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 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 succinct 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 consideration 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.

(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;

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(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 1979, 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 pro-ject. It should help to dispel confusion in the minds of many authors of 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

August, 1979

#### PREFACE

The present volume completes the compilation and evaluation of the solubility of the noble gases in liquids. The literature on the solubility of argon was covered through 1978. Some 1979 papers are cited.

The users of this volume will find (1) the experimental solubility data of argon gas in liquids as reported in the scientific literature, (2) tables of smoothed mole fraction solubility data for the systems which were studied over a temperature interval, and (3) tables of either tentative or recommended solubility data when two or more laboratories reported solubility data over the same range of temperature and pressure for a system. 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.

Some words of explanation are required with respect to units, corrections, smoothing equations, auxiliary data and data sources, nomenclature, and other points. The experimental data are presented in the units found in the original paper. In addition the original data are often converted to other units, especially mole fraction. Temperatures have been converted to Kelvin. In evaluations of solubility data, S.I. units are used.

Only in the past 10 to 15 years have experimental methods for the determination of the solubility of gases in liquids developed to the point where 0.5 percent or better accuracy is attained. Only a small fraction of the literature's gas solubility data are accurate to 0.5 percent. The corrections for non-ideal gas behavior and for expansion of the liquid phase on dissolution of the gas are small and well within the normal experimental error. Thus such corrections were not made for the gas solubility data at low pressure.

Most gas solubility measurements carried out near atmospheric 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 such experiments the Ostwald coefficient is the directly measured unit. The Bunsen coefficient and the mole fraction gas solubility at one atmosphere gas partial pressure are calculated from the Ostwald coefficient assuming that the Ostwald coefficient is independent of pressure. The assumption may not be exactly true, especially if the gas is at a partial pressure well below atmospheric, if the solvent has a very high vapor pressure, or if the gas is soluble enough to change the solvent properties from their pure liquid properties. This is a problem that both future evaluators and experimentors must pay more attention. The Bunsen 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

 $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = A + BT$ 

or in alternate form

 $\ln X_1 = -\Delta G^{\circ}/RT = -(A/R)/T - (B/R)$ 

where A is  $\Delta H^{\circ}$ , B is  $-\Delta S^{\circ}$ , X<sub>1</sub> is the mole fraction solubility at a gas partial pressure of 101.325 kPa (l atm), and R is 8.31441 J K<sup>-1</sup> mol<sup>-1</sup>. 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. Much time and effort were expended in evaluating the solubility data of each gas in water. A recommended equation and table of values are presented. 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 that paper is given, even when it is at variance with our recommended values. These data of sometimes poorer quality are presented because the author's ratio of gas solubility in water to solubility in the aqueous solution may be more accurate than the solubility itself. This may be especially true of some of the solubility data in aqueous electrolyte solutions.

Solvent density data were often required in making solubility unit conversions. The density data were not directly referenced. The main sources of density data are

> 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 1973, 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 Ed.

The solubility data are supplemented with partial molal volume and calorimetric enthalpy of solution data when they are known.

Chemical Abstracts recommended names and registry numbers were used throughout. Common names are cross referenced to Chemical Abstract 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 Equilibrium Data and the Subcommittee on Solubility Data; the cooperation and hard work of the Evaluators and Compilers; and the untiring efforts of the typists Peggy Tyler, Carolyn Dowie, and Lesley Flanagan.

Acknowledgement is made to the Donors of the Petroleum Research Fund, administered by the American Chemical Society, for partial support of the compilation and evaluation of the gas solubility data.

H. Lawrence Clever

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Atlanta, GA August, 1979

# THE SOLUBILITY OF GASES IN LIQUIDS

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

#### 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-liquid 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.

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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 quoted 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:

$$X(g) = \frac{n(g)}{n(g) + n(1)}$$

W(g)/M(g) {W(g)/M(g)} + {W(l)/M(l)}

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<sub>W</sub>

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) =  $\frac{C_{W}M(1)}{1 + C_{M}M(1)}$ 

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 quoted 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, $\alpha$

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) = 
$$\frac{\alpha}{\alpha + \frac{273.15}{T} \frac{v^{O}(g)}{v^{O}(1)}}$$

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,

$$X = \frac{\alpha}{\alpha + \frac{273.15R}{v^{o}(1)}}$$

Real gases do not follow the ideal gas law and it is important to establish the real gas law used for calculating  $\alpha$  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.

#### The Ostwald Coefficient, L

The Ostwald coefficient, L, is defined as 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

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

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

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#### The Absorption Coefficient, $\beta$

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.  $\beta$  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 Constant

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

 $P(g) = K_H X$ 

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

 $P(g) = K_2C(1)$ 

or

 $C(g) = K_{c}C(1)$ 

where  $K_2$  and  $K_c$  are constants, C the concentration, and (1) and (g) refer to the liquid and gas phases. Unfortunately,  $K_H$ ,  $K_2$  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

 $L = \alpha(T/273.15)$  $C_w = \alpha / v_o \rho$  $K_{\rm H} = \frac{17.033 \times 10^6 \rho_{\rm soln}}{10^6 \rho_{\rm soln}} +$ 760 α M(1)  $L = C_w v_{t,gas}^{\rho}$ 

where v is the molal volume of the gas in cm<sup>3</sup>mol<sup>-1</sup> at 0°C,  $\rho$  the density of the solvent at the temperature of the measurement,  $\rho_{soln}$  the density of the solution at the temperature of the measurement, and v<sub>t</sub> gas the molal volume of the gas (cm<sup>3</sup>mol<sup>-1</sup>) 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 Cs, the electrolyte concentration, and C<sub>i</sub>, 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  $\ensuremath{\mathtt{C}}_{\ensuremath{\mathtt{S}}}$ and Ci values when there is negligible chemical interaction between solute species.

$$\log f_i = k_s C_s + k_1 C_i$$

where  $k_{\rm s}$  is the salt effect parameter and  $k_{\rm i}$  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  $f_i = f_i^{\circ} = \frac{s}{s_i}$ 

where  $S_i$  and  $S_i^{\circ}$  are the gas solubility in the salt solution and in the pure solvent, respectively, and the f's are the corresponding activity coefficients. It follows that  $\log \frac{f_i}{f_i} = \log \frac{S_i^{\circ}}{s_i^{\circ}} = k_s C_s + k_i (S_i - S_i^{\circ})$ . When the f,<sup>0</sup>

Si

quantity (S<sub>i</sub> - S<sub>i</sub><sup>O</sup>) is small the second term is negligible even though  $k_s$  and  $k_i$  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 solu-bility or the salt concentration. Both molar (mol dm<sup>-3</sup>) and molal (mol kg<sup>-1</sup>) are used for the salt concentration. The gas solubility ratio  $S_1^{O(S_1)}$  is given as Purses for the salt concentration. Si<sup>O</sup>/Si is given as Bunsen coefficient ratio and Ostwald coefficient ratio,

<u>, i</u>

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<sup>-3</sup> and  $S_i^{O}/S_i$  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  $\overline{\Delta G_1^0}$ ,  $\overline{\Delta H_1^0}$ ,  $\overline{\Delta S_1^0}$  and  $\Delta \overline{C}^{\circ} p_{1}$  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:

> $\Delta \overline{G}_{1}^{\circ} = -RAT - 100 RB - RCT ln (T/100) - RDT^{2}/100$  $\Delta \overline{S}_{1}^{2} = RA + RC \ln (T/100) + RC + 2 RDT/100$  $\Delta \overline{H}_{\gamma}^{\circ} = -100 \text{ RB} + \text{RCT} + \text{RDT}^2 / 100$ RC + 2 RDT/100 =

In cases where there are solubilities at only a few temperatures it is convenient to use the simpler equations

 $\Delta \overline{G}_1^\circ = - RT \ln x = A + BT$ 

in which case  $A = \Delta \overline{H}_1^\circ$  and  $-B = \Delta \overline{S}_1^\circ$ .

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Water

<ol> <li>Argon; Ar; 7440-37-1</li> <li>Water; H<sub>2</sub>O; 7732-18-5</li> </ol>	Rubin Battino Department of Chemistry Wright State University Dayton, OH 45431 U.S.A.
	December 1978

CRITICAL EVALUATION:

The experimental solubility data produced by eight workers was considered to be sufficiently reliable to use for smoothing. In fitting the data to the equation those points which differed by about two standard deviations or more from the smoothed values were rejected. We thus used 42 points which were obtained as follows (reference - number of data points used from that reference): 1-4, 2-9, 3-6, 4-6, 5-3, 6-3, 7-3, 8-2, 9-1, 10-2, 11-3. The fitting equation used was

$$\ln X_{1} = A + B/(T/100K) + C \ln (T/100K) + DT/100K$$
(1)

By using T/100K as the variable rather than T/K the coefficients in the smoothed equation are of roughly equal magnitude. The best fit for the 42 points gave

 $\ln x_1 = -57.6661 + 74.7627/(T/100K) + 20.1398 \ln (T/100K)$ 

where  $X_1$  is the mole fraction solubility of the gas at 101.325 kPa (1 atm) partial pressure of the gas. The fit in  $\ln X_1$  gave a standard deviation of 0.26% taken at the middle of the temperature range. Table 1 gives smoothed values of the mole fraction at 101.325 kPa partial pressure of the gas and the Ostwald coefficient at 5K intervals.

Table 1 also gives the thermodynamic functions  $\Delta \vec{G}_1^\circ$ ,  $\Delta \vec{H}_1^\circ$ ,  $\Delta \vec{S}_1^\circ$ , and  $\Delta \vec{C}_{p_1}^\circ$ 

for the transfer of gas from the vapor phase at 101.325 kPa partial pressure to the (hypothetical) solution phase of unit mole fraction. These thermodynamic properties were calculated from the smoothing equation according to the following equations:

 $\Delta \overline{G}_{1}^{\circ} = -RAT - 100RB - RCT \ln (T/100) - RDT^{2}/100$  (3)

 $\Delta \overline{S}_{1}^{\circ} = RA + RC \ln (T/100) + RC + 2RDT/100$  (4)

 $\Delta \overline{H}_1^\circ = -100 RB + RCT + RDT^2/100$ 

(5) (6)

 $\Delta \overline{C}_{p_1}^{\circ} \approx RC + 2RDT/100$ 

Several sets of data were rejected for various reasons. Clever and Reddy's single point (12) was too low by about 3%. Cargill and Morrison (13) presented their data graphically only. Sisskind and Kasarnovsky's single value (14) was 4% low. The single value reported by Novak and Con-way was also low by about 5% (15). Of the three values reported by Patsatsiya and Krestov (16) two were low and the other was okay, so all three were rejected. The one value reported by Strakhov and Krestov (17) was about 3% low. The higher temperature (40 to 70° C) values reported by Krestov and Nedelko (18) were quite significantly low (16 to 20%). Ashton, et al.'s values (19) were between one and two percent high. The values determined by Shoor, et al., (20) by a gas chromatographic method were erratically high and low. The 25° C value by Clever, et al., (21) was 2% low. Antro-poff's measurements were very high (22). The 25° C value reported by Akerlof (23) was very high. König's measurements (24) were 4 to 10% low. Friedman (25) reported two values, one of which was high and the other okay, but the set was rejected. Both values reported by Eucken and Hertzberg (26) were about 2% low. The three values by Patsatsiya and Krestov (27) were 2-3% low. The five values by Krestov and Nedelko (28) were also 2-3% low. Lannung's data (29) were erratically high and low, but close to the best data. Abrosimov et al.(36) reported five values from 10 to 45  $^{\circ}$ C which were 1 to 6 per cent different from the smoothed values and varied erratically. Figure 1 shows the temperature dependence of the mole fraction solubility for argon. The curve was obtained from the smoothing equation. In the extrapolated values (beyond those used for the fitting equation) there appears to be a minimum at about 368K.

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COMPONENT	S:		EVALUATOR:		
1. Argon	; Ar; 7440-37-	-1	Rubin Ba	ttino	
2 Water				nt of Chemistry	
2. water	; H <sub>2</sub> O; 7732-18	5-5		tate University OH 45431 U.	.S.A.
			Day com	011 45451 0.	<i>D</i> • <i>A</i> •
				· ··· · · · · · · · · · · · · · · · ·	
l	EVALUATION:				
TABLE 1	. Smoothed val	lues of the so	lubility of a	rgon in Water,ang equation 2 a	and thermo-
	kPa (l atm)	partial press	sure of gas.	ng equation 2 a	101.325
	Mal Engetion	0= 1= 1=			<u> </u>
T/K	Mol Fraction	Ostwald Coefficient	∆G?/kJ mol <sup>-1</sup>	∆H1 <sup>0</sup> /kJ mol <sup>-1</sup>	$\Delta \overline{S}^{\circ}_{J} / J K^{-1} mo \overline{1}^{1}$
ł	$x_{1} \times 10^{3}$	L	- <b>1</b> ,	T,	
					140 7
273.15 278.15	0.04284 0.03775	0.05330 0.04782	22.84 23.55	-16.42 -15.58	-143.7 -140.7
283.15	0.03362	0.04335	24.25	-14.75	-137.7
288.15	0.03025	0.03967	24.93	-13.91	-134.8
293.15	0.02748	0.03662	25.60	-13.07 -12.24	-131.9
298.15 303.15	0.02519 0.02328	0.03410 0.03201	26.25 26.89	-11.40	-129.1 -126.3
308.15	0.02169	0.03027	27.51	-10.56	-123.6
313.15	0.02036	0.02882	28.12	- 9.72	-120.9
318.15 323.15	0.01925 0.01832	0.02762 0.02664	28.72 29.31	- 8.89 - 8.05	-118.2 -115.6
328.15		0.02585	29.88	- 7.21	-113.0
333.15		0.02522	30.44	- 6.37	-110.5
338.15	0.01637 0.01594	0.02473 0.02436	30.98 31.52	- 5.54 - 4.70	-108.0 -105.5
348.15	0.01560	0.02412	32.04	- 3.86	-103.1
	[				
⊿	<b>\$</b>  - \				_
			Argon		
X <sub>1</sub> ×10 <sup>5</sup>	3-				
×					
5	I				
2	2-				_
	273	293			
	275	293 T/K	313	333	353
		17 K			
DIANNS	1 (1) (1) (1)				
FIGURE	1. The mole find (1 atm).	raction solubi	uity of argon	in water at l	01.325 kPa
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Wate	r
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COMPONENTS: EVALUATOR:	
<pre>1. Argon; Ar; 7440-37-1 Rubin Battin Department o 2. Water; H<sub>2</sub>O; 7732-18-5 Wright State Dayton, OH</pre>	of Chemistry

## CRITICAL EVALUATION:

Alexander (30) measured the enthalpy of solution of argon in water at 298.15 K, and reported values of -11.2, -13.0, and -11.9 kJ mol<sup>-1</sup>, average  $-12.1 \pm 0.8$  kJ mol<sup>-1</sup>. The calorimetric enthalpy of solution of argon in water agrees well with the enthalpy value of -12.24 kJ mol<sup>-1</sup> derived from the recommended equation for the mole fraction solubility of argon in water at 101.325 kPa and temperatures between 273.15 and 348.15 K.

There are at least four reports of the partial or apparent molal volume of argon in water at 298.15 K. Namiot (31) gives a value from the fit of high argon pressure solubility data to a theoretical equation. Enns, Scholander and Bradstreet (32) studied the equilibrium pressure of argon required to maintain a constant concentration of dissolved argon as the hydrostatic pressure on the solution varied from 34-102 atm, from which they derived a partial molal volume of argon in water. Tiepel and Gubbins (33) made direct dilatometer measurements at atmospheric pressure of argon dissolved in water and in several aqueous salt solutions. Popov and Drakin (34) calculated an apparent molal volume of argon in water from their measurements of the density of gas saturated water at pressures of 10 to 96 atm. They used the solubility data of Namiot and Bondareva to calculate the gas concentration in their solutions (35).

The partial and apparent molal volumes of argon dissolved in water are summarized in Table 2. The four sets of values agree well except for the data of Popov and Drakin, which ranges 70 percent higher than the other values. The present recommendation is that the value reported by Tiepel and Gubbins is the most reliable.

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		ties up to 200 kPa
COMPONENTS :		EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-</li> <li>Water; H<sub>2</sub>O; 7732-18</li> </ol>		H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322
		U. S. A. August 1978
CRITICAL EVALUATION:		
TABLE 2. Argon partial	. molal volume	e in water.
T/K P/atm <sup>a</sup> $\overline{V}_1$ /cm	<sup>3</sup> mol-1 Refe	erence and Comments
298.15 32	and	ot (31) quotes the value from Namiot Bondareva (35). (We have not been able obtain a copy of the paper).
	e.l stud requ of a stat	s, Scholander and Bradstreet (32). A by of the argon equilibrium pressure nired to maintain a fixed concentration argon dissolved in water as the hydro- tic pressure is increased from 34 to atm.
298.15 1 31.71	met: ueou	bel and Gubbins (33). A careful dilato- tic study of argon in water and in aq- as solutions of KCl, KI, CaCl <sub>2</sub> , $(CH_3)_4$ N- and $(C_4H_9)_4$ NBr. For the $\overline{V}_1$ values in salt solutions see the original paper.
298.15 9.67 - 55.2 95.80	satı inte appa usir	by and Drakin (34). The density of argon wrated $H_2O$ was measured at about 10 atm ervals over the pressure range and arent molal volumes were calculated by the solubility data of Namiot and lareva (35).
<sup>a</sup> l atm = 101.325 kPa 24. König, H. <u>Z. Natu</u> 25. Friedman, H. L. J	rforsch. 1963 Amer. Chem.	, <u>18a</u> , 363. <u>Soc</u> . 1954, <u>76</u> , 3294.
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<u>Tekhnol</u> . 1971, <u>14</u> ,	1006.	
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ADDED NOTE: Mathes argon in water at recommended value. for argon + water At temperatures of recommended values of 323, 338 and 35	on and King ( 298.15 K whic Potter and C at 13 tempera 298, 303, 30 with an aver 3 K their val	37) report a value of the solubility of the is 7.9 per cent higher than the lynne (38) report Henry's constants tures from 298 to 561 K by a new method. 8 and 313 K the values agree with the age deviation of 0.20 %. At temperatures ues of the mole fraction solubility are the recommended values. See pages 5-7.
37. Matheson, I.B.C.; K 38. Potter, R. W.; Cly	ing, A.D. J. nne, M. A. J.	<u>Coll. Interface Sci. 1978, 66</u> , 464. <u>Soln. Chem. 1978, 7</u> , 837.

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Water

COMPONENTS:	EVALUATOR:
<pre>1. Argon; Ar; 7440-37-1 2. Water; H<sub>2</sub>O; 7732-18-5</pre>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 U. S. A.
	July 1979

CRITICAL EVALUATION:

#### Argon + Water: Evaluation Update

Potter and Clynne (1) have extended the measurements of the solubility of the noble gases in water to temperatures of 560 K and moderate pressures. They report measurements of the solubility of argon, and calculate Henry's constants from 298 to 561 K. The inverse of Potter and Clynne's Henry's constant is the mole fraction solubility of water at 101.325 kPa (1 atm). Their solubility values at temperatures near 298, 303, and 313 K deviate from Battino's recommended solubility values (pp 1 - 4) from 0.00 to 0.69 percent with an average deviation of under 0.20 per cent. At temperatures of 323, 338, and 353 K Potter and Clynne's values are greater than the recommended values by 4.8, 14.0, and 21.6 per cent respectively.

The experimental method of gas solubility determination used by Potter and Clynne is quite different than the methods used by others who have measured the solubility of argon in water in the room temperature range. The method appears to be reliable. The question is "are Potter and Clynne's data in the 323 - 353 K range more reliable than Battino's recommended solubility values?"

When evaluating gas solubility data, the higher values are usually given more weight because the two principle errors in measuring the solubility are incomplete degassing of the solvent and failure to establish equilibrium from the gas low pressure side. Both errors lead to low values of solubility. Α third problem, that according to Horiuti (2) can lead to low results, is the measurement of the gas volumes under wet conditions (gas saturated with solvent vapor). Most methods used are "wet" methods. That low values of solubility are a problem is evident from Battino's evaluation. He used data from eleven papers to obtain his recommended values. He rejected data from about 20 papers, and of the rejected data about 80 percent were lower valued than the recommended data. One of the few papers that reported data consistently higher than the recommended was work done under "dry" conditions by Ashton, Dawe, Miller, Smith and Stickings (3). The Ashton, et al. value at 323.15 K is about two percent higher than the recommended value. They do not report values at higher temperatures where the deviations of Potter and Clynne's data are more pronounced.

Figure 1 shows the experimental values used by Battino to establish the rec-Ommended values (open symbols), Potter and Clynne's data in the region of deviation (solid circles), and the Ashton, et al. data at their three highest temperatures of measurement (solid squares). The solid line is from the recommended equation of Battino. The two dashed lines are for a 3 constant (----) and four constant (- -) fit to the data of Potter and Clynne plus all of the data used to obtain the recommended equation.

Figure 2 shows the data of Potter and Clynne and one point from the high pressure data of Sisskind and Kasarnowsky (4) with the same three curves running up to a temperature of 573 K. It is interesting that Battino's recommended equation based on data between 273 and 348 K does not deviate more than about 30 per cent from Potter and Clynne's experimental values even when extrapolated to a temperature as high as 561 K.

The question about the reliability of Potter and Clynne's data in the 323 - 365 K range cannot be answered without more experimental work in this important temperature range. It should be pointed out that Battino's recommended Values above 323 K are based on data from only two papers (5,6). The recommended equation has a much stronger experimental basis at temperatures between 273 and 313 K than at temperatures of 323 K and above.

(Continued on the middle of page 7)

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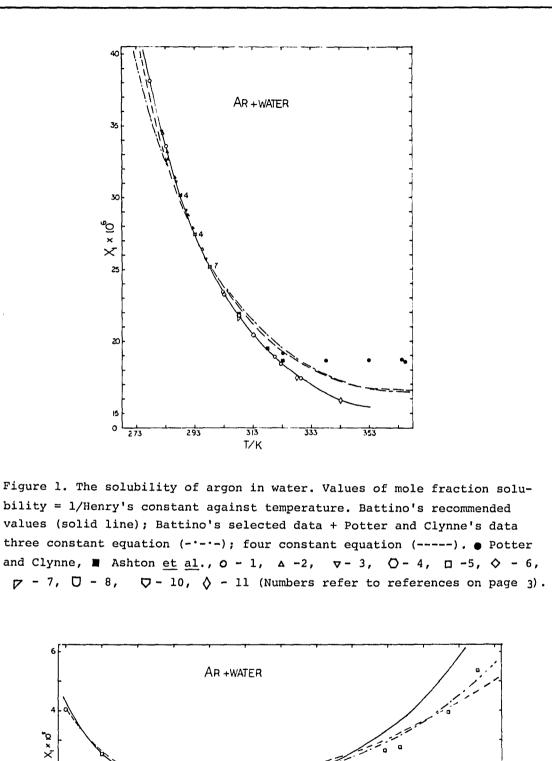


Figure 2. The solubility of argon in water. Values of mole fraction solubility = 1/Henry's constant against temperature. Caption continued on next page.

T/K

373

473

573

0 273

Water 7 COMPONENTS: EVALUATOR: Argon; Ar; 7440-37-1 H. L. Clever 1. Department of Chemistry 2. Water; H<sub>2</sub>O; 7732-18-5 Emory University Atlanta, GA 30322 U.S.A. July 1979 CRITICAL EVALUATION: Figure 2 (continued) \_\_\_\_\_ Recommended equation from experimental data from 273.15 - 348.15 K (Battino), Three constant equation from selected data + \_ . \_ . \_ . \_ . Potter and Clynne values, Four constant equation from selected data + Potter and Clynne values. Potter and Clynne values, Sisskind and Kasarnowsky value obtained from the equation  $X_1 = aP + bP^2$ . ŧ In fitting all of the data to an equation one cannot statistically favor the four constant equation over the three constant equation. However, the four constant equation does appear to fit the low temperature data better and it is given here and in Figure 2 as a tentative equation for calculating the inverse of Henry's constant in the temperature range of 353 - 573 K.  $\ln X_1 = \ln(1/K) = -80.8022 + 105.678/(T/100) + 40.644 \ln(T/100)$ - 3.2257 (T/100) The mole fraction solubility has only hypothetical significance at the higher temperatures where the system must be pressurized. Values of the thermodynamics of solution (ideal) at several temperatures based on the four constant equation are given in the table below. Mol Fraction Henry's Constant  $\Delta G^{\circ}/J \mod^{-1} \Delta H^{\circ}/J \mod^{-1} \Delta S^{\circ}/J \mod^{-1} \Delta Cp/J K_{-1}^{-1}$  $x_1 \times 10^5$ K x 10<sup>-4</sup> T/K <u>mo</u>1-1 164.5 - - 111.0 29,182 - 6,694 1.91 5.24 323,15 137.7 861 89.2 ----34,158 1.65 6.06 373.15 110.9 7,075 ----73.6 5.21 38,207 423.15 1.92 11,949 15,188 84.1 41,595 44,535 47,202 -62.7 3.91 2.56 473.15 57.2 55.5 2.79 523.15 3.58 30.4 51.4 17,680 2.01 4.98 573.15 Potter, R. W.; Clynne, M. A. J. Soln. Chem. 1978, 7, 837. Horiuti, J. <u>Sci. Pap. Inst. Phys. Chem. Res.</u> (Jpn) 1931/32, 17. 125. Ashton, J. T.; Dawe, R. A.; Miller, K. W.; Smith, E. B.; Stickings, B. J. J. Chem. <u>Soc</u>. (4) 1968, 1793. Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. 1931, 200, 279. Morrison, T. J.; Johnstone, N. B. J. Chem. <u>Soc</u>. 1954, 3441. Krestov, G. A.; Nedel'ko, B. E. <u>Izv. Vyssh. Uchebn. Zaved.</u>, <u>Khim. Khim.</u> <u>Tekhnol</u>. 1969, <u>12</u>, 1685. 1. 2. з. 4. 5. 6. The data sheets for the Potter and Clynne and the Sisskind and Kasarnowsky papers are in the high pressure section of the volume.

COMPONENTS:	
	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. Water; H <sub>2</sub> O; 7732-18-5	
2. Water; H <sub>2</sub> O; 7732-18-5	
	<u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68-80.
VARIABLES:	PREPARED BY:
T/K: 274.80 - 313.15	
P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac	tion Bunsen
	3 Coefficient
x <sub>1</sub> x 10	α
274.8 0.040 285.55 0.031	
293.05 0.027	
293.15 0.026	
298.15 0.025 303.15 0.023	
308.15 0.021	
313.15 0.020	57 0.0254
313.15 0.020	0.0251
AUXILIARY	INFORMATION
METHOD:	
Water is degassed while over	
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	SOURCE AND PURITY OF MATERIALS:
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde.
mercury. Gas uptake is measured on a gas buret.	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde.
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on a gas buret.	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific
mercury. Gas uptake is measured on a gas buret. APPARATUS/PROCEDURE:	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
Mercury. Gas uptake is measured on a gas buret. APPARATUS/PROCEDURE: The apparatus is based on the	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup></pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The	SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific conductivity of 2 x 10 <sup>-7</sup> ESTIMATED ERROR:
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>
APPARATUS/PROCEDURE: The apparatus is based on the design of v. Antropoff (1). The entire apparatus is designed to be	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde. 2. Water. Distilled. Specific     conductivity of 2 x 10<sup>-7</sup> ESTIMATED ERROR:</pre>

Water

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COMPONENTS:	·····		LODTOTIVIT 10		
		_ 、		ASUREMENTS:	
1. Argon;	Ar; 7440-3	/-1	Morrison	, T.J.; Johnsto	one, N.B.
2. Water:	н <sub>2</sub> 0; 7732-	18-5			
	2	-			
			T	G 1054 044	11 2446
			<u>J. Cnem</u> .	<u>Soc</u> . 1954, 344	11-3446.
VARIABLES:			PREPARED BY	<i>(</i> :	
		- 347.25		R. Battino	
P/K	Pa: 101.32	5 (1 atm)		R. Battino	
			<u></u>		
EXPERIMENTAL	VALUES:				
T/K Mo	1 Fraction	Kuenen	T/K	Mol Fraction	Kuenen
		Coefficient		,	Coefficient
	$x_{1} \times 10^{3}$	$s_0 \times 10^3$		$x_{1} \times 10^{3}$	s <sub>o</sub> x 10 <sup>3</sup>
	±		ـــــــــــــــــــــــــــــــــــــ	L 	
283.85	0.03288	40.9	320.95		23.1
287.45	0.02992	37.2	322.65		22.6
291.35	0.02185 0.02507	34.6 31.1	329.45 339.45		21.3 20.2
302.95	0.02284	28.3	344.45		19.4
309.75	0.02095	25.9	347.25		19.1
312.55	0.02033	25.1	<del></del> ,		
*Solubility		ich were used in	the final	smoothing ogu	ation for the
recommende		lity values give			
		reported above			
in the ori	ginal paper	as cm <sup>3</sup> argon at	a partial	pressure of 76	60 torr, re-
duced to 7	60 torr and	273.15K dissolv	ed by 1 kg	water.	
The author	s fitted th	eir solubility d	ata to the	equation log.	S =
	3290/(T/K)			1 1 1	J
1					101 205 kps
		ubility at an ar d by the compile		i pressure or .	101.325 KPa
(1 aciii) wa	5 Carcurace	d by the compile	±•		1
		ΔΙΙΥΤΙ ΤΑΡΥ	INFORMATION	· · · · · · · · · · · · · · · · · · ·	
		AUXILIANI	INFORMATION		
METHOD:			SOURCE AND	PURITY OF MATERIA	ALS:
The pre	viously deg	assed solvent	l. Argo		ygen Co., Ltd.
flows in a	thin film	through the gas	Spec	troscopically	pure.
	absorption e measured	helix. Volume	2. Wate	r No informa	tion given.
onaliges at	e measureu	In Durets.	2. wate		cron grven.
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1					
1			1		
{			1		'
APPADATUS (	APPHER		ESTIMATED	ERROR:	
APPARATUS/PRO			1		
The app	aratus desc	ribed by			
morrison a	na Billett	(1) was used.	1		
1			DEEDDONOUS		
1			REFERENCES	-	
1			1. Morr	ison, T.J.; Bi	llett, F.
]			1 2. 9	<u>Chem.</u> <u>Soc</u> . 1952	, 3819.
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COMPONENTS:	ORIGINAL MEA	SUREMENTS :	
1. Argon; Ar; $7440-37-1$		E.; Benson, B.	в.
1		,,,	
2. Water; H <sub>2</sub> O; 7732-18-5			
2			<b>.</b>
	J. Marine	Res. (Sears F	ound. Marine
	<u>Res</u> .) 196	3 <u>, 21</u> , <u>48 - 57</u>	•
VARIABLES:	DDEDADED DV		
T/K: 275.50 - 299.87	PREPARED BY:		
P/kPa: 101.325 (1 atm)		R. Battino	
EXPERIMENTAL VALUES:			
T/K Mol Fraction Bunsen	T/K	Mol Fraction	Bunsen
$X_1 \times 10^3$ Coefficient		x <sub>1</sub> × 10 <sup>3</sup>	Coefficient a
$X_1 \times 10^{\circ}$ $\alpha$		^1 <sup>* 10</sup>	u
			0.02575
275.50 0.04070 0.05064	290.76	0.02877*	0.03575 0.03461
276.17 0.03994 0.04969	292.45 293.37	0.02786* 0.02743*	0.03461
279.91 0.03634 0.04521 282.10 0.03446* 0.04287	293.37		0.03280
282.10         0.03446*         0.04287           283.71         0.03321*         0.04130	295.54	0.02556	0.03171
283.71 0.03321* 0.04150	297.55		0.03108
286.34 0.03142* 0.03907	299.87	0.02465	0.03057
288.16 0.03017* 0.03751			
-			
AUXILIARY			
	INFORMATION		
METHOD /APPARATUS/PROCEDURE:		PURITY OF MATERIA	LS ;
Degassed water is equilibrated	SOURCE AND	PURITY OF MATERIA n. No source (	•
Degassed water is equilibrated with a gas for up to 48 hrs by	SOURCE AND		•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The	SOURCE AND 1. Argor 99.9	n. No source o per cent.	•
Degassed water is equilibrated with a gas for up to 48 hrs by	SOURCE AND 1. Argor 99.9 2. Water	n. No source o	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argor 99.9 2. Water	n. No source o per cent.	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argor 99.9 2. Water	n. No source o per cent. r. Distilled.	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argor 99.9 2. Water	n. No source o per cent. r. Distilled. RROR:	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Water ESTIMATED E	n. No source of per cent. r. Distilled. RROR: δT/K = 0.01	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argor 99.9 2. Water ESTIMATED E	n. No source o per cent. r. Distilled. RROR:	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argor 99.9 2. Water ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•
Degassed water is equilibrated with a gas for up to 48 hrs by rocking it between two bulbs. The total solution volume is precisely known. The gas is extracted with a toepler pump and its quantity mea- sured in the dry state so that cor- rections for non-ideality may be made. The equilibration is done very	SOURCE AND 1. Argon 99.9 2. Wates ESTIMATED E	n. No source of per cent. r. Distilled. RROR: $\delta T/K = 0.01$ $\delta x_1/x_1 = 0.001$	•

W	ater
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Ben-Naim, A.; Baer, S.
2. Water; H <sub>2</sub> O; 7732-18-5	
	Trans. <u>Faraday</u> <u>Soc</u> . 1963, <u>59</u> , 2735-2738.
VARIABLES:	PREPARED BY:
T/K: 276.05 - 301.05 P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Fra	
x <sub>1</sub> x	10 <sup>3</sup> Coefficient. L
276.05 0.03	996 0.05025
	463* 0.04445
· · · · · · · · · · · · · · · · · · ·	379 0.04357 107* 0.04056
290.15 0.02	911* 0.03843
	761 0.03677 573* 0.03470
	509* 0.03400
301.05 0.02	415 0.03299
<sup>rec</sup> ommended solubility values given <sup>Mo</sup> le fraction solubility of qas at 101	.325 kPa (l atm) partial pressure of
<sup>dole</sup> fraction solubility of qas at 101	.325 kPa (l atm) partial pressure of
Mole fraction solubility of gas at 101 Mole fraction solubility of gas at 101 Jas was calculated by the compiler.	.325 kPa (1 atm) partial pressure of INFORMATION
AUXILIARY	
Mole fraction solubility of gas at 101 gas was calculated by the compiler. AUXILIARY METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel	INFORMATION
Auxiliary of gas at 101 gas was calculated by the compiler. Mole fraction solubility of gas at 101 gas was calculated by the compiler. Auxiliary METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure".
Auxiliary of gas at 101 gas was calculated by the compiler. Mole fraction solubility of gas at 101 gas was calculated by the compiler. Auxiliary METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure".
Auxiliary of gas at 101 gas was calculated by the compiler. Mole fraction solubility of gas at 101 gas was calculated by the compiler. Auxiliary METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure".
Mole fraction solubility of gas at 101 gas was calculated by the compiler. AUXILIARY METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to sidearms attached to the top of the flask and the liquid	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure". ESTIMATED ERKOR: $\delta X_1/X_1 = 0.002$
Auxiliary of gas at 101 gas was calculated by the compiler. Mole fraction solubility of gas at 101 gas was calculated by the compiler. Auxiliary METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure". ESTIMATED ERKOR:
Mole fraction solubility values given Mole fraction solubility of gas at 101 Jas was calculated by the compiler. AUXILIARY METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas Duret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure". ESTIMATED ERKOR: $\delta X_1/X_1 = 0.002$
Mole fraction solubility values given Mole fraction solubility of gas at 101 Jas was calculated by the compiler. AUXILIARY METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas Duret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure". ESTIMATED ERKOR: $\delta x_1/x_1 = 0.002$
Auxiliary of gas at 101 gas was calculated by the compiler. Mole fraction solubility of gas at 101 gas was calculated by the compiler. Auxiliary METHOD /APPARATUS/PROCEDURE: A calibrated dissolution vessel Contains degassed water. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire appa- ratus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 brs. of slow	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. No comment by authors. 2. Water. Authors stated it was "pure". ESTIMATED ERKOR: $\delta x_1/x_1 = 0.002$

1	2
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on Solubilities up to 200 kPa ٨.

Argon Solubilities up to 200 kPa		
COMPONENTS: 1. Argon; Ar; 7440-37-1	ORIGINAL MEASUREMENTS: Douglas, E.	
2. Water; H <sub>2</sub> O; 7732-18-5		
2. Water; H <sub>2</sub> O; 7732-18-5		
	J. Phys. Chem. 1964, 68, 169-174.	
VARIABLES:	PREPARED BY:	
т/к: 277.77 - 302.85		
P/kPa: 101.325 (1 atm)	R. Battino	
EXPERIMENTAL VALUES:		
T/K Mol Frac	Coefficient	
X, × 1	0 <sup>3</sup> α	
277.77 0.038		
283.15 0.033 288.19 0.030		
293.15 0.027	42* .03405	
302.85 0.023	42* .02901	
*Solubility values which were used in recommended solubility values given in	the final smoothing equation for the the critical evaluation.	
<sup>a</sup> Each value reported above is the aver	age of five experimental determina-	
tions. The greatest percentage standa	rd deviation was 0.17.	
Mole fraction solubility of gas at 101	.325 kPa (1 atm) partial pressure of	
gas was calculated by the compiler.		
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The apparatus and procedure are	1. Argon. Source not given.	
based on the Scholander microgas-	98.9% pure.	
ometric apparatus (1). This version uses one arm with an expanded solvent	2. Water. Double-distilled.	
reservoir. Degassed water is intro-		
duced to this reservoir and sealed over mercury. The water is then		
tipped into the absorption chamber.		
Gas is introduced and the entire		
apparatus is shaken in a water thermo-		
stat ( <u>+</u> 0.01 <sup>O</sup> C). Gas and liquid volumes are read on a micrometer		
syringe by displacement of mercury.	ESTIMATED ERROR:	
4		
	$\delta x_1 / x_1 = 0.0025 - 0.0050.$	
l		
	REFERENCES :	
1	1. Scholander, P.F. J. Biol. Chem.	
	1947, <u>167</u> , 235.	
1	Į	

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Water	•
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ORIGINAL MEASUREMENTS:

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	Ben-Naim, A. <u>J</u> . <u>Phys</u> . <u>Chem</u> . 1965, <u>69</u> , 3245-3250.
VARIABLES:	
T/K: 278.15 - 298.15	PREPARED BY:
P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac	
X, x 1	Coefficient ·
278.15 0.037 283.15 0.033	
288.15 0.030 293.15 0.027	17* 0.03956
298.15 0.025	
*Solubility value which were used in th	be final smoothing equation for the
recommended solubility values given in	the critical evaluation.
Mole fraction solubility at 101.325 kP	a (1 atm) partial pressure of gas was
calculated by the compiler.	
AUXILIARY	INFORMATION
METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD:	
METHOD:	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given.
METHOD: Used the apparatus of Ben-Naim and Baer (1) in which a calibrated disso- lution vessel contains degassed water. Gas is introduced wet from a gas buret system. Stirring forces the liquid through the gas. The amount of gas dissolved is measured on a gas	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given. 2. Water. No information given.
METHOD: Used the apparatus of Ben-Naim and Baer (1) in which a calibrated disso- lution vessel contains degassed water. Gas is introduced wet from a gas buret system. Stirring forces the liquid through the gas. The amount of gas dissolved is measured on a gas	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given. 2. Water. No information given. ESTIMATED ERROR:
METHOD: Used the apparatus of Ben-Naim and Baer (1) in which a calibrated disso- lution vessel contains degassed water. Gas is introduced wet from a gas buret system. Stirring forces the liquid through the gas. The amount of gas dissolved is measured on a gas buret.	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given. 2. Water. No information given.
METHOD: Used the apparatus of Ben-Naim and Baer (1) in which a calibrated disso- lution vessel contains degassed water. Gas is introduced wet from a gas buret system. Stirring forces the liquid through the gas. The amount of gas dissolved is measured on a gas buret.	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given. 2. Water. No information given. ESTIMATED ERROR:
METHOD: Used the apparatus of Ben-Naim and Baer (1) in which a calibrated disso- lution vessel contains degassed water. Gas is introduced wet from a gas buret system. Stirring forces the liquid through the gas. The amount of gas dissolved is measured on a gas	SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given.

COMPONENTS:

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Argon Solubilities up to 200 kPa

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H.L.; Holland, C.J.
2. Water; H <sub>2</sub> O; 7732-18-5	
2. water, $n_2^{0}$ , $7752-10^{-5}$	
	<u>J. Chem. Eng. Data</u> 1968, <u>13</u> , 411-414.
VARIABLES:	
T/K: 298.15 - 313.15	PREPARED BY:
P/kPa: 101.325 (1 atm)	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac	
x <sub>1</sub> × 1	o <sup>3</sup> Coefficient
×1 × 1	0 α
298.15 0.025	39 0.0315
303.15 0.023	25* 0.0288
308.15 0.021 313.15 0.020	
313.15 0.020	41* 0.0252
*Solubility values which were used in recommended solubility values given in	the final smoothing equation for the the critical evaluation.
Mole fraction solubility of gas at 103	325 kPa (1 atm) partial pressure of
gas was calculated by the compiler.	
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
They used a modification of the	1. Argon. Matheson Co. 99.99
Markham and Kobe (1) apparatus. This apparatus has an absorption vessel	per cent.
with two compartments, one above the	2. Water. Distilled.
other. Degassed liquid from the top	
compartment drains into the gas in	
the lower compartment. Shaking effects solution. Volumes and pres-	
sures are measured.	
	ESTIMATED ERROR:
APPARATUS/PROCEDURE:	
This paper also lists salting out	
coefficients for argon in aqueous	
solutions of LiCl, NaCl, NaBr, and KCl.	REFERENCES :
	1. Markham, A.E.; Kobe, K.A.
	J. Am. Chem. Soc. 1941, 63, 449.

OMPONENTS:		
		ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37		Ashton, J. T.; Dawe, R. A.; Miller, K. W.; Smith, E. B.;
2. Water; H <sub>2</sub> O; 7732-1	8-5	Stickings, B. J.
		<u>J. Chem</u> . <u>Soc</u> ( <u>A</u> ) 1968, 1793 - 1796.
ARIABLES :		PREPARED BY:
	5 - 323.15	H. L. Clever
P/kPa: 101.3		
EXPERIMENTAL VALUES:		L
т/к	Mol Fraction	Kuenen
	X_ x 10 <sup>5</sup>	Coefficient S x 10 <sup>3</sup>
278.15	3.83	47.6
283.15	3.40	42.3
288.15		38.0
2493.15 298.15		34.5 31.7
308.15	2.19	27.3
318.15		24.3
323.15	1.86	23.1
Potter and section) of	Clynne (2) (data	of the recent report of sheet in high pressure
above 313 K	than those reco	lubility values at temperatures mmended.
	than those reco	
METHOD APPARATUS / PROCEDURE	than those reco AUXILIARY	INFORMATION
METHOD APPARATUS/PROCEDURE s designed for the me olubilities of the or raction. It allows th as measurement to be dry" conditions. Hori uggests that "wet" (so rated gas) frequently	AUXILIARY : The apparatus asurement of gas der of 10 <sup>-6</sup> mole e bulk of the preformed under uti's analysis lvent vapor sat-	<pre>mmended. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Mass- spectrographic analysis showed it to be better than 99.9 per cent pure.</pre>
METHOD APPARATUS/PROCEDURE s designed for the me olubilities of the or raction. It allows th as measurement to be dry" conditions. Hori uggests that "wet" (so rated gas) frequently olubility values. he apparatus consists 1200 cm <sup>3</sup> cylinricall essel with magnetical t top and bottom, and	AUXILIARY AUXILIARY The apparatus asurement of gas der of 10 <sup>-6</sup> mole bulk of the preformed under uti's analysis lvent vapor sat- gives low gas of a gas buret, y shaped solution ly driven stirred	<pre>mmended. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Mass- spectrographic analysis showed it to be better than 99.9 per cent pure. 2. Water. Doubly distilled. n rs</pre>
METHOD APPARATUS/PROCEDURE s designed for the me olubilities of the or raction. It allows th as measurement to be dry" conditions. Hori uggests that "wet" (so rated gas) frequently olubility values. The apparatus consists 1200 cm <sup>3</sup> cylinricall ressel with magnetical top and bottom, and uret which also acted connections are of 1 m subing. The water is degassed facuum for five hours.	AUXILIARY AUXILIARY The apparatus asurement of gas der of 10 <sup>-6</sup> mole bulk of the preformed under uti's analysis lvent vapor sat- gives low gas of a gas buret, y shaped solution ly driven stirre a secondary as a manometer. m capillary by boiling under The apparatus	<pre>mmended. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Mass- spectrographic analysis showed it to be better than 99.9 per cent pure. 2. Water. Doubly distilled. n rs ESTIMATED ERROR:</pre>
	AUXILIARY AUXILIARY	<pre>mmended. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Mass- spectrographic analysis showed it to be better than 99.9 per cent pure. 2. Water. Doubly distilled. n rs ESTIMATED ERROR:</pre>

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COMPONENTS:	Argon Solubilities		u
	MPONENTS:		SUREMENTS :
1. Argon; Ar; 7440-37-1	)	Krestov,	G.A.; Nedelko, B.E.
2. Water; H <sub>2</sub> O; 7732-18-5			
-		Tau Vucci	h. Uchebn. Zaved., Khim.
		Khim. Tek	$\frac{12}{1001}$ . 1969, $\frac{12}{12}$ , 1685-1691.
VARIABLES:		PREPARED BY:	
T/K: 313.15 - 343.15			
P/kPa: 101.325 (1	atm)	:	R. Battino
EXPERIMENTAL VALUES:	l		
T/K MOI	l Fraction	Bunsen	Ostwald
		oefficient	Coefficient
2	$x_1 \times 10^3$	α	L
313.15	0.01985	0.0245	0.02809
318.15	0.01899	0.0234	0.02726
323.15	0.01790	0.0220	0.02603
328.15 333.15	0.01745* 0.01676	0.0214 0.0205	0.02571 0.02500
338.15	0.01615	0.0197	0.02439
343.15	0.01586*	0.0193	0.02425
	AUXILIARY	INFORMATION	
METHOD:			PURITY OF MATERIALS:
METHOD: Presumably used the app scribed by Patsatsiya and which is based on that of Baer (2). Solvent degasse for four hours under vacuu solvent thermostatted for Gas is saturated with solv entering system. Gas upta mined on thermostatted gas Also measured solubility i glycerol mixtures.	Aratus de- Krestov (1) Ben-Naim and d by boiling m. Degassed two hours. ent before ke deter- buret.		PURITY OF MATERIALS:
Presumably used the app scribed by Patsatsiya and which is based on that of Baer (2). Solvent degasse for four hours under vacuu solvent thermostatted for Gas is saturated with solv entering system. Gas upta mined on thermostatted gas Also measured solubility i glycerol mixtures.	Aratus de- Krestov (1) Ben-Naim and d by boiling m. Degassed two hours. ent before ke deter- buret.		
Presumably used the app scribed by Patsatsiya and which is based on that of Baer (2). Solvent degasse for four hours under vacuu solvent thermostatted for Gas is saturated with solv entering system. Gas upta mined on thermostatted gas Also measured solubility i	Aratus de- Krestov (1) Ben-Naim and d by boiling m. Degassed two hours. ent before ke deter- buret.	SOURCE AND I	
Presumably used the app scribed by Patsatsiya and which is based on that of Baer (2). Solvent degasse for four hours under vacuu solvent thermostatted for Gas is saturated with solv entering system. Gas upta mined on thermostatted gas Also measured solubility i glycerol mixtures.	Aratus de- Krestov (1) Ben-Naim and d by boiling m. Degassed two hours. ent before ke deter- buret.	SOURCE AND I	
Presumably used the app scribed by Patsatsiya and which is based on that of Baer (2). Solvent degasse for four hours under vacuu solvent thermostatted for Gas is saturated with solv entering system. Gas upta mined on thermostatted gas Also measured solubility i glycerol mixtures.	Aratus de- Krestov (1) Ben-Naim and d by boiling m. Degassed two hours. ent before ke deter- buret.	SOURCE AND I ESTIMATED E REFERENCES: 1. Patsat Zh. Fi 2. Ben-Na	RROR: δX1/X1 = 0.01 (compiler)

Wa		1
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Murray, C.N.; Riley, J.P.	
2. Water; H <sub>2</sub> O; 7732-18-5		
	<u>Deep-Sea</u> <u>Res</u> . 1970, <u>17</u> , 203 - 209.	
VARIABLES:	PREPARED BY:	
T/K: 274.20 - 308.15 P/kPa: 101.325 (1 atm)	R. Battino	
EXPERIMENTAL VALUES:		
T/K Mol Frac		
X <sub>1</sub> × 1	$0^3$ Coefficient $\alpha$	
274.20 0.041	83 0.052045	
278.15 0.037	62 0.046812	
283.15 0.033 288.15 0.030		
288.15 0.030 293.22 0.027		
298.15 0.025	20* 0.031258	
302.23 0.023 308.15 0.021		
308.15 0.021	76* 0.026912	
Mole fraction solubility at 101.325 kP		
Mole fraction solubility at 101.325 kP		
Mole fraction solubility at 101.325 kP calculated by the compiler.		
Mole fraction solubility at 101.325 kP calculated by the compiler. 	a (l atm) partial pressure of gas wa	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben-	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS:	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and Solution are in a calibrated vessel.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP Calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and Solution are in a calibrated vessel.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP Calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and Solution are in a calibrated vessel.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP Calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and Solution are in a calibrated vessel.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and Solution are in a calibrated vessel.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and solution are in a calibrated vessel. See ref. 2 for modification.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and solution are in a calibrated vessel. See ref. 2 for modification.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent.	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and solution are in a calibrated vessel. See ref. 2 for modification.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled.	
METHOD:	<pre>a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled. ESTIMATED ERROR: δX1/X1 = 0.0013</pre>	
Mole fraction solubility at 101.325 kP calculated by the compiler.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled. ESTIMATED ERROR: $\delta x_1/x_1 = 0.0013$ REFERENCES:	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and solution are in a calibrated vessel. See ref. 2 for modification.	<pre>a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled. ESTIMATED ERROR: δX1/X1 = 0.0013</pre>	
Mole fraction solubility at 101.325 kP calculated by the compiler. AUXILIARY METHOD: Used a modification of the Ben- Naim and Baer (1) apparatus. Liquid is pumped through the gas. Uptake is measured on gas burets. Liquid and solution are in a calibrated vessel. See ref. 2 for modification.	a (1 atm) partial pressure of gas was INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. 99.99 per cent. 2. Water. Distilled. ESTIMATED ERROR: $\delta X_1/X_1 = 0.0013$ REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59,	

18 Argon Solubilitie	s up to 200 kPa
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Weiss, R.F.
2. Water; H <sub>2</sub> O; 7732-18-5	
	<u>Deep-Sea</u> <u>Res</u> . 1971, <u>18</u> , 225 - 230.
VARIABLES :	PREPARED BY:
T/K: 298.18 P/kPa: 101.325 (1 atm)	R. Battino
17 Ald. 101.325 (1 auk)	K. Battino
EXPERIMENTAL VALUES:	
T/K Mol Frac	tion Bungon
	Coefficient
x <sub>1</sub> × 1	0 <sup>5</sup> α
298.18 0.025 298.18 0.025	
298.18 0.025	
*Solubility values which were used in recommended solubility values given in	the final smoothing equation for the the critical evaluation.
Mole fraction solubility at 101.325 kPa	
calculated by the compiler.	a (I ata) partial pressure of gas was
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS;
A gas chromatographic procedure was used. This was based on the procedure	l. Argon. No information given.
of Swinnerton et al., (1,2) in which	2. Water. Distilled.
a dissolved gas is stripped and passed on to a gas chromatograph.	
passed on to a gas chromatograph. The gas is stripped with helium	
carrier gas.	
APPARATUS / PROCEDURE :	ESTIMATED ERROR:
	REFERENCES :
	<ol> <li>Swinnerton, J.W.; Linnenbom, V.J.; Cheek, C.H. <u>Anal</u>. <u>Chem</u>. 1962, <u>34</u>, 483.</li> </ol>
	<ol> <li>Swinnerton, J.W.; Linnenbom, V.J.; Cheek, C.H. <u>Anal</u>. <u>Chem</u>. 1962, 34, 1509.</li> </ol>

Water 19	
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. Water; H <sub>2</sub> O; 7732-18-5	ORIGINAL MEASUREMENTS: Masterton, W.L.; Polizzotti, D.; Welles, H.
	<u>J. Solution</u> <u>Chem</u> . 1973, <u>2</u> , 417-423.
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: R. Battino
EXPERIMENTAL VALUES:	
	Ostwald mol Ar <sup>,</sup> dm <sup>-3</sup> efficient L n x 10 <sup>3</sup>
298.15 0.02522*	0.03415 1.396
*Solubility value which was used in recommended solubility values given in	the final smoothing equation for the the critical evaluation.
AUXILIARY	INFORMATION
METHOD: The apparatus used was the Wen and Hung (1) modification of the Ben-Naim and Baer apparatus (2). The volume of the dissolution vessel was 200 cm <sup>3</sup> . Also studied were argon solubilities in aqueous solutions of <u>t</u> -[Co(en) <sub>2</sub> NCSC1]Br.	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. 99.998 percent pure.</li> <li>2. Water. Distilled, conductivity 10<sup>-6</sup> mho cm<sup>-1</sup>.</li> </ul>
2 Convertiger.	10 mno cm .

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Argon Solubilities up to 200 kPa COMPONENTS: EVALUATOR: 1. Argon; Ar; 7440-37-1 Rubin Battino, Department of Chemistry, Wright State University, Dayton, 2. Water-d<sub>2</sub>; D<sub>2</sub>O; 7789-20-0 Ohio, 45431 U.S.A. June 1978.

CRITICAL EVALUATION:

The experimental data of three workers were used for the smoothing equation. In fitting the data to the smoothing equation those points which differed by about two standard deviations or more from the smoothed values were rejected. We thus used 13 points as follows (reference - number of data points used from that reference): 1-3; 2-5; 3-5. The fitting equation used was

$$\ln x_1 = A + B/(T/100K) + C \ln (T/100K)$$

The best fit for the 13 points gave

 $\ln x_1 = -42.5425 + 54.8437/(T/100K) + 12.4767 \ln (T/100K)$ 

where  $x_1$  is the mole fraction solubility of the gas at 101.325 Pa (1 atm) partial pressure of the gas. The fit in  $\ln x_1$  gave a standard deviation of 0.69% taken at the middle of the temperature range. Table 1 gives smoothed values of the mole fraction at 101.325 Pa partial pressure of gas and the Ostwald coefficient at 5 K 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 the gas from the vapor phase at 101.325 Pa partial pressure to the (hypothetical) solution phase of unit mole fraction. These thermodynamic properties were calculated from the smoothing equation according to the following equations:

 $\Delta \overline{G}_{1}^{\circ} = - RAT - 100RB - RCT ln (T/100) - RDT^{2}/100$ (3) $\Delta \overline{H}_1^\circ = -100RB + RCT + RDT^2/100$ (4)  $\Delta \overline{S}_1^\circ = RA + RC \ln (T/100) + RC + 2RDT/100$ (5) $\Delta \overline{C}_{p_1}^{\circ} = RC + 2RDT/100$ (6)

There were only the three sets of data reported in the literature. Ben-Naim's data were extrapolated from a linear least squares fit of solubility in  $H_2O/D_2O$  mixtures of 0.03, 0.5, and 0.9 mole fraction in  $D_2O(3)$ References

1.	Abrosimov, V.	K.; Strakhov, A.	N.; Krestov, G.A.	Izv. Vyssh. Ucheb.
	Zaved., Khim.	Khim. Tekhnol.	1974, <u>17</u> , 1463-5;	CA 82:65031y.
2.	Ben-Naim, A.	J. Chem. Phys.	1965, <u>42</u> , 1512-3.	
2	Don-Noim A	T Chem Dhug	1066 AF 1040-0	

3. Ben-Naim, A. <u>J. Chem. Phys</u>. 1966, <u>45</u>, 1848-9.

20

(1)

(2)

Water-d	2
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DMPONENTS: • Argon; Ar; 7440-37-1 • Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0			Rubin C U	EVALUATOR: Rubin Battino, Department of Chemistry, Wright State University, Dayton, Ohio, 45431 U.S.A.			
			June	1978			
UTICAL EV	ALUATION:	· · · · · · · · · · · · · · · · · · ·					
Table	1. Smoot	hed values of	argon solub	ility in D <sub>2</sub> O a	and		
				4			
Thermodynamic functions* 101.325 Pa partial press					-		
				uas.			
	101.3	25 Pa partial	pressure or	5400			
т/к	Mole Fraction	Ostwald Coefficient	-		Δ̄ <u>δ</u> <sup>°</sup> ,∕Jκ <sup>-1</sup> mo1 <sup>-1</sup>		
т/К	Mole	Ostwald	-		Δ <u>δ</u> °/JK <sup>-1</sup> mo1 <sup>-1</sup>		
T/K	Mole Fraction	Ostwald Coefficient	-		Δ̄s̄°/JK <sup>-1</sup> mol <sup>-1</sup> 		
278.15	Mole     Fraction $ $	Ostwald Coefficient $L \times 10^2$ 5.408 4.853	ΔG <sup>°</sup> <sub>1</sub> /kJmol <sup>-1</sup>  23.27 23.98	∆H <sup>°</sup> 1/kJmol <sup>-1</sup>			
278.15 283.15 288.15	Mole Fraction $x_1 \times 10^5$ 4.268 3.763 3.346'	$\begin{array}{r} & \\ & \text{Ostwald} \\ \text{Coefficient} \\ & \\ & \\ \hline \\ & \\ \hline \\ & \\ & \\ \hline \\ & \\ &$	ΔG¯°/kJmol <sup>-1</sup> 	ΔH <sup>°</sup> <sub>1</sub> /kJmol <sup>-1</sup> 	-143.9 -142.0 -140.2		
278.15 283.15 288.15 293.15	Mole Fraction $x_1 \times 10^5$ 4.268 3.763 3.346 2.997	Ostwald Coefficient L x 10 <sup>2</sup> 5.408 4.853 4.387 3.995	Δ <sub>G</sub> °/kJmol <sup>-1</sup>  23.27 23.98 24.69 25.39	$\Delta \overline{H}_{1}^{\circ}/k Jmol^{-1}$ -16.74 -16.23 -15.71 -15.19	-143.9 -142.0 -140.2 -138.4		
278.15 283.15 288.15 293.15 298.15	Mole Fraction X <sub>1</sub> x 10 <sup>5</sup> 4.268 3.763 3.346 2.997 2.705	Ostwald Coefficient L x 10 <sup>2</sup> 5.408 4.853 4.387 3.995 3.662	$     \Delta \overline{G}_{1}^{\circ} / k Jmol^{-1}     23.27     23.98     24.69     25.39     26.07     $	$     \Delta \overline{H}_{1}^{\circ} / k Jmol^{-1}     -16.74     -16.23     -15.71     -15.19     -14.67     -14.67     -14.67     -14.67 $	-143.9 -142.0 -140.2 -138.4 -136.7		
278.15 283.15 288.15 293.15 298.15 303.15	Mole Fraction X <sub>1</sub> x 10 <sup>5</sup> 4.268 3.763 3.346 2.997 2.705 2.457	Ostwald Coefficient L x 10 <sup>2</sup> 5.408 4.853 4.387 3.995 3.662 3.378	$   \frac{\Delta \overline{G}_{1}^{\circ} / k Jmol^{-1}}{23.27}   23.98   24.69   25.39   26.07   26.75   $	$     \Delta \overline{H}_{1}^{\circ}/k Jmol^{-1}     -16.74     -16.23     -15.71     -15.19     -14.67     -14.15     -14.15     -14.15 $	-143.9 -142.0 -140.2 -138.4 -136.7 -134.9		
278.15 283.15 288.15 293.15 298.15 303.15 308.15	Mole Fraction X <sub>1</sub> × 10 <sup>5</sup> 4.268 3.763 3.346 2.997 2.705 2.457 2.247	Ostwald Coefficient L x 10 <sup>2</sup> 5.408 4.853 4.853 4.387 3.995 3.662 3.378 3.135	$\Delta \overline{G}_{1}^{\circ} / k Jmol^{-1}$ 23.27 23.98 24.69 25.39 26.07 26.75 27.42	$\Delta \overline{H}_{1}^{\circ}/k Jmol^{-1}$ -16.74 -16.23 -15.71 -15.19 -14.67 -14.15 -13.63	-143.9 -142.0 -140.2 -138.4 -136.7 -134.9 -133.2		
278.15 283.15 288.15 293.15 298.15 303.15	Mole Fraction X <sub>1</sub> x 10 <sup>5</sup> 4.268 3.763 3.346 2.997 2.705 2.457	Ostwald Coefficient L x 10 <sup>2</sup> 5.408 4.853 4.387 3.995 3.662 3.378	$   \frac{\Delta \overline{G}_{1}^{\circ} / k Jmol^{-1}}{23.27}   23.98   24.69   25.39   26.07   26.75   $	$     \Delta \overline{H}_{1}^{\circ}/k Jmol^{-1}     -16.74     -16.23     -15.71     -15.19     -14.67     -14.15     -14.15     -14.15 $	-143.9 -142.0 -140.2 -138.4 -136.7 -134.9		

22	Argo	on Solubilitie	es up	to 200 kPa			
COMPONENTS :			ORIGI	INAL MEASUREMENTS:			
1. Argon; Ar; 7440-	1. Argon; Ar; 7440-37-1			-Naim, A.			
2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0			J. <u>Chem.</u> <u>Phys</u> . 1966, <u>45</u> , 1848-1849.				
VARIABLES:			PREP	ARED BY:			
			r ner <i>i</i>				
T/K: 278.15	- 298.15			R. Battino			
EXPERIMENTAL VALUES:							
	T/K	Mol Fract X <sub>1</sub> x 10	tion <sup>ë</sup> 0 <sup>5</sup>	a Ostwald Coefficient <sup>b</sup> L x 10 <sup>2</sup>			
	278.15	4.292	*	5.408			
	283.15	3.745	*	4.805 4.344			
	293.15	2.988	*	3.966	1		
	298.15	2.719	*	3.668			
	in the for the	final smo e recommen given in	oothi nded	hich were used ing equation solubility critical			
in H <sub>2</sub> O/D <sub>2</sub> O mixtures	of 0.03,	, 0.5, an	đ 0.9	a least squares fit of solubilit 9 mole fraction D <sub>2</sub> O.			
		AUXILIARY	INFORMATION				
ME THOD:			SOUR	RCE AND PURITY OF MATERIALS:			
The Ben-Naim and Bae was used for these m			1.	Argon - no comment by author.			
			2.	$D_2^0$ - no comment by author.			
			ESTI	IMATED ERROR:			
APPARATUS/PROCEDURE:				$\delta x_{1} / x_{1} = 0.0025$ (compile:	r)		
			REFE	ERENCES :			
			1.	Ben-Naim, A.; Baer, S. Trans. Faraday <u>Soc</u> . 1963, <u>59</u> , 2735.			
			l				

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	er-d <sub>2</sub> 23
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Ben-Naim, A.
	J. Chem. Phys.
<ol> <li>Water-d<sub>2</sub>; D<sub>2</sub>O; 7789-20-0</li> </ol>	1965, 42, 1512-1513.
VARIABLES:	PREPARED BY:
T/K: 278.15 - 298.15	R. Battino
EXPERIMENTAL VALUES:	
T/K Mol Fraction Ost	wald Ostwald
Coef	ficient Coefficient
$X_{1} \times 10^{5}$ L:	$\times 10^2$ L $\times 10^2$
	.394 5.395, 5.394
	.815 <sup>5</sup> 4.819, 4.810, 4.816 .340 4.346, 4.337, 4.337
	.985 3.986, 3.983, 3.987
298.15 2.732* 3	.686 3.686, 3.685, 3.686
*Colubility molece which when	e used in the final smoothing
equation for the recommended	d solubility values given in
the critical evaluation.	w
P11	
The mole fraction solubility at 101.3 gas calculated by compiler.	25 kPa (1 atm) partial pressure of
sas calculated by compiler.	
The experimental Ostwald coefficients	are in the column to the right, the
average Ostwald coefficients are in	the column to the left.
AUXILIARY	INFORMATION
	INFORMATION
METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION
METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS; 1. Argon - no comment by authors.
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS; 1. Argon - no comment by authors.
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro- Elektrisk.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro-
METHOD: The Ben-Naim and Baer apparatus was	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro- Elektrisk. Elektrisk.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro- Elektrisk.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro- Elektrisk. Elektrisk.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. D <sub>2</sub> O - 99.7% from Norsh-Hydro- Elektrisk. Elektrisk.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59,
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S.
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59,
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59,
METHOD: The Ben-Naim and Baer apparatus was used for these measurements (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon - no comment by authors. 2. $D_2O - 99.7$ % from Norsh-Hydro- Elektrisk. ESTIMATED ERROR: $\delta X_2/X_2 = 0.0025$ (compiler) REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59,

ļ	Argon Solub	
OMPONENTS: 1. Argon; Ar; 7440- 2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7		ORIGINAL MEASUREMENTS: Abrosimov, V.K.; Strakhov, A.N.; Krestov, G.A. Izv. Vyssh. Ucheb. Zaved., Khim. Khim. Tekhnol. 1974, <u>17</u> , 1463-5; CA <u>82</u> : 65031y.
ARIABLES: T/K: 283.38	3 - 318.45	PREPARED BY: R. Battino
XPERIMENTAL VALUES:	······································	
		raction Ostwald c 10 <sup>4</sup> Coefficient L x 10 <sup>2</sup>
	292.72       0.1         298.15       0.1         308.25       0.1	3931       5.048         3069       4.068         2717*       3.666         2226*       3.097         1905*       2.728
	in the final the recommend	alues which were used smoothing equation for ded solubility values critical evaluation.
gas was calculated h	by compiler.	L.325 kPa (1 atm) partial pressure of $1 + 1 + 1 + 1 + 2 + 2 + 2 + 2 + 2 + 2 + $
gas was calculated h	by compiler. termined solubi:	Lity at 0.01, 0.03, 0.05, 0.10, 0.30,
gas was calculated k The authors also det	by compiler. termined solubi ion of D <sub>2</sub> O in H	Lity at 0.01, 0.03, 0.05, 0.10, 0.30,
gas was calculated h The authors also det	by compiler. termined solubi ion of D <sub>2</sub> O in H	Lity at 0.01, 0.03, 0.05, 0.10, 0.30, 2 <sup>0</sup> .

	440	101-02			20
COMPONENTS:		ORIGINAL MEAS	UREMENTS:	<u></u>	
1. Argon; Ar; 744(	0-37-1	Ben-Naim,	Α.		
2. Water; H <sub>2</sub> O; 773	32-18-5				
3. Water-d <sub>2</sub> ; D <sub>2</sub> O;	7789-20-0				
		$\underline{J}$ . Chem. P	hys. 1966, <u>45</u>	, 1848-1849.	
VARIABLES:		PREPARED BY:	ti ti Marayan		
	.15 - 298.15 .325 (1 atm)	R	. Battino		
EXPERIMENTAL VALUES:					-
	Water + Water	-d <sub>2</sub> Mixed So	lvent		
$D_2 0/X_3 0.00$ (ext	trapolated	0.03	0.50	0.90	•
T/K Mol Fract	oomerror,	Ostwald	Ostwald	Ostwald	•
1 '	Coofficient	Coefficient	Coefficient	Coefficient	
x <sub>1</sub> × n	D- L	L	L	L	
278.15 0.038	0.04839	0.04860	0.05115	0.05356	
283.15 0.033	74 0.04351	0.04370	0.04566	0.04766	
288.15 0.030 293.15 0.027		0.03981 0.03685	0.04127 0.03818	0.04318 0.03938	
298.15 0.025		0.03415	0.03528	0.03646	
	AUXILIARY	INFORMATION			
METHOD:		SOURCE AND P	URITY OF MATERIA	LS;	
No comment is ma but presumably the	ade by the author, Ben-Naim and Baer	1. Argon.	No comment	by author.	
apparatus (1) was a	used.	2. Water.	No comment	by author.	
					ı
APPARATUS / PROCEDURE :	<u></u>	ESTIMATED ER	ROR:		
		REFERENCES :		<u></u>	
		1. Ben-Na	im, A.; Baer, Faraday Soc.		

COMPONENTS:				to 200 kPa					
1 Arcon. Ar. $7440-37-1$	COMPONENTS :			ORIGINAL MEASUREMENTS:					
1. Argon; Ar; 7440-37-1			Abrosimov, V. K.; Strakhov, A. N.; Krestov, G. A.						
2. Water; H <sub>2</sub> O; 7732-18-5							-	_	
3. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0			12 Kh	<u>v. Vyssh</u> im. <u>Tekh</u>	inol. 1	<u>bn</u> . 974	$\frac{zave}{17}$	146 146	$\frac{Khim}{53 - 146}$
					•				
VARIABLES: T/K: 283.38 - 318.48 P/kPa: 101.325 (1 atm) $D_2O/X_3: 0.00 - 1.00$			PREP	ARED BY:	н. :	L. (	Cleve	r	
EXPERIMENTAL VALUES:									
Mol Fraction	Ost	twald	d co	oefficie	n+/ī. v	103	,		
$D_20/X_3$	283.38	292					318.4	48	
		<u></u>							
0.00 0.01 0.03 0.05 0.10 0.30 0.60 1.00	45.71 46.19 46.52 46.60 46.66 47.49 48.28 50.48	38 39 38 39 38 39	.25 .91	34.50 34.56 34.58 34.59 35.25 36.00	29.5 29.5 29.6 30.0 30.7	5 6 4 6 1	26.0 26.0 26.1 26.1 26.1 26.2 27.0 27.0	09 06 10 20 37 09	
of deuteration on the thermodynamic of at 273 to 353 K. See Abrosimov, V. K. <u>Zh. Strukt</u> . <u>Khin</u> <u>J. Struct</u> . <u>Chem</u> .			19	76, 17,	1027 -	103	35.		
	AUXILI	ARY 1	INFO	RMATION					
METHOD/APPARATUS/PROCEDURE: The apparatus is a modifica apparatus of Ben-Naim and B Modifications include a deg vessel connected directly t absorption cell, a bubbling to presaturate the gas with vapor, and means to maintai supply at a constant pressu entire apparatus is immerse 400 liter water bath contro within 0.005 K (2,3).	tion of laer (1), assing to the vessel solvent n the ga re. The d in a	the -	SOUF 1. 2.	CE AND PU	Specia ted MRT ed not 0.001% Doubly	11y mor <sup>0</sup> 2.	pure -02-3 e tha	e gr. 377- an O	66. .004%

Seawater
----------

COMPONENTS:	EVALUATOR:
1. Argon; Ar; 7440-37-1	Chen-Tung A. Chen School of Oceanography Oregon State University
2. Seawater	Corvallis OR 97331
	June 1979

## CRITICAL EVALUATION:

There is considerable disagreement about the precise argon solubility in seawater. The earlier determinations of Rakestraw and Emmel (1) and Konig (2) cover limited salinity and temperature range and the results differ widely (3%) from currently accepted values. As a result, these measurements will not be analyzed.

The studies of Douglas (3,4) are of good accuracy (0.25%) but are limited in range for salinity. Only four samples (measured at salinities of 0, 27.8, 33.6 and 37.9 %) were measured at various temperatures without including points at intermediate low salinities. The data of Murray and Riley (5) cover wide temperature and salinity ranges (1 to  $35^{\circ}$ C, 0 to 39.1%S) and agree with the results of Douglas to generally within 0.5 % for pure water and for seawater near 35 % salinity. However, it is pointed out by Weiss (6) that at lower salinities the data of Murray and Riley are lower than the Setchenow fit to Douglas' data (7) by as much as 2.3 %.

Although Murray and Riley (5) claimed a precision of 0.13 %, they were only able to fit the data to "better than 0.7 %". This apparent discrepancy led Weiss (6) to critically evaluate their data and come to the conclusion that their measurements are in error for seawater in the low salinity range. The reanalysis of Murray and Riley's data in this study confirms that conclusion. The Murray and Riley data require high order salinity and temperature terms to fit the data when the low salinity (<18 %) solubility values, excluding pure water, are included. This does not seem to be reasonable in view of the simplicity of the equations used to represent the data over wide temperature and salinity ranges for other gases (6-9).

In order to confirm his findings, Weiss (6) made the argon solubility measurements in waters of low salinity using two independent techniques. Both sets of his results agree with the Setchenow treatment of Douglas' data (7) and do not support the data of Murray and Riley (5).

Since the solubility data of Douglas (3,4), Weiss (6) and Murray and Riley (5) are similar in precision, they are combined to form the data base for this study. However, the data of Murray and Riley at salinities below 18  $\$_0$  (except for pure water) are excluded since the available evidences all indicate that they are in error. The following equation is used to represent the Bunsen Solubility Coefficient with a standard deviation of

8.3 x  $10^{-5}$  units ( $\sim 0.25$  %)

 $\ln C = -686.1811 + 21561.99/T + 115.5947 \ln T - 0.161717 T$  $+ S(5.887 x 10^{-3} - 3.4803/T)$ 

where C is the Bunsen Solubility Coefficient, T is the absolute temperature.

It should be pointed out that neither Douglas (3,4) nor Murray and Riley (5) corrected their data for the gas dissolution effect on the volume of the aqueous phase (7). Although their original experimental data have been compiled in this study, the corrected values are used in the least squares fit. The correction ( $\Delta$ ) is made according to the following equation (Weiss, personal communication, 1979)

 $\Delta = \frac{273.15 \Phi_{\rm v}}{22400 ~\rm T}$ 

In the present study, partial molar volume of argon  $(\phi_v)$  in water is taken as 32.2 cm<sup>3</sup>/mol (10) and 1 mole of argon is considered as occupying 22400 ml in volume at STP.

i	COMPONENTS :	EVALUATOR:
	1. Argon; Ar; 7440-37-1	Chen-Tung A. Chen School of Oceanography
	2. Seawater	Oregon State University Corvallis OR 97331
		June 1979
I		

## CRITICAL EVALUATION:

For practical oceanographic purposes, it is convenient to use an equation for the argon solubilities from water-saturated air at 1 atm total pressure in ml (STP)/1 as a function of salinity and temperature (7, 11, 12). To take full advantage of the precision of the data it is also desirable to express the solubility unit in terms of  $\mu$ mol/kg, since it is pressure and temperature independent (7, 11, 12). Consequently, the combined data sets have also been fit to the following equations

 $\ln C (m1/1) = -1304.2075 + 36686.68/T + 226.1517 \ln T - 0.364328 T$  $+ S(6.118 x 10^{-3} - 3.5438/T) (+ 7.6 x 10^{-4} m1/1)$  $\ln C (\mu mo1/kg) = -1313.7070 + 37125.99/T + 228.3402 \ln T - 0.366478 T$  $+ S(5.855 x 10^{-3} - 3.6872/T) (+ 0.033 \mu mo1/kg)$ 

The vapor pressures for pure and seawater have been calculated using the formula given by Besley and Bottomley (13) and by Robinson (14), respectively. The densities have been calculated using the equation of Millero, Gonzalez and Ward (15).

It is worthwhile to point out that the solubility measurements discussed above have all been carried out at argon partial pressures of the order of 1 atm. The results are then applied to use at the normal atmospheric equilibrium pressure of argon ( $\sim 0.934$  %) by assuming that the Henry's law is valid (16). A few unpublished, preliminary mass spectrometric measurements at normal atmospheric equilibrium concentrations (16), however, give values on the average 1.5 % too high as compared to the above data. More carefully designed and executed experiments will be needed to resolve the above discrepancy.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Argon; Ar; 7440-37-1	Douglas, E.
2. Seawater	J. Phys. Chem. 1964, 68, 169 - 174. J. Phys. Chem. 1965, 69, 2608 - 2610.
EXPERIMENTAL VALUES:	
Experimental Bunsen Coefficient	
Chlorin	$nity/\$_0 = 0.0$
Tempe	erature/K
277.77 283.15 288.19	9 293.15 298.35 302.85
0.04744 0.04178 0.0374	
0.04741 $0.04169$ $0.03740.04748$ $0.04182$ $0.0375$	
0.04749 0.04182 0.037	50 0.03405 0.03115 0.02898
Av. 0.04747 0.04189 0.037 Av. 0.04746 0.04180 0.037	
Chloriu	nity/% = 15.376
	erature/K
	287.95 293.14 298.16 302.98
	D.03180 0.02891 0.02668 0.02487 D.03162 0.02894 0.02666 0.02473
	0.03170 0.02889 0.02662 0.02483 0.03171 0.02891 0.02665 0.02481
Chlori	nity/‰ ≈ 18.604
Tempo	erature/K
275.32 279.95 283.40	287.86 293.61 298.42 302.87
	0.03066 0.02770 0.02567 0.02413 0.03065 0.02772 0.02567 0.02412
0.04023 0.03619 0.03343	0.03060 0.02769 0.02563 0.02405
Av. 0.04021 0.03615 0.03344	0.03064 0.02770 0.02566 0.02410
Chlori	nity/% <sub>0</sub> = 20.985
Temp	erature/K
275.25 279.07 283.30	288.20 293.65 298.03 303.14
	0.02970 0.02702 0.02512 0.02342
0.03910 0.03574 0.03273	0.02963 0.02701 0.02514 0.02344 0.02968 0.02702 0.02517 0.02343
	0.02967 $0.02702$ $0.02514$ $0.02343$

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Argon Solubilities up to 200 kPa

COMPONENTS:	OPICINAL MEACURENERING.
1. Argon; Ar; 7440-37-1	ORIGINAL MEASUREMENTS: Douglas, E.
2. Seawater	J. Phys. Chem. 1964, 68, 169-174. J. Phys. Chem. 1965, 69, 2608-2610.
	<u></u>
VARIABLES :	PREPARED BY:
T/K: 274.65 - 303.14 P/kPa: 101.325 (1 atm) Chlorinity/%: 0 - 20.985	Chen-Tung A. Chen
	eding page
-	
	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Microgasometric method: gas-free	1. Argon. Pure argon with less
seawater is brought into contact with pure argon and after equilibra-	than 0.1% nitrogen and less
tion under constant temperature, the amount of gas absorbed by the sea-	2
water is measured volumetrically	
with a micrometer buret. The ratio of the volume of argon absorbed to	
the volume of seawater gives the solubility coefficient.	
· · · · · ·	
	ESTIMATED ERROR:
	$\delta C1/\$_{0} = 0.05$ $\delta T/K = 0.01$
	$\delta \alpha / \alpha = 0.0025$
	REFERENCES:

		Seav	vater		3
COMPONENTS :	_		ORIGINAL MEASUREM	ENTS:	
1. Argon; Ar; 7440-37-1			Murray, C. N.; Riley, J. P.		
2. Seawater			<u>Deep-Sea</u> <u>Res</u>	. 1970, <u>17</u>	, 203-209.
VARIABLES: T/K:	274.20 -	308.15	PREPARED BY:		
Total P/kPa: Salinity/%:	101.325 0 - 39.1	(1 atm)	Che	n-Tung A.	Chen
EXPERIMENTAL VALUE	s:		······		
Temp/k	Salinity (%0)	Bunsen Coefficient $\alpha \times 10^3$	Temp/k	Salinity (%)	Bunsen Coefficient $\alpha \times 10^3$
274.20	0.000 8.913 22.484 22.891 36.321	52.045 48.629 44.532 44.506 40.471	293.22	0.000 7.553 18.740 31.668 36.258	34.030 32.056 30.234 28.132 27.247
278.15	0.000 7.599 17.188 27.005 33.765	46.812 44.615 42.060 39.266 37.572	298.15	0.000 14.329 15.116 27.460 31.324	31.258 28.331 28.318 26.520 26.057
283.15	0.000 10.058 19.608 24.403 33.765	41.655 38.668 36.714 35.618 33.571	303.23	0.000 5.362 8.528 15.496 37.933	28.874 27.378 26.940 26.003 23.110
288.15	0.000 10.761 17.944 25.324 39.108	37.478 34.808 33.437 32.051 29.298	308.15	0.000 7.435 19.450 27.874 36.143	26.912 25.477 23.960 23.070 22.150
		AUXILIARY	INFORMATION	<u> </u>	
METHOD/APPARATUS/PROCEDURE: Gasometric method: measures the volume of water-saturated argon absorbed by the vacuum degassed sea- water in an equilibrium chamber, which is controlled under constant temperature, volume and pressure. The ratio of the volume of argon absorbed to the volume of seawater (measured by weight) gives the solubility coefficient.		<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Pure argon with stated purity of 99.99% supplied by the British Oxygen Company; mass spectrometry showed the total impurity content to be below 0.02 %.</li> <li>2. Seawater. Natural surface seawater. Seawaters of various salinities were made by dilution with distilled water or by evaporation.</li> </ul>			
			units in accu REFERENCES: 1. Murray, C. Wilson, T. 1969, <u>16</u> , 2 2. Murray, C.	$\delta T/K =$ h precision $10^{-3}$ Bunsen hracy (<0 N.; Riley R. S. <u>De</u> 297-310. N.; Riley	0.015 n and smaller n coefficient 1%) , J. P.; ep-Sea Res.

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32 Argon Solubili	lies up to 200 kPa		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Weiss, R. F.		
2. Seawater	Deep-Sea Res., 1971, <u>18</u> , 225-230.		
VARIABLES: T/K: 278.22 - 298.21	PREPARED BY:		
P/kPa: 101.325 (1 atm) Salinity/‰: 0 - 36.425	Chen-Tung A. Chen		
EXPERIMENTAL VALUES:			
Salinity/% 0	solubility coefficients 11.535 11.535		
T/K 298.18	283.31 298.21		
Bunsen 0.03115 <sup>k</sup>			
Coefficient 0.03132	0.01525		
0.03105			
Average 0.03117	0102927		
Bunsen s	olubility coefficients		
Salinity/%0 11.535			
Т/К 298.18	278.22 298.18		
Bunsen 0.02914 <sup>b</sup>	0.03690 <sup>a</sup> 0.02530 <sup>b</sup>		
Coefficient 0.02924	0.03688 0.02541		
0.02922	0.03698 0.02537		
Average 0.02920	0.03692 0.02536		
a. microgasometric results			
b. gas chromatographic results			
AUXILIAR	Y INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
a. Microgasometric method: measure	1. Argon. Pure argon with speci-		
the volume of water-saturated	by Air Reduction; gas chromato-		
argon absorbed by the vacuum- degassed seawater in an equilib-	graphic checks showed <0.01%		
rium chamber, which is controlle			
under constant volume and temper ature at 1 atm. The ratio of th	i como modo ha dilation attalata		
volume of the argon absorbed to			
the volume of seawater gives the solubility coefficient.	asting instated heating.		
b. Gas chromatographic method: use			
helium carrier gas to strip the	$S/8_0 = 0.004$		
gases in sample. Argon peak separation was achieved using a	$\begin{cases} \delta T/K = 0.01 \\ \delta Ar(microgasometric) = 0.2 \& (2\sigma); \end{cases}$		
molecular sieve. Peaks were	$\delta Ar(GC) = 0.6$ % (2 $\sigma$ ) in precision;		
detected by thermal conductivity and their areas determined by	l% in accuracy. REFERENCES:		
means of a Disc integrator.	1. Weiss, R. F.		
	J. Chem. Eng. Data 1971, 16, 235 - 241.		
	· · ·		

COMPONENTS:	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever
2. Water; H <sub>2</sub> O; 7732-18-5	Department of Chemistry Emory University
3. Electrolyte	Atlanta, GA 30322 U.S.A.
(4. Polar Organic Component)	July 1979

CRITICAL EVALUATION:

The effect of electrolytes on the solubility of argon in water, water-d<sub>2</sub>, organic and mixed solvents has been measured by workers in about ten laboratories. It is difficult to compare results from the many laboratories because there is no common agreement among them on the best units to report solubility values and salt-effect parameters. The electrolyte concentrations are reported in units of mole salt dm<sup>-3</sup> solution, mole salt kg<sup>-1</sup> solvent, or mole salt (55.51 mole solvent)<sup>-1</sup>. The argon solubility values are reported as Bunsen coefficients, Ostwald coefficients, mole fraction (treating each ion as a species in solution), or cm<sup>3</sup> argon at standard conditions and 101.325 kPa (1 atm) pressure (55.51 mole solvent)<sup>-1</sup>. The last unit is the solvemolality unit in current use in some of the Russian salt effect work.

To carry out an effective evaluation the salt effect data needs to be expressed in the same units. For the evaluation of the salt effects on the other noble gases all of the electrolyte concentrations were converted to mole salt kg<sup>-1</sup> solvent and the gas solubility values in pure solvent and salt solutions were converted to mole fraction. A salting-out parameter,  $k_{g,g} = (1/m) \log (X^{\circ}/X)$ , was calculated and compared. To carry out the same calculations for the argon solubilities proved to be a too time consuming project to complete before the deadline for the argon volume. In place of such a comparison, qualitative evaluation comments are given below about each of the laboratories carrying out salt effect work. The argon solubilities in salt solutions are considered tentative unless there are specific comments to the contrary in the section below. Values presented only in graphs are rejected because they are not of quantitative use to the rest of the scientific community.

Abrosimov, Badelin and Krestov (1,2) measured the solubility of argon in both water and water-d<sub>2</sub> solutions of the alkali halides LiCl, NaCl, KCl, RbCl, CsCl, CsBr, NaI, and KI up to concentrations of about 2.5 molal at ten degree intervals from 283.15 to 313.15 K. The salt concentration and the argon solubility are reported in the solvomolality unit which is referenced to 55.51 moles of solvent. When the solvent is ordinary water, the unit is molality for the salt and proportional to the Kuenen coefficient for the gas. For water-d<sub>2</sub> and other solvents there are no comparable units. Abrosimov et al. values of the argon solubility in water agree well with the recommended values, but in water-d<sub>2</sub> the agreement is not quite as good (within 1.5 percent). The data are classed as tentative.

Akerlof (3) was the first to measure the effect of added electrolyte on the solubility of argon. His apparatus and procedure were elaborate but his argon solubility values in water are high. He measured the solubility of argon in about 3 and 6 molal NH<sub>4</sub>Cl, LiCl, NaCl, KCl, MgCl<sub>2</sub>, CaCl<sub>2</sub>, SrCl<sub>2</sub>, BaCl<sub>2</sub>, AlCl<sub>3</sub>, HClO<sub>4</sub>, and NaNO<sub>3</sub> at 298.15 K. For the alkali halides his values of the salt-effect parameter are usually lower than the values reported by other workers. There is a trend for the salt effect parameter to decrease as salt molality increases. Either that or a systematic error in his method could account for his low results.

Ben-Naim and Egel-Thal (4) measured the solubility of argon in water and 1.0 molal salt solutions of LiCl, NaCl, KCl, KBr, NaI and KI at five degree intervals from 278.15 to 298.15 K. They made measurements at only one salt concentration and applied no correction for solvent evaporation on degassing. Thus their results may not be quite as reliable as when measurements are made at several salt concentrations and the solutions are analyzed after degassing. The data are classed as tentative.

Clever and Holland (5) measured the solubility of argon in aqueous solutions of LiCl and NaI at three temperatures and in aqueous solutions of NaCl, KCl, and NaBr at one temperature. Clever and Reddy (6) measured the solubility of argon in both water + NaI and methanol + NaI at one temperature. Agreement between the Setschenow salt-effect parameters for argon

in water + NaI is only fair. The data are classed as tentative.

Conway, Novak and Laliberte (7) measured the solubility of argon at several salt concentrations in aqueous  $NH_4Br$ ,  $(CH_3)_4NBr$ ,  $(C_2H_5)_4NBr$ ,  $(n-C_3H_7)_4NBr$  and  $(n-C_4H_9)_4NBr$  at 298.15 K. They reported their results as Henry's constant and as mole gas dm<sup>-3</sup> atm<sup>-1</sup>. Some of their Henry's constant values appear to be in error (see note on the data sheet). They define a relative salting out constant as  $k = \Delta S/S^\circ m$  where  $\Delta S$  is the difference in the argon solubility between water and salt solution, S° is the solubility in pure water, and m is the salt concentration. They state that the relative salting out constant is consistent with the continuum-distribution treatment of salting out. The data are classed as tentative.

Eucken and Hertzberg (8) measured the solubility of argon in aqueous solutions at 273.15 and 293.15 K. In an earlier evaluation of the argon + water + NaCl system by Clever and Holland (5) there was evidence that their salt effect parameter at 293.15 K is high, but the 273.15 K value is consistent with the data of others.

Masterton, Polizzotti and Wells (20) measured the solubility of argon in the solutions of the aqueous complex ion electrolyte trans-[Co(en)\_NCSC1]Br [15362-24-0] at 298.15 K. The work appears to have been carried out care-fully and the data are classified as tentative.

Mishnina, Avdeeva, and Bozhovakaya (21) present a table of smoothed values of argon Bunsen coefficients at 12 concentrations from 0 to 5.4 molal NaCl at five degree intervals from 278.15 to 348.15 K. There is a value of the salting out parameter at each temperature. The experimental data base for the table is not completely clear. Morrison and Johnstone's value is mentioned, as well as some Russian work not available to us. The salt-effect parameters agree reasonably well with values from other sources, see Figure 1 in the paper of Clever and Holland (6).

Morrison and Johnstone (22) measured the salt-effect parameter for argon solubility in aqueous LiCl, NaCl, and KI at 298.15 K. They made measurements at the single salt concentration of one molal. Use of a single salt solution gives their values more uncertainty than the values of others who measured the solubility over a range of concentrations. The data are classified as tentative.

Shoor, Walker, and Gubbins (25) measured the solubility of argon in aqueous KOH up to concentrations of 10.37 molal and at temperatures of 298.15, 313.15, 333.15, and 353.15 K. The authors used a gas chromatographic method of measurement. Chromatographic methods are sometimes not as accurate as volumetric methods. However, this work appears to have been carried out carefully and the data are classed as tentative.

The group of Krestov, Nedel'ko, Abrosimov, Myasoedova, Badelin, Bobrinev, Slyusar and other co-workers of the Ivanovo Chemical Technology Institute, USSR, are very active in the study of the solubility of gases in the presence of added electrolytes. Unfortunately many of their papers were not available to us in time to include in this compilation of data. Of the papers that are available many report the solubility data in only graphical form. Summarized below are the systems on which the Russians have worked, but because of either nonavailability of the paper or only graphical presentation in the paper, no data sheets were prepared.

Argon + Water + Water-d<sub>2</sub> + Potassium Chloride

Krestov, Abrosimov, and Strakhov (9) graphically show argon Bunsen coefficients as a function of water-d<sub>2</sub> mole fraction in 0.00, 0.10, 0.30, 1.00 and 2.00 molal KCl at temperatures of 283.38, 292.72, 308.25 and 318.48 K.

2. Argon + Water + Methanol + Potassium Chloride

Provokov, Krestov, Kopov (24) report argon solubility data on this system. The paper was not available.

3. Argon + Water + Ethanol + Potassium Chloride

Krestov, Nedel'ko, Bobrinov, Kuvanova and Zakharova (16) report argon solubility data on the system and on the mixed solvent system with other electrolytes. The paper was not available. 4. Argon + Water + 2-Methyl-2-propanol + Potassium Chloride

Krestov, Nedel'ko, and Slyusar (18, 19) report on the solubility and thermodynamics of argon dissolution in the system in two deposited documents. The data extend over the 293 to 313 K temperature range. The papers have not arrived in time to be compiled.

5. Argon + Water + 2-Propanone + Electrolytes

Krestov, Nedel'ko, and Myasoedova have published three papers on these systems. They report (10) the solubility of argon in solutions at 0.00, 0.05, 0.09, 0.17, 0.25, 0.33, 0.49, and 0.60 mole fraction 2-propanone from 0 to 4 molal KCl at temperatures of 288.15, 298.15, 303.15 and 313.15 K. The data are on small scale graphs, no data sheets were prepared. They also report the solubility of argon in the mixed solvent up to an 2-propanone mole fraction of 0.331 and containing LiCl, NaCl, KCl, KBr, KI, RbCl or CsCl at concentrations up to 4 molal. Most of the data are at a temperature of 298.15 K but some is over the 288.15 to 313.15 K temperature interval. The data are on small scale graphs and no data sheets were prepared. In a deposited document (17) they report data up to 0.331 mole fraction 2-propanone, up to saturated solutions of LiCl, NaCl, KBr, and KI at 298.15 K. We do not have a copy of the document and no data sheets were prepared.

6. Argon + Water + Dimethylformamide + Electrolytes

Krestov, Nedel'ko, and Polishchuk (11) show graphs of the argon Bunsen coefficient up to dimethylformamide concentrations of 0.4 mole fraction at 0.00, 0.05, 0.2, 0.3, and 0.4 molal LiCl, NaCl, KCl or CsCl at 298.15 K. No data sheets were prepared.

7. Argon + Water + Transition metal tetrasulfophthalocyanine complexes

Nedel'ko, Krestov, Al'yanov, Borodkin, Golyand and Maizlish (23) report the solubility and thermodynamic parameters of dissolution in the system. The paper was not available and no data sheets were prepared.

In addition to the papers discussed above the Ivanovo Chemical Technology Institute group has published several general papers (13, 14, 15) on the solubility of gases in aqueous electrolyte solutions.

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		Salt Solutions	(Aqueous)	37
COMPONEN'	TS:		ORIGINAL MEASUREMENTS:	
l. Arg	gon; Ar; 7440-3	7-1	Akerlof, G.	
2. Wat	ter; H <sub>2</sub> 0; 7732-	18-5	J. Am. Chem. Soc.	1935, <u>57</u> , 1196-1201.
3. Per	cchloric Acid;	HClO <sub>4</sub> ; 7601-90-3		
VARIABLE	::		PREPARED BY:	
	T/K: P/kPa:	298.15 101.325 (l atm) 0 - 9.32	T. D. Ki H. L. Clo	
	INTAL VALUES:			<u></u>
Т/К	Electrolyte	Argon Solubility	Salt Effect	Parameters
	Mol kg <sup>-1</sup> H <sub>2</sub> O	dm <sup>3</sup> Ar (STP) kg <sup>-</sup> H <sub>2</sub> O	$k_{s} = (1/m) \log (s^{\circ}/s)$	$k_{sx} = (1/m) \log (X^{\circ}/X)$
298.15	0.00 4.05 9.32	0.0332 0.0411 0.0521	-0.023 -0.021	-0.008 -0.008
METHOR	APPARATUS/PROC		SOURCE AND PURITY OF M	
Gas abs was pre calcula (Mohr-W tables Tables	sorption method epared and its ated from the m Vestphal balanc in the Interna (Vol. III). T	. The solution concentration easured density e) and density tional Critical he solution was	<ol> <li>Argon. Source to be 99 per c of the impurit</li> <li>Water. No inf</li> </ol>	not given. Stated ent argon with most y nitrogen. ormation.
vacuum	for 45 minutes	-	3. Electrolyte. Stated to be o variety".	Source not given. f the "Analyzed
Vapor f Volume	from the soluti was measured b	rated with water on. The solution y displacement of of mercury as the		
gas and contact relativ stirred librium	l solution were t. The gas-liq vely large area l for two hours n appeared to b	brought into uid interface, of , was gently , although equi- e established	δT/K = 0.01 δS/S = 0.01	(author)
within crease was mea system.	a matter of mi in gas volume asured on the a	nutes. The de- due to solution ttached buret	REFERENCES :	
The sol dm <sup>3</sup> Ar equival	(STP) kg <sup>-1</sup> wat	were reported as er. This is		

COMPONENTS :		ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37	-1	Ben-Naim, A.; Egel-Thal, M.		
2. Water; H <sub>2</sub> O; 7732-1	8-5	<u>J. Phys</u> . <u>Chem</u> . 1965, <u>69</u> , 3250-3253.		
3. Ammonium Chloride;	NH <sub>4</sub> Cl;			
12125-02-9	7			
	·····			
VARIABLES: T/K: 278.15	- 298.15	PREPARED BY:		
Total P/kPa: 101.325	(l atm)	P. L. Long		
Salt/mol kg <sup>-1</sup> H <sub>2</sub> O: 0	- 1	1		
EXPERIMENTAL VALUES:				
		vald Salt Effect Parameter		
mol	KG H.U	$\frac{10^3}{10^3} = (1/m) \log (L^0/L)$		
278.15	- · ·	.07 – .20 0.100		
283.15	0.0 43	- 36		
288.15		.91 0.094 .56 -		
	1.0 32	.23 0.089		
293.15		.63 – .08 0.086		
298.15		.08 - .27 0.081		
	AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCE	DURE:	SOURCE AND PURITY OF MATERIALS;		
The apparatus of Ben- (1) is used. There i	Naim and Baer s a calibrated	1. Argon. No source given.		
dissolution vessel wh	ich contains the	2. Water. Distilled.		
degassed solvent. Th duced wet from a gas	buret. Stirring	3. Ammonium Chloride. Analar grade.		
forces the liquid through the gas. The amount of gas dissolved is mea-				
sured on a gas buret.		1		
The entire apparatus a water thermostat.	is immersed in			
During outgassing a small change in		ESTIMATED ERROR:		
salt concentration may occur. No correction for this is made.		$\delta m/m = 0.01$		
		Overall apparatus precision <u>+</u> 0.2% (authors)		
		REFERENCES :		
		1. Ben-Naim, A.; Baer, S. <u>Trans. Faraday Soc</u> . 1963, <u>59</u> , 2735.		
1		1		

Salt	So	lutions	(Aq	ueous)
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COMPONEN	ITS:	· ····································	ORIGINAL MEASURE	MENTS :	
1. Argon; Ar; 7440-37-1			Conway, B. E.; N		M
2. Water; H <sub>2</sub> O; 7732-18-5		Laliberte, L.		••• /	
3. Ammo	- onium Bromide;	NH <sub>4</sub> Br; 12124-	J. Solution Chem	<u>1. 1974, 3</u>	, 683 - 711.
	9;and some N,N anaminium Bron				
EXPERIM	MENTAL VALUES	:	••••••••••••••••••••••••••••••••••••••		
т/к	Electrolyte		ty	Salt Effe	ect Paramete
	mol dm <sup>-3</sup>	Henry's Constant		***	
	mor um	mol dm <sup>-3</sup> (mmHg) <sup>-1</sup>	mol dm <sup>-3</sup> atm <sup>-1</sup>		$k_s =$
		x 10 <sup>6</sup>	× 10 <sup>3</sup>		(1/C) log Cº/
An	nmonium Bromić	le; NH <sub>4</sub> Br; 12124-97	9		
298.15	0.0	-	1.31	-	_
	0.25	8-88*	1.32	-0.075**	-0.013
	0.50	8.88* 8.93*	1.33	-0.076**	-0.013
	1.00	9.41*	1.33 1.45	-0.076** -0.158**	-0.044
	2.00	9.85*	1.47	-0.115**	-0.025
N, (C	N,N-Trimethy] CH <sub>3</sub> ) <sub>4</sub> NBr; 64-2	lmethanaminium Bron 20-0	nide or Tetramethy	'l ammoniu	n Bromide;
298.15	0.0	1.72	1.31	-	-
	0.25	1.70	1.29	-0.055	0.027
	0.50	1.67	1.27	-0.052	0.027
	1.00	1.62	1.23	-0.058	0.027
	1.50	1.55	1.18	-0.057	0.030
	2.00 3.00	1.32 0.74	1.00 0.56	0.019 0.116	0.059 0.123
N,	N,N-Triethyle	ethanaminium Bromid			•••==
298.15	0.0	1.72	1.31	-	-
	0.25	1.68	1.28	-0.049	0.040
	0.50	1.52	1.16	0.045	0.106
	1.00	1.13	0.85	0.202	0.188
	1.50	0.79	0.61	0.189	0.221
	2.00	0.71	0.54	0.107	0.192
	2.50	0.70	0.55	-	0.151
	3.00	0.88	0.67	-0.020	0.097
	N,N-Tripropyl	propanaminium Brom	ide; (C <sub>3</sub> H <sub>7</sub> ) <sub>4</sub> NBr;	1941-30-6	
298.15	0.0	1.72	1.31	-	-
	0.20	1.68	1.27	0.08	0.067
	0.30	1.62	1.23	-0.041	0.091
	0.50	1.02	0.77	-0.659	0.462
	1.00	0.76	0.59	0.408	0.346
	1.50	0.81	0.61	0.189	0.221
N,	N,N-Tributyl-	l-butanaminium Bro	mide; (C <sub>4</sub> H <sub>9</sub> ) <sub>4</sub> NBr;	1643-19-2	2
	0.0	-	1.31	-	-
		8.29*	1.25	-0.069	0.102
	0.20				
	0.30	4.14*	0.63	1.58	1.06
298.15			0.63 0.67 0.94	1.58 0.80 0.10	1.06 0.58 0.19

stants for the other salts. The values for the other salts appear to be the mol dm<sup>-3</sup> atm<sup>-1</sup> values divided by 760 mmHg atm<sup>-1</sup>. An error is suspected. These may be  $K_{\rm H}$  instead of  $K_{\rm H}$  values (see method below).

Argon Solubilities up to 200 kPa

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Conway, B. E.; Novak, D. M.;		
2. Water; H <sub>2</sub> O; 7732-18-5	Laliberte, L.		
3. Ammonium Bromide; NH <sub>4</sub> Br; 12124-	J. Solution Chem. 1974, 3, 683 - 711.		
97-9; and some N,N,N-Trialkyl			
alkanaminium Bromides	/		
VARIABLES: T/K: 298.15	PREPARED BY:		
Total P/kPa: 76.66 - 101.325	H. L. Clever		
(595 - 760 mmHg) Salt/mol dm <sup>-3</sup> : 0 - 3.00	P. L. Long		
	eding page.		
-			
lated these from the partial mola the paper. The values do not agr	en in the paper. The compiler calcu- l volume of $43.9 \text{ cm}^3 \text{ mol}^{-1}$ given in ee with the values shown in Fig. 4 ble to reproduce the relative salting		
*** The authors calculate the relativ	e salting out, $k_s = \Delta S/S^{O}m$ , which		
they state to be consistent with of salting out. The values of th water and salt solution and the s	the continuum-distribution treatment e argon solubility change between olubility in water and the salt con-		
of water. Values of the argon so	amount of solution containing one dm lubility and the salt concentration		
in the table were converted to the $dm^{-3}$ water basis by means of th partial molal volumes at infinite dilution of the electrolytes in water. The values used are 43.9, 114.2, 174.2, 239.6 and 301.0			
$cm^3 mol^{-1}$ for $NH_4Br$ to $(C_4H_9)_4NBr$	respectively.		
The compiler has added a conventional salting effect parameter,			
$k_s = (1/C) \log(C^{\circ}/C)$ , for use in comparing the present results with			
the results of other workers.			
In the equation above the first C is the salt concentration in uni			
	argon solubility ratio with the C's The C <sup>O</sup> represents the pure water		
in units of mol Ar dm <sup>-3</sup> solution. argon solubility value.	The Cy represents the pure water		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The method is based on the principle	1. Argon. No information.		
employed in volumeteric adsorption studies on high area porus materials	2 <sup>.</sup> Water. Double distilled.		
where the apparent PV relation for a given initial amount of gas is deter- mined as a function of pressure. An advantage of the method is that is	3. Salts. The purification, drying and analysis followed previously described procedures (2).		
advantage of the method is that is precludes the necessity of vacuum-	ESTIMATED ERROR:		
outgassing the liquid phase. The apparatus is described by Novak and	$\delta T/K = 0.1$		
Conway (1).	$\delta L/L = 0.025$		
The apparatus consists of a flask	REFERENCES:		
that hold 500 cm <sup>-3</sup> of liquid solvent and a gas buret. There is a refer- ence manometer, which is independent	<ol> <li>Novak, D. M.; Conway, B. E. <u>Chem. Instr. 1973, 5, 79.</u></li> <li>Conway, B. E.; Verrall, R. E.;</li> </ol>		
of atm pressure. The solvent is roughly degassed on a water pump.	Desnoyers, J. E. <u>Trans</u> . <u>Faraday</u> Soc. 1965, 62, 2738.		
The gas under study is bubbled through to force out any remaining gas			
librium is reached and the final press sure is changed and equilibrium attain 6 to 10 times over the pressure range	sure and volume are taken. The pres- ned again, the procedure is repeated		
of the (PV) $Ar$ vs $P_{Ar}$ is $-K_{H}^{T}RT$ . The st	andard $K_{H}$ is obtained from $K_{H}$ .		
1			

••••

COMPORATS:       DAIGNAL MEANEMENTS:         1. Argon, Ar; 7440-37-1       Masterton, W. L.; Polizzotti, D.;         Water; H_20; 7732-18-5       Masterton, W. L.; Polizzotti, D.;         3. trans-Chloroisothicorynatobis- forming trans-[coen]zGSC1]Br;       J. Solution Chem. 1973, 2, 417 - 423.         J. trans-Chloroisothicorynatobis- forming trans-icoen]zGSC1]Br;       Solubility Ratio         NAMABLES:       T/K. 298.15 F/KPa: 101.325 (1 atm)         Solution dm <sup>-3</sup> 0 - 0.270         EXPERIMENTAL VALUES:       Solubility         T/K Electrolyte Solution mol dm <sup>-3</sup> Argon g cm <sup>-3</sup> g cm <sup>-3</sup> Idd <sup>-3</sup> x 10         296.15       0.0         0.204       1.0303         0.270       1.0410         1.686       1.233         The salt effect parameter is k <sub>BX</sub> = (1/C) log (X <sup>0</sup> /X) = (0.336 ± 0.009)         METHOD/APPARATUS/PROCEDURE: Solubilities were detormined by measu- ing the volume of goal dissolved in a known volume of solvent. The apparatus Master and it possible to accurately masterial to that described by Wran At an explanation conductivity of 99.998 & Ar.         Nater and itsolved. The volume of gaa diggolved can be measured to 1.0.01 master equilibrium.       Solution chemolecal Publishing Co., Inc. See Inorganic Laboratory Prepara- tof equilibrium.         of equilibrium.       Schleeneel Publishing Co., Inc. Set Inorganic Laboratory Prepara- tof equilibrium.       Schlee	Sait Solutio	ons (Aqueous) 41
2. Water; H <sub>2</sub> O; 7732-18-5       3. trans-Chloroisothiocyanatobis- (dthylenediamine)cobalt(III) broad,dc; trans-Chloro(sothiocyanatobis- (dthylenediamine)cobalt(III) broad,dc; trans-Co(sn)2WCSClBr; PKPa: 101.325 (1 atm) Salt/mol dm <sup>-3</sup> : 0 - 0.270       J. Solution Chem. 1973, 2, 417 - 423.         YARIABLES: T/K Electrolyte Solution Argon solubility mol dm <sup>-3</sup> : 0 - 0.270       FREPARED BY: H. L. Clever         T/K Electrolyte Solution Argon o.097 1.0129 0.204 1.0303 1.152 1.174 0.270 1.0410 1.086 1.233       Solubility Ratio 298.15 0.0 0.9971 1.396 1.000 0.097 1.0129 1.281 1.073 0.204 1.0303 1.152 1.174 0.270 1.0410 1.086 1.233         The salt effect parameter is k <sub>EX</sub> = (1/C) log (X <sup>O</sup> /X) = (0.33 <sub>6</sub> ± 0.009)         WETHOD/APPARATUS/PROCEDURE: Solubilities were determined by measuring the volume of gas dissolved in a find Hung (1). The dissolution cell was fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume of molecil was fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume of molecil war fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume of molecil war fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume of molecil may fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume change of the a system of gas burts with maxillary bubbs, Siz to twelve hours Were required to ensure achievement of equilibrium.       Sume Kenes, TyK = 0.02 by method of Schlessinger, G. 0.2 by method	COMPONENTS:	ORIGINAL MEASUREMENTS:
2. Water; H <sub>2</sub> O; 7732-18-5 3. trans-Chioroisothicoymatobis- (fethylenediamine)cobalt(III) brounde; trans-(Co(en)2NCSC1]Br; YARLABLES: T/K 298.15 P/KPa: 101.325 (1 atm) Salt/mol dm <sup>-3</sup> : 0 - 0.270 EXPERIMENTAL VALUES:          T/K       Electrolyte Solution mol dm <sup>-3</sup> : 0 - 0.270       Argon Solubility       Solubility Ratio Mol Protoion mol dm <sup>-3</sup> : 0 - 0.270         EXPERIMENTAL VALUES:       T/K       Electrolyte Solution Mol dm <sup>-3</sup> : 0 - 0.270       Argon Mol dm <sup>-3</sup> : 10.325 (1 atm) g cm <sup>-3</sup> Solubility Ratio Mol protoin mol dm <sup>-3</sup> : 10.30         298.15       0.0 0.097 1 : 0.129 1 : 281 0.204 1 : 0.303 1 : 152 1 : 1.74 0.270 1 : 0.410 1 : 0.966       1.000 1 : 0.96 1 : 233         The salt effect parameter is k <sub>EX</sub> = (1/C) log (X <sup>O</sup> /X) = (0.33 <sub>6</sub> ± 0.009)         METHOD/APPARATUS/PROCEDURE: Solubilities were determined by measu- ring the volume of solvent. The apparatus Mas similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, Mich made it possible to accurately measure the solvent volume change as index arystem of gas Durets with and signified a gas Durets with the argod dissolved. The volume of gas dissolved in the solution of gas dispolved can be measured to to 0.01 were requilibrium.       Nargon. Matheson Co., Inc. Stated purity of 99.998 & Ar. Nargon dissolved. The volume of gas Durets with the argod dissolved to to 0.01 were requilibrium.       Nargon. Matheson Co., Inc. Stated purity of 99.998 & Ar. Nargon. Laboratory Prepared by method of Schlessinger, G. C. See Inorganic Laboratory Prepared Mex York, 1962, page 240. Nev York, 1962, page 240. Nev York, 1962, page 240. Nev York, 1962, page 240. Nev York, 1962, page 240.	-	
VARIABLES:       T/K: 298.15       PKPa: 101.325 (1 atm)         Salt/mol dm <sup>-3</sup> : 0 - 0.270       H. L. Clever         EXPERIMENTAL VALUES:       Mol Praction         T/K       Electrolyte       Solubility         g cm <sup>-3</sup> mol dm <sup>-3</sup> x 10 <sup>3</sup> Mol Praction         g cm <sup>-3</sup> mol dm <sup>-3</sup> x 10 <sup>3</sup> Ar in H <sub>2</sub> O/Ar in Sol'n.         298.15       0.0       0.9971       1.396         0.097       1.0129       1.281       1.073         0.204       1.0303       1.152       1.174         0.270       1.0410       1.096       1.233         The salt effect parameter is k <sub>SX</sub> = (1/C) log (X <sup>0</sup> /X) = (0.336 ± 0.009)         METHOD/APPARATUS/PROCEDURE:         SOURCE AND FURITY OF MATERIALS:         Source AND FURITY OF	3. <u>trans</u> -Chloroisothiocyanatobis- (ethylenediamine)cobalt(III) bromide; trans-[Co(en)2NCSC1]Br;	
T/K Electrolyte Solution Argon Solubility Mol Fraction         mol dm <sup>-3</sup> g cm <sup>-3</sup> solubility Mol Fraction         g cm <sup>-3</sup> mol dm <sup>-3</sup> x 10 <sup>3</sup> Ar in H <sub>2</sub> O/Ar in Sol'n.         298.15       0.097       1.0129       1.281         0.204       1.0303       1.152       1.174         0.270       1.0410       1.086       1.233         The salt effect parameter is k <sub>SX</sub> = (1/C) log (X <sup>O</sup> /X) = (0.33 <sub>6</sub> ± 0.009)         MUXILIARY INFORMATION         MUXILIARY INFORMATION         MUXILIARY INFORMATION         NETHOD/APPARATUS/PROCEDURE:         Solubilities were determined by measuring the volume of gas dissolved in a flow notume of solvent. The apparatus fitted with three capillary pipets, Which made it possible to accurately measure the solvent volume change as fitted with three capillary pipets, Which made it possible to accurately the avgoid can be measured to ± 0.01       Summed as black it does with axillary bubs. Six to twelve hours were required to ensure achievement of equilibrium.       Strang-ICO(en),NCSCIBr. Prepareations, Chemical Publishing Co.,Inc. New York, 1962, page 240.         ESTIMATED ERROR:         Mather of gas burets with axillary bubs. Six to twelve hours were required to ensure achievement of equilibrium.         Of equilibrium.	VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm) Salt/mol dm <sup>-3</sup> : 0 - 0.270	
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	EXPERIMENTAL VALUES:	
0.097       1.0129       1.281       1.073         0.204       1.0303       1.152       1.174         0.270       1.0410       1.086       1.233         The salt effect parameter is k <sub>SX</sub> = (1/C) log (X <sup>0</sup> /X) = (0.33 <sub>6</sub> ± 0.009)         MUXILIARY INFORMATION         MUXILI	mol dm <sup>-3</sup> Density Solubi	lity Mol Fraction $^{-3} \times 10^{3}$ Ar in H <sub>2</sub> O/Ar in Sol'n.
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: Solubilities were determined by measu- ring the volume of gas dissolved in a known volume of solvent. The apparatus was similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, which made it possible to accurately measure the solvent volume change as the argon dissolved. The volume of gas dissolved can be measured to ± 0.01 cm <sup>3</sup> in a system of gas burets with auxillary bulbs. Six to twelve hours Were required to ensure achievement of equilibrium. AUXILIARY INFORMATION SOURCE AND PURITY OF MATERIALS: SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Stated purity of 99.998 % Ar. 2. Water. Distilled, passed through ion exchange column. Specific conductivity 10 <sup>-6</sup> (ohm-cm) <sup>-1</sup> . 3. trans-[Co(en)_NCSC1]Br. Prepared by method of Schlessinger, G. G. See Inorganic Laboratory Prepara- tions, Chemical Publishing Co.,Inc New YOYK, 1962, page 240. ESTIMATED ERROR: 6T/K = 0.02 6P/mmHg = 3 6AV/cm <sup>3</sup> = 0.01 REFERENCES: 1. Wen, WY.; Hung, J. H.	0.097 1.0129 1.2 0.204 1.0303 1.1	81 1.073 52 1.174
<ul> <li>METHOD/APPARATUS/PROCEDURE:</li> <li>Solubilities were determined by measuring the volume of gas dissolved in a known volume of solvent. The apparatus was similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, which made it possible to accurately measure the solvent volume change as the argon dissolved. The volume of gas the argon dissolved. The volume of gas to accurately measure the solvent volume change as the argon dissolved. The volume of gas differences at a system of gas burets with auxillary bulbs. Six to twelve hours were required to ensure achievement of equilibrium.</li> <li>SURCE AND PURITY OF MATERIALS:</li> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>Argon. Matheson Co., Inc. Stated purity of 99.998 % Ar.</li> <li>Water. Distilled, passed through ion exchange column. Specific conductivity 10<sup>-6</sup> (ohm-cm)<sup>-1</sup>.</li> <li>trans-[Co(en) 2NCSC1]Br. Prepared by method of Schlessinger, G. G. See Inorganic Laboratory Preparations, Chemical Publishing Co., Inc New York, 1962, page 240.</li> <li>ESTIMATED ERROR:</li> <li>ST/K = 0.02</li> <li>δP/mmHg = 3</li> <li>δΔV/cm<sup>3</sup> = 0.01</li> </ul>		
<ul> <li>Solubilities were determined by measuring the volume of gas dissolved in a known volume of solvent. The apparatus was similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, which made it possible to accurately measure the solvent volume change as the argon dissolved. The volume of gas dissolved can be measured to ± 0.01 cm<sup>3</sup> in a system of gas burets with auxillary bulbs. Six to twelve hours were required to ensure achievement of equilibrium.</li> <li>1. Argon. Matheson Co., Inc. Stated purity of 99.998 % Ar.</li> <li>2. Water. Distilled, passed through ion exchange column. Specific conductivity 10<sup>-6</sup> (ohm-cm)<sup>-1</sup>.</li> <li>3. trans-[Co(en) 2NCSC1]Br. Prepared by method of Schlessinger, G. G. See Inorganic Laboratory Preparations, Chemical Publishing Co., Inc New York, 1962, page 240.</li> <li>ESTIMATED ERROR:</li> <li>6T/K = 0.02</li> <li>6P/mmHg = 3</li> <li>6ΔV/cm<sup>3</sup> = 0.01</li> <li>REFERENCES:</li> <li>Wen, WY.; Hung, J. H.</li> </ul>	AUXILIARY	' INFORMATION
<ul> <li>Solubilities were determined by measuring the volume of gas dissolved in a known volume of solvent. The apparatus was similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, which made it possible to accurately measure the solvent volume change as the argon dissolved. The volume of gas the argon dissolved. The volume of gas the argon dissolved can be measured to ± 0.01 cm<sup>3</sup> in a system of gas burets with auxillary bulbs. Six to twelve hours were required to ensure achievement of equilibrium.</li> <li>1. Argon. Matheson Co., Inc. Stated purity of 99.998 % Ar.</li> <li>2. Water. Distilled, passed through ion exchange column. Specific conductivity 10<sup>-6</sup> (ohm-cm)<sup>-1</sup>.</li> <li>3. trans-[Co(en) 2NCSC1]Br. Prepared by method of Schlessinger, G. G. See Inorganic Laboratory Preparations, Chemical Publishing Co., Inc New York, 1962, page 240.</li> <li>ESTIMATED ERROR:</li> <li>6T/K = 0.02</li> <li>6P/mmHg = 3</li> <li>6ΔV/cm<sup>3</sup> = 0.01</li> </ul>	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	Solubilities were determined by measuring the volume of gas dissolved in a known volume of solvent. The apparature was similar to that described by Wen and Hung (1). The dissolution cell was fitted with three capillary pipets, which made it possible to accurately measure the solvent volume change as the argon dissolved. The volume of gas dissolved can be measured to ± 0.01 cm <sup>3</sup> in a system of gas burets with auxillary bulbs. Six to twelve hours were required to ensure achievement	<ul> <li>1. Argon. Matheson Co., Inc. Stated purity of 99.998 % Ar.</li> <li>2. Water. Distilled, passed through ion exchange column. Specific conductivity 10<sup>-6</sup> (ohm-cm)<sup>-1</sup>.</li> <li>3. trans-[Co(en)_NCSC1]Br. Prepared by method of Schlessinger, G. G. See Inorganic Laboratory Prepara- tions, Chemical Publishing Co.,Inc. New York, 1962, page 240.</li> <li>ESTIMATED ERROR: δT/K = 0.02 δP/mmHq = 3 δΔV/cm<sup>3</sup> = 0.01</li> <li>REFERENCES:</li> <li>Wen, WY.; Hung, J. H.</li> </ul>

OMPONENT			ORIGINAL MEASUREMENTS:	
1. Argo	on; Ar; 7440-37	7-1	Akerlof, G.	ļ
-	er; H <sub>2</sub> O; 7732-1			1935, <u>57</u> , 1196-1201.
3. Alu	minum Chloride;			1939, <u>51</u> , 1170 2001
744	6-70-0			
VARIABLE	S: T/K: 298.15		PREPARED BY:	Kittredge
Salt/mc		25 (l atm)	H. L. C	
EXPERIMEN	NTAL VALUES:			
т/к	Electrolyte Mol kg <sup>-1</sup> H <sub>2</sub> O	Argon Solubilit dm <sup>3</sup> Ar (STP) kg H <sub>2</sub> O	-1	ect Parameters 5) k <sub>sx</sub> =(1/m)log(X°/X)
298.15	0.00 0.98	0.0332 0.0247	0.131	0.161
	1,56	0.0179	0.172	0.202
		AUXILIARY	Y INFORMATION	
	APPARATUS/PROCE	EDURE:	SOURCE AND PURITY OF N	
Gas abs was pro	sorption method epared and its ated from the m	EDURE: d. The solution concentration measured density	SOURCE AND PURITY OF M 1. Argon. Source to be 99 per	not given. Stated cent argon with most
Gas abs was pro calculs (Mohr-V tables	sorption method epared and its ated from the n Westphal balanc in the Interna	EDURE: d. The solution concentration measured density ce) and density ational Critical	SOURCE AND PURITY OF N 1. Argon. Source to be 99 per	not given. Stated cent argon with most ty nitrogen.
Gas abs was pro calcula (Mohr-V tables Tables degasse	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III).	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in	SOURCE AND PURITY OF M 1. Argon. Source to be 99 per of the impuri 2. Water. No in a 3. Electrolyte. Stated to be	not given. Stated cent argon with most ty nitrogen.
Gas abs was pro calcula (Mohr-V tables Tables degasse vacuum The arc vapor	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III). T ed by heating, for 45 minutes gon was presatu from the soluti	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in s. urated with wates ion. The solution	SOURCE AND PURITY OF N 1. Argon. Source to be 99 per of the impuri 2. Water. No in <sup>2</sup> 3. Electrolyte. Stated to be variety".	not given. Stated cent argon with most ty nitrogen. formation. Source not given.
Gas abs was pro calcula (Mohr-V tables Tables degasse vacuum The arg vapor	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III). T ed by heating, for 45 minutes gon was presatu from the soluti was measured h	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in s. urated with wates ion. The solution by displacement	SOURCE AND PURITY OF N 1. Argon. Source to be 99 per of the impuri 2. Water. No in 3. Electrolyte. Stated to be variety".	not given. Stated cent argon with most ty nitrogen. formation. Source not given.
Gas abs was pro- calcula (Mohr-V tables Tables degasse vacuum The arc vapor i volume of an of the gas	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III). T ed by heating, for 45 minutes gon was presatu from the soluti was measured h equivalent volu s and solution	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in s. urated with wates ion. The solution by displacement ume of mercury as were brought in	SOURCE AND PURITY OF N 1. Argon. Source to be 99 per of the impuri 2. Water. No in 3. Electrolyte. Stated to be variety". s ESTIMATED ERROR:	not given. Stated cent argon with most ty nitrogen. formation. Source not given.
Gas abs was pro- calcula (Mohr-V tables Tables degasse vacuum The arc vapor volume of an of the gas contac relativ stirred	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III). T ed by heating, for 45 minutes gon was presatu from the soluti was measured h equivalent volu s and solution t. The gas-lic vely large area d for two hours	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in s. urated with water ion. The solution by displacement ume of mercury as were brought int quid interface, o a, was gently s, although equi-	SOURCE AND PURITY OF N 1. Argon. Source to be 99 per of the impuri 2. Water. No in 3. Electrolyte. Stated to be variety". n s ESTIMATED ERROR: of $\delta T/K = 0.01$ $\delta S/S = 0.01$ (au	not given. Stated cent argon with most ty nitrogen. formation. Source not given. of the "analyzed
Gas abs was pro- calcula (Mohr-V tables Tables degasse vacuum The arg vapor volume of an o the gas contact relativ stirred librium within crease	sorption method epared and its ated from the m Westphal baland in the Interna (Vol. III). T ed by heating, for 45 minutes gon was presatu from the solution tequivalent volution t. The gas-lic vely large area d for two hours m appeared to h a matter of mi in gas volume asured on the a	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in s. urated with water ion. The solution by displacement ume of mercury as were brought in quid interface, o a, was gently s, although equi- be established	SOURCE AND PURITY OF M 1. Argon. Source to be 99 per of the impuri 2. Water. No in 3. Electrolyte. Stated to be variety". n S ESTIMATED ERROR: of $\delta T/K = 0.01$ $\delta S/S = 0.01$ (au	not given. Stated cent argon with most ty nitrogen. formation. Source not given. of the "analyzed

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		Salt Solution	ns (A	queous)	43
COMPONENTS	5:	······································	ORIG	INAL MEASUREMENTS:	
1. Argo	n; Ar; 7440-37	-1	Aker	clof, G.	
2. Wate	r; H <sub>2</sub> O; 7732-1	8-5	<u>J.</u> 2	<u>Am. Chem. Soc</u> . 19	35, <u>57</u> , 1196-1201.
3. Alka	line Earth Met	al Chlorides			
VARIABLES			PREP	ARED BY:	
Salt/		298.15 101.325 (1 atm) 0 - 5.37		T. D. Kit H. L. Cle	
EXPERIMEN	TAL VALUES:				
Т/К	Electrolyte	Argon Solubility	<u></u>	Salt Effect Param	eters
	MOI kg + H <sub>2</sub> O	dm <sup>3</sup> Ar (STP) kg <sup>-</sup> H <sub>2</sub> O		$c_s = (1/m) \log (S^O/S)$	$k_{SX} = (1/m) \log (X^{O}/X)$
Mag	nesium chlorid	e; MgCl <sub>2</sub> ; 7786-30	)-3		
298.15	0.00	0.0332		-0.042	_ 0.064
	3.02 5.02	0.0248 0.0228		0.033	0.053
Cal	cium Chloride;	CaCl <sub>2</sub> ; 10043-52-	-4		
298.15	0.00 2.95	0.0332 0.0216		_ 0.063	- 0.085
	5.37	0.0180		0.050	0.070
Str	ontium Chlorid	le; SrCl <sub>2</sub> ; 10476-8	35-4		
298.15	0.00	0.0332		-	_ 0.124
	2.10 3.56	0.0203 0.0150		0.102 0.097	0.118
Bar	ium Chloride;	BaCl <sub>2</sub> ; 10361-37-2	2		
298.15	0.00 1.25	0.0332 0.0185		_ 0.203	- 0.226
	1.74	0.0141		0.214	0.236
		AUXILIARY	INFO	RMATION	
METHOD/A	PPARATUS/PROCE	DURE :	SOUR	CE AND PURITY OF MAT	CERIALS:
		. The solution	11.		t given. Stated to
calcula		easured density		the impurity nit	rgon with most of rogen.
tables	in the Interna	e) and density tional Critical	2.	Water. No inform	ation given.
		e solution was then boiling in	3.	Electrolytes. So	urces not given.
	for 45 minutes			Stated to be of variety".	
The arg	on gas was pre n water vapor.	saturated with The solution			
volume	was measured b	y displacement me of mercury as			
the gas	and solution	were brought into		IMATED ERROR: $\delta T/K =$	
relativ	ely large area	id interface, of , was gently		6S/S =	0.01 (author)
ibrium	appeared to be	, although equil- established	<b> </b>		······
Within	a few minutes.	The decrease in ed on the attache	×a '	The salt effect p	arameters above
buret s					th respect to the
The sol	ubility value	in water is n coefficient.	·	values were calcu	lated with respect e ionic strength.
In the	electrolyte s	olutions the		to the electrolyt	e ionic strength.
	ity is kg <sup>=1</sup> wa				

r			
COMPONENTS :		ORIGINAL MEASURE	MENTS:
1. Argon; Ar; 7440-37-1		Ben-Naim, A.;	Egel-Thal, M.
2. Water; H <sub>2</sub> O; 7732-18-5	i	J. Phys. Chem	. 1965, <u>69</u> , 3250 - 3253.
3. Lithium Chloride; LiCl;	7447-41-8		
VARIABLES: T/K: 278.15 - 2 Total P/kPa: 101.325 Salt/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 - 1		PREPARED BY:	L. Long
EXPERIMENTAL VALUES: T/K	Electrolyte	Ostwald	Salt Effect Parameter
	mol kg <sup>-1</sup> H <sub>2</sub> O		$k_{\rm s} = (1/m) \log (L^{\rm O}/L)$
278.15	0.0 1.0	48.07 37.01	0.114
283.15	0.0 1.0	43.36 33.83	_ 0.108
288.15	0.0 1.0	39.56 31.25	_ 0.102
293.15	0.0 1.0	36.63 29.19	_ 0.099
298.15	0.0 1.0	34.08 27.47	_ 0.094
	AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURI	₹. <b>:</b>	SOURCE AND PURIT	TY OF MATERIALS:
The apparatus of Ben-Naim			source given.
is used. There is a calibriution vessel which conta:		2. Water. Di	stilled.
degassed solvent. The gas duced wet from a gas bured forces the liquid through amount of gas dissolved is a gas buret.	t. Stirring the gas. The		hloride. Analar grade.
The entire apparatus is in water thermostat.	nmersed in a		
During outgassing a small salt concentration may occ correction for this is mad	cur. No		$\delta m/m = 0.01$ apparatus on ± 0.2 % (authors)
		<u>Trans</u> . Far	aday <u>soc</u> . 1963, <u>59</u> , 2735.

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COMPONENT	S;			ORIGINAL MEASUREMENTS:
l. Argo	on; Ar; 7440-37	-1		Clever, H. L.; Holland, C. J.
2. Wate	ег; H <sub>2</sub> O; 7732-1	8-5		J. <u>Chem</u> . <u>Eng</u> . <u>Data</u> 1968, <u>13</u> , 411 -414.
3. Lith	nium Chloride;	LiCl; 74	47-41-8	
VARIABLES				PREPARED BY:
LiCl/mc	T/K: 296. P/kPa: 101. ol kg <sup>-1</sup> H <sub>2</sub> O: 0	15 - 313 325 (1 - 2.53	.15 atm)	P. L. Long
EXPERIMEN	TAL VALUES:		1	
Т/К	Electrolyte mol kg <sup>-1</sup> H <sub>2</sub> O	No. of Det'n.	Bunser Coeffici a x l	ent $k_s = k_s =$
296.15	0.0 0.4186 1.2311 2.5340	4 5 3	32.3 28.5 ± 0 23.9 ± 0 18.0 ± 0	0.3 0.130 0.3 0.106
308.15	0.0 0.4378 0.6325 1.2581 1.9735	10 3 6 6 3	26.9 ± 0 24.5 ± 0 23.5 ± 0 19.9 ± 0 17.2 ± 0	0.2 0.5 0.5 0.104
313.15	0.0 0.4378 0.9986 1.2311 1.2581	4 3 5 5 4	25.2 ± 0 23.3 ± 0 20.6 ± 0 18.6 ± 0 19.4 ± 0	0.1         0.078           0.4         0.088           0.3         0.107
The con table a to the	mpiler calculat above. Values c values above.	ed indiv of k <sub>sX</sub> =	vidual val (1/m)log	tues of $k_s = (1/m) \log(\alpha^0/\alpha)$ in the $(X^0/X)$ can be obtained by adding 0.015
			AUXILIARY	INFORMATION
METHOD / P	APPARATUS/PROCE	DURE :		SOURCE AND PURITY OF MATERIALS:
of Mark TRUEBOI section The vol	paratus was mod kham and Kobe ( RE tubing of 0, n was used as t lume of argon,	(1). A le 4643 cm the gas b presatu	ength of <sup>2</sup> cross- ouret. rated	<ol> <li>Argon. Matheson Co. Inc. Stated to be 99.99 % argon.</li> <li>Water. Distilled.</li> </ol>
with th	he solvent vapo 1 cm <sup>3</sup> sample of	or, take	n up by	<ol> <li>Lithium Chloride. Either Merck &amp; Co. or J.T.Baker Co. Composition of the solutions determined by a Volhard titration.</li> </ol>
				ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 3$ $\delta \alpha/\alpha = 0.015 - 0.025$
				REFERENCES: 1. Markham, A. E.; Kobe, K. A. <u>J. Am. Chem. Soc</u> . 1941, <u>63</u> , 449.

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COMPONENTS:		ORIGINAL MEA	SUREMENTS:
1. Argon; Ar; 7440-37-	1	Abrosimov.	V. K.; Badelin, V. G.
2. Water; H <sub>2</sub> O; 7732-18		Krestov,	
	5	Izv. Vyssh	. Ucheb. Zaved.,Khim.
3. Lithium Chloride; I	iCl; 7447-41-8	Khim. Tekh	<u>nol</u> . 1976, <u>19</u> , 1381 - 1386.
VARIABLES:	······································	PREPARED BY:	
	.15 - 313.15		A. L. Cramer
P/kPa: 101 LiCl/mol kg <sup>-1</sup> H <sub>2</sub> O: 0	.325 (l atm)	4	A. D. Clamer
EXPERIMENTAL VALUES: T/K		l Argon	Salt Effect Parameter
EXPERIMENTAL VALUES: 17 N	Chloride mol kg <sup>-1</sup> H <sub>2</sub> O	Solubility Asm	$k = (1/C_{\rm SM}) \log (A^{\rm O}/A)$
283.15	$\frac{101 \text{ Kg} - 1120}{0.0}$	<u>41.81</u>	
203120	0.2309	39.36	0.1136
	0.5704	36.37	0.1061
	0.9524	33.31	0.1036
	1.8825	27.20	0.0992
293.15	0.0	34.21	-
275.15	0.1615	22 06	0.0920
	0.1884	32.92	0.0886
	0.4471	31.24	0.0882
	0.9536	28.11	0.0894
	1.3590 1.4690	25.92 25.29	0.0887 0.0893
	1.4030	20122	
303.15	0.0	29.00	-
	0.1098	28.16	0.1163
	0.1605	27.89 26.54	0.1056 0.0977
	0.3942 0.8065	24.43	0.0923
	1.3469	22.24	0.0856
	2.2980	18.42	0.0858
212.15	0.0	25.40	-
313.15	0.0 0.1415	25.00	0.0487
	0.6324	22.73	0.0763
		20.18	0.0788
	1.6011	18.99	0.0789
	2.3751	16.57	0.0781
		INFORMATION	
METHOD / APPARATUS / PROCED	URE:	SOURCE AND F	PURITY OF MATERIALS:
The apparatus and proce sumably based on those Ben-Naim and Baer (1).		No infor	cmation given.
The authors define the argon, A <sub>sm</sub> , as	solubility of		
$A_{sm} = \frac{v^{\circ} (55.51M_{r,1} + \frac{v_{p-p}}{v_{p-p}})}{v_{p-p} + \frac{1000}{v_{p-p}}}$	$C_{sm}M_{r,2})$		
where v <sup>o</sup> = ml Ar at 101 standard conditions, v <sub>p</sub> tion, $\rho_{p-p}$ = solution d	-p = ml solu-	ESTIMATED EN	
M <sub>r,1</sub> and M <sub>r,2</sub> = water a weight, respectively, a	nd salt mol nd C <sub>sm</sub> = salt		A = 0.01 (Compiler)
mol kg <sup>-1</sup> water (55.51 m authors also define $A_{SR}$ 101.325 kPa and standar (55.51 mol $H_2O$ ) <sup>-1</sup> , but the definition it appea should be deleted from	as ml Ar at d contitions if that is ars the 1000	1. Ben-1	Naim, A.; Baer, S. <u>5. Faraday Soc</u> . 1963, <u>59</u> ,
denominator.			
the second se			

	ins (Aqueous)	47
COMPONENTS :	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Akerlof, G.	
2. Water; H <sub>2</sub> O; 7732-18-5	J. Am. Chem. Soc. 1935, 57,1196-12	01.
3. Alkali Metal Chlorides		
VARIABLES:	PREPARED BY:	
T/K: 298.15 P/kPa: 101.325 (1 atm) Salt/mol kg <sup>-1</sup> $H_2$ O: 0 - 6.78	T. D. Kittredge H. L. Clever	
EXPERIMENTAL VALUES:		
T/K Electrolyte Argon Solubilit Mol kg <sup>-1</sup> H <sub>2</sub> O dm <sup>3</sup> Ar kg <sup>-1</sup> H <sub>2</sub> O	y Salt Effect Parameters $k_s = (1/m) \log(S^O/S) k_{sX} = (1/m) \log(X)$	/x)
Lithium chloride; LiCl; 7447-41-8		
298.15         0.00         0.0332           3.35         0.0248           6.78         0.0187	0.038 0.053 0.037 0.051	
Sodium Chloride; NaCl; 7647-14-5		
298.15         0.00         0.0332           3.23         0.0216           5.98         0.0149	0.058 0.073 0.058 0.072	
Potassium Chloride; KCl; 7447-40-	7	
298.15         0.00         0.0332           3.00         0.0220           4.55         0.0174	0.060 0.074 0.062 0.076	
	( INFORMATION	
METHOD/APPARATUS/PROCEDURE: Gas absorption method. The solution was prepared and its concentration calculated from the measured density (Mohr-Westphal balance) and density tables in the International Critical Tables (Vol. III). The solution was degassed by heating, then boiling in vacuum for 45 minutes.	Stated to be of the "analyzed	
The argon was presaturated with water vapor from the solution. The solution volume was measured by displacement o an equivalent volume of mercury as th gas and solution were brought into contact. The gas-liquid interface, of relatively large area, was gently stirred for two hours, although equil ibrium appeared to be established wit in a matter of minutes. The decrease in gas volume due to solution was measured on the attached buret system The solubility values were reported a	f e ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta S/S = 0.01$ (author) h The salt effect parameters above were calculated from electrolyte	
dm <sup>3</sup> Ar (STP) kg <sup>-1</sup> water. This is equivalent to the Kuenen coefficient when water alone is the solvent.	s molality. The author's values were calculated from electrolyte ionic strength.	!

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8	Argon Solubilitie	
COMPONENTS:		ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7		Morrison, T. J.; Johnstone, N. B. B.
2. Water; H <sub>2</sub> O;	7732-18-5	
3. Electrolytes	3	<u>J</u> . <u>Chem</u> . <u>Soc</u> . 1955, 3655 - 3659.
VARIABLES:		PREPARED BY:
T/K: 29	98.15	g T. D. Kittredge March 1978
EXPERIMENTAL VALUES:	:	
		$g(S^{\circ}/S)  k_{SX} = (1/m)\log(X^{\circ}/X)$
		e; LiCl; 7447-41-8
	298.15 0.096	
		; NaCl; 7647-14-5
	298.15 0.133	
		e; KI; 7681-11-0
	298.15 0.108	0.123
	AUXILIARY	INFORMATION
ME THOD :	AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS:
	AUXILIARY in a flow system.	SOURCE AND PURITY OF MATERIALS:
		SOURCE AND PURITY OF MATERIALS:
		SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd.
		SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information
Gas absorption	in a flow system.	SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information
Gas absorption	in a flow system.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information given. ESTIMATED ERROR:</pre>
Gas absorption APPARATUS/PROCEDURE The previously	in a flow system.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information given. ESTIMATED ERROR:</pre>
Gas absorption APPARATUS/PROCEDURE The previously in a thin film ral through the	in a flow system. : degassed solvent flows in an absorption spi- solvent vapor satu-	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information given. ESTIMATED ERROR:</pre>
Gas absorption APPARATUS/PROCEDURE The previously in a thin film ral through the rated gas at a atmosphere. Vo	in a flow system. : degassed solvent flows in an absorption spi-	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. British Oxygen Co. Ltd. 2. Water. No information given. 3. Electrolytes. No information     given. ESTIMATED ERROR:</pre>

		Sal	t Solutic	ons (Aque	eous)			49
COMPONENTS:				ORIGIN	AL MEASU	REMENTS:		
1. Argon	n; Ar; 7440-37-	-1				L.; Holla	nd, C. J	•
2. Water	; H <sub>2</sub> 0; 7732-18	3-5		J.	Chem. E	Ing. Data 1	968, <u>13</u> ,	411-414
3. Alkal	i Metal Chlor:	ides			•			
	T/K: 303.15			PREPA	RED BY:			
	<sup>'</sup> kPa: 101.325 kg <sup>-1</sup> H <sub>2</sub> O: 0					P. L. Long		
Salt/mol	kg H <sub>2</sub> U: U	- 2.11						
EXPERIMENTA								
T/K	Electrolyte				$\frac{s}{k} =$	alt Effect	Paramet	.ers
	mol kg <sup>-1</sup> H <sub>2</sub> O	200	α	x 10 <sup>3</sup>	<sup>75</sup> (1/0	C) log ( $\alpha^{0}/\alpha$ )	<sup>s</sup> (1/m)1	.og (α <sup>0</sup> /α)
Soc	lium Chloride;	NaCl; 7						
303.15	0.0	4	28.8	+ 0.3		-	-0.1	
	0.583 1.0337	3 3 3	24.5	+ 0.3			0.1	29
	2.1119	3	15.6	<del>I</del> 0.0	0 127	(authors)	0.132	
					0.127	(auchors)	0.100	, a a o no e o ,
	assium Chlori	-				_	-	_
303.15	0.0 0.3702	4 4 4 4	28.8	$\frac{+}{+}$ 0.3 $\frac{+}{+}$ 0.4		-	0.1	
	0.7627 1.0210	4	22.3	$\frac{1}{10.4}$			0.1 0.1	
	1.6778	4	18.2	$\pm$ 0.1		<i>.</i>	0.1	119
					0.125	(authors)	0.130	(authors)
		A	UXILIAR	Y INFORM	1ATION			
	PARATUS/PROCED					RITY OF MATER		
The app	aratus was mod ham and Kobe (	eled aft	er tha Length	it 1.	Argon. to be 9	Matheson ( 9.9 % argon	Co. Inc.	Stated
	BORE tubing of		-			Distilled		
cross-s	ection was use	ed as the	e gas	3.	Alkali	Metal Chlo	rides.	Either
buret. saturat	The volume of ed with the so	argon, lvent va	pre- por,		Merck & Composi	Co. or J. tion of th	T. Bake: e soluti	r Co. ons
taken u	p by a 103.1 c	m <sup>3</sup> sampl			determi	ned by a V	olhard t	itration.
the sol	vent was measu	red.						
				ESTIN	ATED ERR	OR:		
						δт/К =		
ļ.						δP/mmHg = δα/α =	3 0.015 -	0.025
1				DEPEN	ENGUG			
					RENCES: Markham	1, A. E.; K	obe, K.	А.
					<u>J. Am</u> .	Chem. Soc.	1941, <u>6</u>	<u>3</u> , 449.
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50	Argon Solu	bilities up to 200 kPa
COMPONENTS :		ORIGINAL MEASUREMENTS:
l. Argon; An	c; 7440-37-1	Eucken, A.; Hertzberg, G.
2. Water; H	20; 7732-18-5	<u>Z. physik</u> . <u>Chem</u> . 1950, <u>195</u> , 1 - 23.
3. Sodium Ch	nloride; NaCl; 7647-14-	5
VARIABLES : T/F	<: 273.15 - 293.15	PREPARED BY: P. L. Long
EXPERIMENTAL VA	LUES:	
<u> </u>	r/K Sodium Chloride	Ostwald Setschenow Constant
	mol kg <sup>-1</sup> H <sub>2</sub> O	Coefficient L $k = (1/m) \log (L^O/L)$
273	3.15 0.0 0.43 1.005 1.07 2.26 3.46	$\begin{array}{c ccccc} 0.0526 & (L^{O}) & - \\ 0.0443 & 0.172 \\ 0.0343 & 0.183 \\ 0.0337 & 0.178 \\ 0.0208 & 0.178 \\ 0.0147 & 0.180 \end{array}$
293	3.15 0.0 0.54 1.13 1.91	0.0361 (L <sup>O</sup> ) – 0.0297 0.157 0.0241 0.156 0.0183 0.154
	AUXILI	ARY INFORMATION
METHOD /APPARA	TUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas absorp consists of sorption fla capillary tu is shaken. T 2 m long gla gas is measu the gas bure difference f	tion. The apparatus a gas buret and an ab- sk connected by a be. The whole apparatus the capillary tube is a ss helix. An amount of ared at STP and placed t. After shaking, the from the original amount of in the gas buret is	Components. No information given.
		ESTIMATED ERROR: $\delta L/L = 0.01$
		REFERENCES :

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Ben-Naim, A.; Egel-Thal, M.		
2. Water; H <sub>2</sub> O; 7732-18-5	J. Phys. Chem. 1965, 69, 3250-3253.		
3. Sodium Chloride; NaCl; 7647-14-5			
VARIABLES:	PREPARED BY:		
T/K: 278.15 - 298.15 Total P/kPa: 101.325 (l atm)	P. L. Long		
Salt/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 - 1			
EXPERIMENTAL VALUES:			
T/K Electrolyte Ostv	-		
mol kg <sup>-1</sup> H <sub>2</sub> O Coeffi			
278.15 0.0 48. 1.0 33.			
	36 - 44 0.154		
288.15 0.0 39 1.0 28			
293.15 0.0 36 1.0 26			
298.15 0.0 34 1.0 24			
AUXILIARY INFORMATION			
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus of Ben-Naim and Baer	1. Argon. No source given.		
(1) is used. There is a calibrated dissolution vessel which contains the			
degassed solvent. The gas is intro-			
duced wet from a gas buret. Stirring forces the liquid through the gas. The amount of gas dissolved is mea- sured on a gas buret.	3. Sodium Chloride. Analar grade.		
The entire apparatus is immersed in a water thermostat.			
During outgassing a small change in	ESTIMATED ERROR:		
salt concentration may occur. No correction for this is made.	$\delta m/m = 0.01$		
	Overall apparatus precision <u>+</u> 0.2% (authors)		
	REFERENCES :		
	1. Ben-Naim, A.; Baer, S. <u>Trans</u> . <u>Faraday</u> <u>Soc</u> . 1963, <u>59</u> , 2735.		

COMPONENTS :			ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1		Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.	
2. Water; H <sub>2</sub> O; 77	32-18-5		Tay Wyagh Hebeb Zovel White
3. Sodium Chlori	de; NaCl; 7647	-14-5	Izv. Vyssh. Ucheb. Zaved.,Khim. Khim. Tekhnol. 1976, 19, 1381 - 1386.
VARIABLES:			PREPARED BY:
т/к: 283	.15 - 313.15 .325 (1 atm) : 0 - 2.9485		A. L. Cramer
EXPERIMENTAL VALUES:			
т/к	Sodium Chloride mol kg <sup>-1</sup> H <sub>2</sub> O	Argon Solub A <sub>S</sub>	bility
283.15	0.0 0.2347 0.4414 0.9652 1.5892 2.1864	41.8 38.4 35.7 30.2 25.1 20.9	46       0.1545         72       0.1549         22       0.1461         11       0.1393
293.15	0.0 0.0439 0.2119 0.4081 1.2487 1.6829 2.9485	34.2 33.5 31.8 30.2 24.2 21.1 15.1	50       0.2075         89       0.1439         29       0.1295         20       0.1204         15       0.1241
303.15	0.0 0.1071 0.2350 0.4228 0.9094 2.4000	29.0 28.0 27.0 25.5 22.3 15.0	00 0.1423 07 0.1273 54 0.1305 33 0.1248
313.15	0.0 0.1553 0.2368 0.5441 1.1234 1.7888	25.4 24.5 24.0 22.0 19.1 16.1	50       0.1009         01       0.1032         02       0.1140         11       0.1100
COMMENTS: The authors define the SOURCE AND PURITY OF MATERIALS: solubility of argon, A <sub>sm</sub> , as			
$ A_{sm} = \frac{v^{O}(M_{r,1}55.51 + C_{sm}M_{r,2})}{v_{p-p} 1000 \rho_{p-p}} $ where $v^{O}$ ml Ar at 101.325 kPa and standard conditions, $v_{p-p} = ml$ solution, $\rho_{p-p} = solution $			
<pre>density, M<sub>r,1</sub> and M<sub>r,2</sub> = water and salt molecular weight, C<sub>sm</sub> = mol <u>salt kg<sup>-1</sup> water</u>.</pre>		ESTIMATED ERROR:	
APPARATUS/PROCEDURE: The apparatus and procedure were Presumably based on those described by Ben-Naim and Baer (1).			
See page 58 for a	dditional comm	ents.	REFERENCES: 1. Ben-Naim, A.; Baer, S. <u>Trans</u> . <u>Faraday</u> <u>Soc</u> . 1963, <u>59</u> , 2735.

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ORIGINAL MEASUREMENTS: Clever, H. L.; Holland, C. J. <u>J. Chem</u> . <u>Eng</u> . <u>Data</u> 1968, <u>13</u> , 411-414.
PREPARED BY: P. L. Long
$ \begin{array}{c c} & & \\ \text{Salt Effect Parameters} \\ \hline \\ \text{ent} & \\ k_{\text{s}}^{\text{s}} & \\ \hline \\ 10^{3} & \\ \hline \\ 1/C) \log(\alpha^{\circ}/\alpha) & \\ \hline \\ \text{s}(1/m) \log(\alpha^{\circ}/\alpha) \\ \hline \\ \end{array} $
0.3 0.4 0.150 0.2 0.133 0.2 0.124 0.126 (authors) 0.132 (authors)
INFORMATION
<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. Inc. Stated to be 99.9 % argon.</li> <li>2. Water. Distilled.</li> <li>3. Sodium Bromide. Either Merck &amp; Co. or J. T. Baker Co. Composi- tion of the solutions determined by a Volhard titration.</li> </ul>
ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 3$ $\delta \alpha / \alpha = 0.015 - 0.025$ REFERENCES: 1. Markham, A. E.; Kobe, K. A. <u>J. Am. Chem. Soc</u> . 1941, <u>63</u> , 449.

Salt Solution	ns (Aqueous) 55
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Reddy, G. S.
2. Water; H <sub>2</sub> O; 7732-18-5	<u>J. Chem</u> . <u>Eng</u> . <u>Data</u> 1963, <u>8</u> , 191 - 192.
3. Sodium Iodide; NaI; 7681-82-5	
VADIAD EC.	
VARIABLES: T/K: 303.15 Total P/kPa: 101.325 (1 atm) Salt/mol dm <sup>-3</sup> : 0 - 6.99	PREPARED BY: S. A. Johnson
EXPERIMENTAL VALUES:	
mol dm <sup>-3</sup> Solubi:	$k_{s} = (1/C)\log(L^{O}/L)$
303.15       0.0       1.         0.782       1.         1.33       1.         2.23       1.         3.56       2.         5.25       3.	.0     -       .350     0.167       .575     0.148       .950     0.130       .605     0.117       .615     0.106       .370     0.092
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was modeled after that of Markham and Kobe (1). A length of TRUEBORE tubing of 0.4643 cm <sup>2</sup> cross- section was used as the gas buret. The volume of argon, presaturated with the solvent vapor, taken up by a 103.1 cm <sup>3</sup> sample of the solvent was measured.	<ol> <li>Water. Distilled.</li> <li>Sodium Iodide. J. T. Baker Analyzed Reagent Grade. Used as</li> </ol>
	ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 3$ $\delta \alpha/\alpha = 0.015 - 0.025$ REFERENCES:
	1. Markham, A. E.; Kobe, K. A. J. <u>Am</u> . <u>Chem</u> . <u>Soc</u> . 1941, <u>63</u> , 449.

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COMPONENTS: 1. Argon; Ar; 7440-37-1 Ben-Naim, A.; Egel-Thal, M.	
I. Argon; Ar; /440-5/~1 Ben-Naim; A., Eger-Indi, M.	
2. Water; H <sub>2</sub> O; 7732-18-5 J. Phys. Chem. 1965, <u>69</u> , 3250	-3253.
3. Sodium Iodide; NaI; 7681-82-5	
VARIABLES: PREPARED BY;	
T/K: 278.15 - 298.15	
Total P/kPa: 101.325 (1 atm) P. L. Long Salt/mol kg <sup>-1</sup> H <sub>2</sub> 0: 0 - 1	
EXPERIMENTAL VALUES: T/K Electrolyte Ostwald Salt Effect Parameter	
	ſ
$ \underbrace{ \text{mol } \text{kg}^{-1} \text{ H}_2 \text{ O } \underbrace{ \text{Coefficient}}_{\text{L x } 10^3} \text{ k}_{\text{s}} = (1/\text{m}) \log (\text{L}^{\circ}/\text{L}) $	
278.15 0.0 48.07 -	
1.0 33.25 0.160	:
283.15 0.0 43.36 -	1
1.0 30.86 0.148	
288.15 0.0 39.56 -	
1.0 28.57 0.141	
1.0 26.90 0.134	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
AUXILIARY INFORMATION	
METHOD / APPARATUS / PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
The apparatus of Ben-Naim and Baer 1. Argon. No source given. (1) is used. There is a calibrated	
dissolution vessel which contains the 2. Water. Distilled.	
degassed solvent. The gas is intro-	ab
duced wet from a gas buret. Stirring 3. Sodium Iodide. Analar gra forces the liquid through the gas.	
The amount of gas dissolved is mea-	
sured on a gas buret.	
The entire apparatus is immersed in a water thermostat.	
During outgassing a small change in	
salt concentration may occur. No	
correction for this is made. $\delta m/m = 0.01$	
Overall apparatus precision +	0.2%
(authors)	
(authors) REFERENCES: 1. Ben-Naim, A.; Baer, S. <u>Trans. Faraday Soc</u> . 1963, 2735.	<u>59</u> ,
REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963,	<u>59</u> ,
REFERENCES: 1. Ben-Naim, A.; Baer, S. <u>Trans. Faraday</u> <u>Soc</u> . 1963,	<u>59</u> ,

Salt Solutions (Aqueous)

	Salt Solution	is (Aq	ueous)		57
COMPONENTS:		ORIGI	NAL MEAS	UREMENTS :	
1. Argon; Ar; 7440-37-1	Cle	ver, H.	L.; Holla	nd, C. J.	
2. Water; H <sub>2</sub> O; 7732-18-5		J.	Chem. E	Ing. Data l	968, <u>13</u> , 411-414.
3. Sodium Iodide; NaI; 7681-8	32-5			······································	
VARIABLES:		PREPA	RED BY:		
VARIABLES: T/K: 296.15 - 313.1 Total P/kPa: 101.325 (1 atm)	) ·			P. L. Lon	g
Nal/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 - 3.8766					-
		L			
EXPERIMENTAL VALUES: T/K Electrolyte No. of	Bunser			valt Effort	Parameters
T/K Electrolyte No. of mol kg <sup>-1</sup> H <sub>2</sub> O Det'n.	Coeffici		k_=	AIL EILECL	$k_{s}^{=}(1/m)\log(\alpha^{0}/\alpha)$
mor kg H <sub>2</sub> 0	<u>α x</u> ]	L0 <sup>3</sup>	<sup>s</sup> (1/c	$2) \log (\alpha^{\circ} / \alpha)$	$\frac{1}{m}\log(\alpha^{\prime}/\alpha)$
296.15 0.0 -	32.3			_	-
0.6712 7	26.1 + 0	0.4			0.138 0.148
1.0773 3 2.2264 3	22.4 + 0 15.5 + 0	).4 ).1			0.143
			0.143	(authors)	0.155 (authors)
303.15 0.0 4	28.8 + (	0.3		-	-
303.15         0.0         4           0.5016         4           1.0840         3	24.1 + (20.9 + (20.9))	0.5			0.154 0.128
2.0180 5	15.2 + (	0.3			0.138
3.8766 5	8.3 <u>+</u> (	0.3	0 138	(authors)	0.139 0.155 (authors)
			0.100	(aachor b)	01200 (0000000)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	25.2 + 0 20.4 + 0	0.3		-	0.137
1.0773 3	17.7 + (	0.1			0.142
2.2264 3	12.6 $\pm$	0.1	0.136	(authors)	0.135 0.147 (authors)
				(4401010)	
	AUXILIARY	INFOR	MATION		
METHOD / APPARATUS / PROCEDURE:		SOUR	CE AND PI	URITY OF MATE	CRIALS:
The apparatus was modeled af	ter that		Argon.	Matheson	Co. Inc. Stated
of Markham and Kobe (1). A				99.9 % argo	
TRUEBORE tubing of 0.4643 cm section was used as the gas	cross-			Distilled	
The volume of argon, presatu	rated	3.	Co. or	J. T. Bake	Lither Merck & er Co. Composi-
with the solvent vapor, take			tion of	f the solut	ions determined
a 103.1 cm <sup>3</sup> sample of the so measured.	lvent was		by a ve	olhard tit	ration.
		{			
		ESTI	MATED ER	ROR:	
				δт/к =	
				$\delta P/mmHg = \delta \alpha / \alpha =$	3 0.015 - 0.025
1					
			RENCES :		
		1.	Markha	m, A. E.; 1	Kobe, K. A.
			<u>J</u> . <u>Am</u> .	Chem. Soc	. 1941, <u>63</u> , 449.
		1			
		1			
		1			

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COMPONENTS :		ORIGINAL MEASUR	REMENTS:
1. Argon; Ar; 7440-37-1		Abrosimov, Krestov,	V. K.; Badelin, V. G.; G. A.
2. Water; H <sub>2</sub> O; 7732-18-5			
3. Sodium Iodide; NaI; 7681-82-5		<u>Khim</u> . <u>Tekhn</u>	<u>Uchebn.</u> <u>Zaved.,Khim</u> . <u>ol</u> . 1976, <u>19</u> , 1381 - 1386.
VARIABLES: T/K: 283.	15 - 313.15 325 (1 atm)	PREPARED BY:	A. L. Cramer
NaI/mol kg <sup>-1</sup> $H_2^{0:0}$ 0 -	2.3242		A. D. Clandi
EXPERIMENTAL VALUES: T/K	Sodium	Argon	Salt Effect Parameter
	Iodide mol kg <sup>-1</sup> H <sub>2</sub> O	Solubility	$k = (1/C_{1}) \log (A^{\circ}/A)$
283,15	$\frac{101 \text{ kg} - 120}{0.0}$	A <sub>sm</sub> 41.81	$k = (1/C_{sm}) \log (A^{\circ}/A)$
203.13	0.1508	39.63	0.1542
	0.3171	37.51	0.1486
	0.5890 0.8504	34.54 31.86	0.1408 0.1388
	2.3242	20.47	0.1334
293.15	0.0	34.21	-
[	0.0962	33.61	0.1839
	0.2397	32.15	0.1283
	0.5680 0.9824	29.18 26.31	0.1216 0.1161
}	1.2376	24.36	0.1192
	1.9359	20.41	0.1159
303.15	0.0	29.00	_
	0.1085	28.20	0.1120
	0.1972 0.5030	27.39 25.32	0.1258 0.1172
	0.8579	23.28	0.1112
	2.0872	17.69	0.1029
313.15	0.0	25.40	_
	0.1285	24.94	0.0618
	0.2969 0.5567	24.01 22.78	0.0823 0.0849
	1.2626	19.57	0.0897
	1.7716	17.41	0.0922
	AUXILIARY	INFORMATION	
METHOE / APPARATUS / PROCEDUR	E:	SOURCE AND PUR	ITY OF MATERIALS:
The apparatus and procedu sumably based on those de Ben-Naim and Baer (1, 2).		No informati	ion given.
The authors define the so argon, A <sub>sm</sub> , as	lubility of		
$v^{\circ}$ (55.51 $M_{r,1}$ +	C <sub>sm</sub> M <sub>r,2</sub> )		
$A_{sm} = \frac{v^{\circ} (55.51 M_{r,1} + v_{p-p})}{v_{p-p} 1000 \rho}$		1	
p-p 1000 p	p-p		
where $v^{\circ} = ml$ Ar at 101.3 standard conditions, $v_{p-p}$	= ml solu-	ESTIMATED ERRO	R:
tion, $\rho_{p-p} = $ solution den	sity, g ml <sup>-1</sup> ,	δA/A =	0.01 (Compiler)
$M_{r,1}$ and $M_{r,2}$ = water and			-
weight, respectively, and	$C_{sm} = salt$	REFERENCES :	
mol kg <sup>-1</sup> water (55.51 mol	water). The		
authors also define A <sub>sm</sub> a 101.325 kPa and standard	s ml Ar at	ll. Ben-Nair	n, A.; Baer, S. Faraday <u>Soc</u> . 1963, <u>59</u> ,
$(55.51 \text{ mol } H_20)^{-1}$ , but i	f that is	2735.	<u>uruuuy</u> <u>boo</u> . 1903, <u>55</u> ,
the definition it appears	the 1000	1	/a, K. M.; Krestov, G. A.
should be deleted from th denominator.	e equation	Zh. Fiz.	<u>Khim</u> . 1970, <u>44</u> , 1835.
denominator .			

COMPONENTS	S:		ORIGI	NAL MEASUREMENTS	:	
1. Argon; Ar; 7440-37-1			Aker	lof, G.		
2. Water; H <sub>2</sub> O; 7732-18-5			<u>J.</u> <u>A</u>	m. Chem. Soc.	1935, <u>5</u>	57, 1196-1201.
3. Sodi	.um Nitrate; Na	aNO <sub>3</sub> ; 7631-99-4				
		5				
VARIABLES	•		PREPA	RED BY:		
	Т/К:	298.15		T. D. K	littredg	je
Salt/	P/kPa: mol kg <sup>-1</sup> H <sub>2</sub> O:	101.325 (1 atm) 0 - 7.37		H. L. C	lever	
	TAL VALUES:			, ,		
T/K	Electrolyte	Argon Solubility	7 S	alt Effect Par	ameters	3
·	Mol $kg^{-1}H_2O$	dm <sup>3</sup> Ar (STP) kg	·1			
<u> </u>		<sup>H</sup> 2 <sup>O</sup>	— <u> </u>	$s = (1/m) \log(s^2)$	$\frac{\kappa_{sX}}{\kappa_{sX}}$	$x = (1/m) \log (X^0/2)$
298.15	0.00	0.0332		-		-
	3.51 7.37	0.0204		0.060		0.075
	/.3/	0.0123		0.059		0.073
		AUXILIARY	INFOR	MATION		
METHOD/A	PPARATUS/PROCE				MATERIAL	.5 :
Gas abs was pre calcula (Mohr-W	pared and its ted from the m estphal balance	EDURE: 1. The solution concentration measured density ce) and density	SOUR 1.	CE AND PURITY OF Argon. Source to be 99 per of the impur:	ce not q cent an ity nitm	given. Stated rgon with most rogen.
Gas abs was pre calcula (Mohr-W tables Tables	orption method pared and its ted from the m estphal baland in the Interna (Vol. III).	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was	SOUR 1. 2.	CE AND PURITY OF Argon. Source to be 99 per of the impur:	ce not q cent an ity nitm	given. Stated rgon with most rogen.
Gas abs was pre calcula (Mohr-W tables Tables degasse	orption method pared and its ted from the m estphal baland in the Interna (Vol. III).	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a	SOUR 1. 2.	CE AND PURITY OF Argon. Source to be 99 per of the impuri Water. No in Electrolyte. Stated to be	ce not g cent an ity nitu nformati Source	given. Stated rgon with most rogen. ion. e not given.
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg	orption method pared and its ted from the m 'estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a s. urated with water	SOUR 1. 2. 3.	CE AND PURITY OF Argon. Sourd to be 99 per of the impur: Water. No in Electrolyte.	ce not g cent an ity nitu nformati Source	given. Stated rgon with most rogen. ion. e not given.
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu rom the soluti was measured b	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a s. mated with water ion. The solution by displacement of	SOUR 1. 2. 3.	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety".	ce not g cent an ity nitu nformati Source	given. Stated rgon with most rogen. ion. e not given.
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume an egui	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu rom the soluti was measured h valent volume	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a s. urated with water ion. The solution by displacement of of mercury as the	SOUR 1. 2. 3.	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety".	ce not o cent ar ity nitr nformati Source of the	given. Stated rgon with most rogen. ion. e not given.
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume an equi gas and contact	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu rom the soluti was measured valent volume solution were . The gas-lice	EDURE: d. The solution concentration measured density se) and density ational Critical The solution was then boiling in a s. mated with water ion. The solution by displacement of of mercury as the brought into quid interface, of	SOUR 1. 2. 3. ESTI	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety". MATED ERROR: δT/K =	cent of cent ar ity nitr nformati Source of the 0.01	given. Stated rgon with most rogen. ion. e not given. "analyzed
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume an equi gas and contact relativ stirred	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu rom the soluti was measured h valent volume . The gas-lic ely large area for two hours	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a s. urated with water ion. The solution by displacement of of mercury as the brought into guid interface, or a, was gently s, although equil-	SOUR 1. 2. 3. ESTI	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety". MATED ERROR: δT/K =	ce not o cent ar ity nitr nformati Source of the	given. Stated rgon with most rogen. ion. e not given. "analyzed
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume an equi gas and contact relativ stirred ibrium	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). T d by heating, for 45 minutes on was presatu rom the soluti was measured h valent volume solution were ely large area for two hours appeared to be	EDURE: The solution concentration measured density te) and density ational Critical The solution was then boiling in a s. mated with water ion. The solution by displacement of of mercury as the brought into quid interface, of a, was gently s, although equil- e established with	SOUR 1. 2. 3. ESTI	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety". MATED ERROR: δT/K =	cent of cent ar ity nitr nformati Source of the 0.01	given. Stated rgon with most rogen. ion. e not given. "analyzed
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f volume an equi gas and contact relativ stirred ibrium in a ma in gas	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatured was measured h valent volume solution were to The gas-lice ely large area for two hours appeared to be tter of minute volume due to	EDURE: d. The solution concentration measured density ce) and density ational Critical The solution was then boiling in a s. urated with water ion. The solution by displacement of of mercury as the brought into guid interface, or a, was gently s, although equil- e established with es. The decrease solution was	SOUR 1. 2. 3. EESTI	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety". MATED ERROR: $\delta T/K = \delta S/S =$	cent of cent ar ity nitr nformati Source of the 0.01	given. Stated rgon with most rogen. ion. e not given. "analyzed
Gas abs was pre calcula (Mohr-W tables Tables degasse vacuum The arg vapor f vapor f vapor f vapor f vapor f vacuum contact relativ stirred ibrium in a ma measure	orption method pared and its ted from the m estphal baland in the Interna (Vol. III). 7 d by heating, for 45 minutes on was presatu rom the solution was measured h valent volume solution were to the gas-lic ely large area for two hours appeared to be tter of minute volume due to ad on the attac	EDURE: d. The solution concentration measured density te) and density ational Critical The solution was then boiling in a s. urated with water ion. The solution by displacement of of mercury as the brought into guid interface, or a, was gently s, although equil- e established with es. The decrease	SOUR 1. 2. 3. ESTI REFE	CE AND PURITY OF Argon. Source to be 99 per of the impur: Water. No in Electrolyte. Stated to be variety". MATED ERROR: $\delta T/K = \delta S/S =$	cent of cent ar ity nitr nformati Source of the 0.01	given. Stated rgon with most rogen. ion. e not given. "analyzed

Argon Solubilities up to 200 kPa

COMPONEN	TS:		i	ORIGINAL MEASUREMENTS:			
l. Argo	on; Ar; 7	440-37-1		Shoor, S. K.; Walke Gubbins, K. E.	r, R. D. Jr.;		
2. Water; H <sub>2</sub> O; 7732-18-5							
3. Pota	assium Hy	droxide; KOH	; 1310-58-3	<u>J. Phys</u> . <u>Chem</u> . 1969	, <u>/3</u> , 312 - 317.		
VARIABLE	S:	······································		PREPARED BY:			
	P/kP	K: 298.15 - a: 101.325 %: 0 - 41.40	(l atm)	P. L. L H. L. C	-		
EXPERIME	NTAL VALUE	S:			·····		
		m Hydroxide	Mol Fractio	on Solubility Ratio	Salt Effect		
	Wt %	mol dm <sup>-3</sup>	$Ar/X_1 \times 10^{-1}$	$\gamma = X^{0}/X$	Parameter $k_s = (1/C) \log (X^O/X)$		
298.15	0.0	0.0	0.0253	1.00	-		
	5.00	0.92		1.56	0.210		
	13.50	2.67		3.18 7.68	0.188 0.177		
ł	23.00 32.40	5.00 7.60		22.8	0.179		
	41.40	10.37		70.3	0.178		
					0.179 (authors)		
313.15	0.0	0.0	0.0200	1.00	-		
	5.00	0.92		1.48	0.185		
	13.50	2.67 5.00		2.81 6.93	0.168 0.170		
	23.00 41.40	10.37		58.2	0.168		
	41.40	10.37		50.2	0.168 (authors)		
333.15	0.0	0.0	0.0168	1.00	_		
	5.00	0.92		1.40	0.159		
	13.50	2.67		2.59	0.155		
	23.00	5.00		5.85	0.153		
	31.61	7.35		14.5	0.158 0.160		
	41.40	10.37		46.1	0.158 (authors)		
353.15	0.0	0.0	0.0152	1.00	-		
	5.00	0.92		1.32	0.131		
	13.50	2.67		2.48	0.148		
	23.00	5.00		5.57	0.149		
	31.61 40.70	7.35 10.15		13.4 30.0	0.153 0.146		
	40.70	10.15					
	2222200000	(DDOORDURP)	AUXILIARY	INFORMATION	0.148 (authors)		
METHODY A	PPARATUS,	/PROCEDURE:		SOURCE AND PURITY OF MA			
(1). Al	l analyse	raphic metho es were made	with a	1. Argon. Source no purity 99.99 %.	t given. Minimum		
helium	as the c	ivity detect arrier gas. ions were pr	The argon	2. Water. Distilled glass-teflon sti	and degassed in		
bubblin	ig the ga	s through pr	esaturators	-			
and the	en through	h the KOH so	lution.	3. Potassium Hydrox	ide. Baker Anal-		
Samples	were dr	awn from the	solution	yzed Reagent Gra	de. Contained a		
over a	48 hour	period to de	termine	maximum of 1 % K	protected from atm		
	or not	equilibrium s were trans	was estab-				
lished.	urator t	o the gas ch	romato-	2			
graph i	in gas ti	ght Hamilton	syringes.	ESTIMATED ERROR:			
				ለጥ / ሦ	= 0.05		
The res	sults ar	e reported a	s activity		= 0.05		
coertic	ments, W	hich are the lity ratio,	$\chi^0/\chi$ . where		•··-		
X <sup>o</sup> is t	the argon	mole fracti	on solubil-	REFERENCES :			
ity in	water an	d X is the a	rgon mole				
fractio	on solubi	lity in the	aqueous	1. Gubbins, K. E.;	Carden, S. N.;		
		oth at a gas		Walker, R. D. Jr J. Gas Chromatoc	. 1965 3 98		
-		tm. Solubili		J. Gas chromator	<u>1</u> , 1), <u>1</u> , <u>1</u>		
		to l atm ass obeyed. The					
		e the averag					
		urements.					
_					and the second secon		

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COMPONENTS: 1. Argon; Ar; 744	0-37-1	1	MEASUREMENTS: aim, A.; Egel-Thal, M.	
2. Water; H <sub>2</sub> O; 77	32-18-5	<u>J.</u> <u>Ph</u>	<u>ys. Chem</u> . 1965, <u>69</u> , 3250-3253.	.
3. Potassium Chlo	ride; KCl; 7447-40-7			
VARIABLES: T/K: 278 Total P/kPa: 101 Salt/mol kg <sup>-1</sup> H <sub>2</sub> O		PREPAREI	D BY: P. L. Long	
EXPERIMENTAL VALUES:				
T/K	mol ka-1 H O Coeff	wald icient 10 <sup>3</sup>	Salt Effect Parameter k <sub>s</sub> = (1/m)log(L <sup>O</sup> /L)	
278.15		.07	 0.153	
283.15		.36	0.144	
288.15	1.0 28	.56	0.137	
293.15	1.0 27	.63	0.132	
298.15		.08	0.126	
	AUXILIARY	INFORMAT	TION	
METHOD / APPARATUS / P	ROCEDURE:	SOURCE	AND PURITY OF MATERIALS;	
The apparatus of (1) is used. The	Ben-Naim and Baer re is a calibrated	1	gon. No source given.	
degassed solvent. duced wet from a forces the liquid	I which contains the The gas is intro- gas buret. Stirring through the gas. dissolved is mea- ret.		ter. Distilled. tassium Chloride. Analar grad	de.
1 -	tus is immersed in a	1		
During outgassing salt concentratio correction for th		ESTIMAT	ED ERROR: $\delta m/m = 0.01$	
		Overal (autho	l apparatus precision <u>+</u> 0.2%	
		REFEREN	ICES :	
		Tr	n-Naim, A.; Baer, S. <u>ans. Faraday Soc</u> . 1963, <u>59</u> , 35.	

62	Argon So	olubilitie	es up to 20	00 kPa
COMPONENTS:				MEASUREMENTS:
1. Argon; Ar; 744	1. Argon; Ar; 7440-37-1			im, A.; Egel-Thal, M.
2. Water; H <sub>2</sub> O; 7732-18-5			J. Phy	<u>s. Chem</u> . 1965, <u>69</u> , 3250-3253.
3. Potassium Brom 7758-02-3	ide; KBr;			
VARIABLES:	15 - 298.15		PREPARED	BY:
Total P/kPa: 101.	325 (l atm)		- -	P. L. Long
Salt/mol kg <sup>-1</sup> H <sub>2</sub> O:	0 - 1			······································
EXPERIMENTAL VALUES:				
T/K	Electrolyte mol kg <sup>-1</sup> H <sub>2</sub> O	Coefi	wald icient	Salt Effect Parameter k <sub>s</sub> = (1/m)log(L <sup>0</sup> /L)
			<u>&lt; 10<sup>3</sup></u>	
278.15	0.0 1.0		3.07 1.07	0.150
283.15	0.0		3.36	-
	1.0		1.24	0.142
288.15	0.0 1.0		9.56 3.94	0.136
293.15	0.0 1.0		5.63 7.11	0.131
298.15	0.0 1.0		4.08 5.57	0.125
	AUX	ILIARY	INFORMATI	ION
METHOD /APPARATUS/PR	OCEDURE:		SOURCE A	ND PURITY OF MATERIALS:
The apparatus of B		er	1	on. No source given.
(1) is used. Ther	e is a calibra	ted	2 10-4	er. Distilled.
dissolution vessel degassed solvent. duced wet from a g forces the liquid The amount of gas sured on a gas bur	The gas is in as buret. Sti through the ga dissolved is m	tro- rring s.	3. Pot	assium Bromide. Analar grade.
The entire apparat water thermostat.	us is immersed	in a		
During outgassing salt concentration	may occur. N	in No	ESTIMATE	D ERROR:
correction for thi	s is made.		Overal (autho	$\delta m/m = 0.01$ 11 apparatus precision <u>+</u> 0.2% prs)
			REFERENC 1. Ber Tra	·

Salt Solutions (Aqueous)

	ons (Aqueous) 63
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.
2. Water; H <sub>2</sub> O; 7732-18-5	Izv. Yyssh. Ucheb. Zaved.,Khim.
3. Potassium Bromide; KBr; 59141-09-2	
VARIABLES:	PREPARED BY:
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm)	A. L. Cramer
KBr/mol kg <sup>-1</sup> $H_20: 0 - 2.1465$	
EXPERIMENTAL VALUES: T/K Potassium	Argon Salt Effect Parameter
Bromide mol kg <sup>-1</sup> H <sub>2</sub>	Solubility O $A_{sm} \cdot k = (1/C_{sm}) \log (A^{\circ}/A)$
283.15 0.0	41.81 -
0.1434 0.2030	40.00 0.1340 39.09 0.1439
0.2030	35.49 0.1317
1.2605	29.26 0.1230
2.1465	24.08 0.1116
293.15 0.0	34.21 -
0.0917 0.2095	33.45 0.1348 32.52 0.1050
0.4939	
0.9766	26.72 0.1099
1.8581	21.95 0.1037
303.15 0.0	29.00 <del>-</del>
0.1013	
0.1880 0.5859	27.57 0.1168 25.01 0.1097
1.1486	22.17 0.1015
1.9871	18.58 0.0973
313.15 0.0	25.40 -
0.1277	25.01 0.0526
0.5811 0.6173	22.46 0.0919 22.42 0.0878
1.1488	20.22 0.0862
1.9362	17.21 0.0873
AUXILIARY	INFORMATION
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus and procedure were pre- sumably based on those described by Ben-Naim and Baer (1, 2).	No information given.
The authors define the solubility of argon, $A_{sm}$ , as	
$v^{\circ} (55.51M_{r,1} + C_{sm}M_{r,2})$	
$A_{sm} = \frac{v^{\circ} (55.51M_{r,1} + C_{sm}M_{r,2})}{v_{p-p} 1000 \rho_{p-p}}$	
where $v^{\circ} = ml$ Ar at 101.325 kPa and standard conditions, $v_{p-p} = ml$ solu-	ESTIMATED ERROR:
tion, $\rho_{p-p} = $ solution density, g ml <sup>-1</sup>	$\delta A/A = 0.01$ (Compiler)
$M_{r,1}$ and $M_{r,2}$ = water and salt mol	
weight, respectively, and $C_{sm} = salt$	DEPERTURING
mol $kg^{-1}$ water (55.51 mol water). The	REFERENCES:
authors also define A <sub>sm</sub> as ml Ar at 101.325 kPa and standard conditions	1. Ben-Naim, A.; Baer, S.
$(55.51 \text{ mol } H_2O)^{-1}$ , but if that is	Trans. Faraday Soc. 1963, 59,
the definition it appears the 1000	2735.
should be deleted from the equation denominator.	2. Patsatsiya, K. M.; Krestov, G. A.
	<u>Zh. Fiz. Khim</u> . 1970, <u>44</u> , 1835.

Argon Solubilities up to 200 kPa

64	Argon Solu	bilitie	s up to 20	О кРа		
COMPONENTS :	<u></u>		ORIGINAL	MEASUREMENTS:		
l. Argon; Ar; 7440	-37-1	Ben-Naim, A.; Egel-Thal, M.				
2. Water; H <sub>2</sub> O; 773	2-18-5		J. Phys. Chem. 1965, 69, 3250-325			
3. Potassium Iodid	e; KI; 7681-11-0					
VARIABLES: T/K: 2 Total P/kPa: 1 Salt/mol kg <sup>-1</sup> H <sub>2</sub> O			PREPARED	BY: P. L. Long		
EXPERIMENTAL VALUES:						
т/к	mol kg <sup>-1</sup> H O Co		cient	Salt Effect Parameter k <sub>s</sub> = (1/m)log(L <sup>O</sup> /L)	,	
278.15	0 1 2 4	48. 33. 24. 14.	41 53	0.158 0.146 0.133		
283.15	0 1 2 4	43. 30. 22. 13.	83 91	0.148 0.138 0.127		
288.15	0 1 2 4	39. 28. 21. 12.	68 58	0.140 0.132 0.121		
293.15	0 1 2 4	36. 26. 20. 12.	98 54	0.133 0.126 0.116		
298.15	0 1 2 4	34. 25. 19. 12.	57 68	- 0.125 0.119 0.110		
The sol measure		e th	ne avera	ge of two to three		
	AUXIL	IARY	INFORMATI	ION		
METHOD / APPARATUS / PROC	EDURE :		SOURCE A	ND PURITY OF MATERIALS;		
The apparatus of			]	on. No source given.		
(1) is used. The dissolution vesse			2. Wat	er. Distilled.		
degassed solvent. duced wet from a forces the liquid The amount of gas sured on a gas bu	The gas is intr gas buret. Stirr through the gas. dissolved is mea	ing		assium Iodide. Analar gra	de.	
The entire appara a water thermosta		ln				
During outgassing a small change in salt concentration may occur. No correction for this is made.			ESTIMATE	D ERROR: 5m/m = 0.01		
			Overal (autho	l apparatus precision ± 0.	28	
				-Naim, A.; Baer, S. ns. Faraday Soc. 1963, 59,		
					!	

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COMPONENTS :		ORIGINAL MEASU	REMENTS:
1. Argon; Ar; 7440-37-1		Abrosimov, V Krestov, (	V. K.; Badelin, V. G.; G. A.
2. Water; H <sub>2</sub> O; 7732-18-5		Tau Mussah	Ushaha Round Whim
3. Potassium Iodide; KI;	7681-11-0	Khim. Tekhno	<u>Uchebn</u> . <u>Zaved</u> ., <u>Khim</u> . <u>ol</u> . 1976, <u>19</u> , 1381 - 1386.
VARIABLES:		PREPARED BY:	
T/K: 283.15 P/kPa: 101.325 KI/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 - 2.1	(latm)		A. L. Cramer
EXPERIMENTAL VALUES: T/K	Potassium	Argon	Salt Effect Parameter
	Iodide mol kg <sup>-1</sup> H <sub>2</sub> O	Solubility <sup>A</sup> sm	$k = (1/C_{sm}) \log (A^{\circ}/A)$
283.15	0.0	41.81	
	0.1514	39.80	0.1413
	0.3029 0.5947	38.21 35.69	0.1291 0.1156
	1.2591	29.21	0.1237
	2.1345	23,56	0.1167
293.15	0.0	34.21	
[	0.0750	33.48	0.1249
1	0.0895 0.2907	33.47 31.92	0.1061 0.1035
	0.6015	29.43	0.1087
	1.0722	26.20	0.1081 0.1138
	1.5708	22.67	0.1136
303.15	0.0	29.00	-
	0.1040 0.1815	28.35 27.93	0.0947 0.0900
	0.4245	26.28	0.0814
	0.8670	24.29	0.0888
1	1.7167	19.94	0.0948
313.15	0.0	25.40	_ 0.0567
	0.1001 0.1704	25.07 24.65	0.0764
	0.1804	23.36	0.0757
	1.0151 1.6690	21.42 18.82	0.0767 0.0780
	······································	INFORMATION	
METHOD /APPARATUS/PROCEDUR	E:	SOURCE AND PUR	ITY OF MATERIALS:
The apparatus and procedu sumably based on those de Ben-Naim and Baer (1, 2).	re were pre- scribed by	No informat	cion given.
The authors define the so argon, A <sub>sm</sub> , as	lubility of		
v° (55.51 M <sub>r 1</sub> +	C <sub>sm<sup>M</sup>r.2</sub> )		
$A_{sm} = \frac{v^{\circ} (55.51 M_{r,1} + v_{p-p})}{v_{p-p} 1000 \rho}$	p-p		
where $v^{\circ} = ml$ Ar at 101.3 standard conditions, $v_{p-p}$	= ml solu-	ESTIMATED ERRC	DR:
tion, $\rho_{p-p}$ = solution den M <sub>r,1</sub> and M <sub>r,2</sub> = water and	sity, g ml <sup>-1</sup> , salt mol	δΑ/Α	= 0.01 (Compiler)
weight, respectively, and	C <sub>sm</sub> = salt	REFERENCES :	
mol kg <sup>-1</sup> water (55.51 mol	water). The		
authors also define A <sub>sm</sub> a 101.325 kPa and standard	conditions	1. Ben-Na	aim, A.; Baer, S.
$(55.51 \text{ mol } H_2O)^{-1}$ , but 1	f that is	$\frac{\text{Trans}}{2735}$	. Faraday. Soc. 1963, <u>59</u> ,
the definition it appears	the 1000		tains & M. Proston C
should be deleted from th denominator.	ις εγματτοπ	2. Patsat $\underline{Zh}$ . $\underline{F}$	tsiya, K. M.; Krestov, G. A. iz. <u>Khim.</u> 1970, <u>44</u> , 1835.

COMPONENTS:       ORIGINAL MEASUREMENTS:         1. Argon; Ar; 7440-37-1       Abrosimov, V. K.; Badelin, V. Krestov, G. A.         2. Water; H <sub>2</sub> O; 7732-18-5       Jzv. Vyssh. Ucheb. Zaved.,Khinking         3. Cesium Chloride; CsCl; 7647-17-8       Izv. Vyssh. Ucheb. Zaved.,Khinking         VARIABLES:       T/K: 283.15 - 313.15         p/kPa: 101.325 (1 atm)       PREPARED BY:         CsCl/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 - 2.4019       A. L. Cramer	n.
2. Water; H <sub>2</sub> O; 7732-18-5 3. Cesium Chloride; CsCl; 7647-17-8 VARIABLES: T/K: 283.15 - 313.15 P/kPa; 101.325 (1 atm) Krestov, G. A. <u>Izv. Vyssh. Ucheb. Zaved.,Khin</u> <u>Khim. Tekhnol. 1976, 19</u> , 1381 A. L. Cramer	n.
3. Cesium Chloride; CsCl; 7647-17-8       Izv. Vyssh. Ucheb. Zaved.,Khin         Khim. Tekhnol. 1976, 19, 1381         VARIABLES:         T/K: 283.15 - 313.15         P/kPa; 101.325         P/kPa; 101.325	n. - 1386.
3. Cesium Chloride; CsCl; 7647-17-8       Khim. Tekhnol. 1976, 19, 1381         VARIABLES:       PREPARED BY:         T/K: 283.15 - 313.15       A. L. Cramer         P/kPa: 101.325 (1 atm)       A. L. Cramer	n. - 1386.
T/K: 283.15 - 313.15 A. L. Cramer P/kPa: 101.325 (1 atm)	
T/K: 283.15 - 313.15 A. L. Cramer P/kPa: 101.325 (1 atm)	
P/kPa: 101.325 (1 atm)	
EXPERIMENTAL VALUES: T/K Cesium Argon Salt Effect Parame	ter
Chloride Solubility	
$mol kg^{-1} H_2O A_{sm} k = (1/C_{sm}) log (A_{sm}) log (A_{sm}) k = (1/C_{sm}) log (A_{sm}) log (A_{sm}) k = (1/C_{sm}) log (A_{sm}) log (A$	°/A)
283.15 0.0 41.81 -	
0.2218 39.26 0.1232	
0.5196 36.32 0.1177 0.9251 32.85 0.1100	
1.6998 27.67 0.1036	
1.0550 27.07 0.1000	
293.15 0.0 34.21 -	
0.1630 32.92 0.1024	
0.2958 31.85 0.1049 0.6479 29.41 0.1013	
1.4554 24.74 0.0967	
1.9811 22.09 0.0959	
303.15 0.0 29.00 - 0.1097 28.28 0.0995	
0.1097 28.28 0.0995 0.2590 27.39 0.0958	
0.7364 24.79 0.0925	
1.1351 22.98 0.0890	
1.4965 21.65 0.0848	
2.4019 18.39 0.0823	
313.15 0.0 25.40 -	
0.1339 25.04 0.0463	
0.2651 24.36 0.0685	I
0.6913 22.39 0.0792 1.1225 20.82 0.0769	
1.6613 18.99 0.0760	
AUXILIARY INFORMATION	
METHOD /APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
The apparatus and procedure were pre-	
sumably based on those described by Ben-Naim and Baer (1, 2) No information given.	
The authors define the solubility of argon, A <sub>sm</sub> , as	
$v^{\circ}(55.51M_{r,1} + C_{sm}M_{r,2})$	
$A_{\rm sm} = \frac{v^{\circ} (55.51 M_{\rm r,1} + C_{\rm sm} M_{\rm r,2})}{v_{\rm p-p} \ 1000 \ \rho_{\rm p-p}}$	
where $v^{\circ} = ml$ Ar at 101.325 kPa and	
standard conditions, $v_{p-p} = ml solu-$ ESTIMATED ERROR:	
tion, $\rho_{p-p}$ = solution density, g ml <sup>-1</sup> , $\delta_{A/A}$ = 0.01 (Compiler)	
··r,1 ·····r,2 ······························	
weight, respectively, and C <sub>sm</sub> = salt	
mol kg <sup>-1</sup> water (55,51 mol water). The REFERENCES:	
authors also define A <sub>sm</sub> as ml Ar at 101.325 kPa and standard conditions 1. Ben-Naim, A.; Baer, S.	
$(55.51 \text{ mol } H_2O)^{-1}$ , but if that is Trans. Faraday Soc. 1963,	<u>59</u> ,
the definition it appears the 1000 2735	
should be deleted from the equation 2 Patsatsiva, K. M.: Kresto	7, G. A.
denominator. <u>Zh. Fiz. Khim. 1970, 44</u> ,	1835.

	Sait Solutions	s (Aqueous) 67		
COMPONENTS:		ORIGINAL MEASUREMENTS:		٦
		Abrosimov, Krestov,	V. K.; Badelin, V. G.; G. A.	
2. Water; H <sub>2</sub> O; 7732-18-5		Tau Wysch	Ucheb. Zaved.,Khim.	
3. Cesium Bromide; CsBr;	59141-08-1	Khim. Tekhn	$\frac{1}{100}$ $\frac{1}$	6.
VARIABLES: m/K- 282		PREPARED BY:		
P/kPa: 101.	15 - 313.15 325 (1 atm)		A. L. Cramer	
CsBr/mol kg <sup>-1</sup> H <sub>2</sub> O: 0 -	2.4317			i
EXPERIMENTAL VALUES: T/K	Cesium	Argon	Salt Effect Parameter	
EXPERIMENTAL VALUES: 47	Bromide	Solubility		
202-15	$\frac{\text{mol kg}^{-1} \text{ H}_2\text{O}}{2}$		$k = (1/C_{sm}) \log (A^{\circ}/A)$	
283.15	0.0 0.1335	41.81 40.29	0.1205	
	0.2935	38.69	0.1148	
	0.5998 1.2974	36.05 30.64	0.107 0.104	
	2.1614	25.83	0.0968	
293.15	0.0	34.21	_	
	0.1179	33.55		
	0.2392 0.6077	32.59 30.12	0.0881 0.0910	
	1.2330	26.70	0.0873	1
	1.6996	24.52	0.0851	
303.15	0.0	29.00	-	
	0.1157	28.14	0.113	
	0.2039 0.4934	27.62 26.28	0.104 0.0867	
	1.0065	23.76	0.0860	
	1.8344	20.62	0.0807	
313.15	0.0	25.40		
	0.1168 0.2537	25.39	0.0015 0.0583	
	0.5392	23.35	0.0678	
	1.0993 2.4317	21.29 17.19	0.0697 0.0697	
	2 • 4 J 1 /			
AUXILIARY		INFORMATION		
METHOD / APPARATUS / PROCEDURE:		SOURCE AND PUR	RITY OF MATERIALS:	
The apparatus and procedure were pre- sumably based on those described by Ben-Naim and Baer (1, 2).		No inform	nation given	
The authors define the solubility of argon, A <sub>sm</sub> , as				
$v^{\circ}$ (55.51M <sub>r,1</sub> + 0	$2 \text{sm}^{M} r, 2$			
v <sub>p-p</sub> 1000 p <sub>p-p</sub>				
where $v^{\circ} = ml$ Ar at 101.325 kPa and standard conditions, $v_{p-p} = ml$ solu-		ESTIMATED ERRO	DR:	
tion, $\rho_{p-p} = $ solution density, g ml <sup>-1</sup> ,		δΑ/Α	= 0.01 (Compiler)	
$M_{r,1}$ and $M_{r,2}$ = water and salt mol		DEEEDENOUS		
weight, respectively, and $C_{sm} = salt mol kg^{-1}$ water (55.51 mol water). The		REFERENCES:	m, A.; Baer, S.	
authors also define A as ml Ar at		Trans.	Faraday Soc. 1963, 59,	
101.325 kPa and standard conditions $(55.51 \text{ mol } H_20)^{-1}$ , but if that is		2735.		
(55.51 mol H <sub>2</sub> O) <sup>2</sup> , but the definition it appear should be deleted from t denominator.	s the 1000	2. Patsats <u>Zh</u> . <u>Fiz</u>	iya, K. M.; Krestov, G. A. . <u>Khim</u> . 1970, <u>44</u> , 1835.	Α.
		L		

Argon Solubilities up to 200 kPa

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68 <i>P</i>	Argon Solubilities			
COMPONENTS:		ORIGINAL MEASUREMENTS:		
		Abrosimov, V Krestov, G	. K.; Badelin, V. G.; . A.	
2. Water; H <sub>2</sub> O; 7732-18-5				
3. Rubidium Chloride; RbCl; 7791-11-9		<u>Khim</u> . <u>Tekhno</u>	<u>Ucheb. Zaved.,Khim.</u> <u>1. 1976, 19</u> , 1381 - 1386.	
VARIABLES: T/K. 283			······	
1/11. 205	.15 313.15 .325 (1 atm) - 2.3879	PREPARED BY:	A. L. Cramer	
EXPERIMENTAL VALUES: T/K	Rubidium Chloride	Argon Solubility	Salt Effect Parameter	
283,15	$\frac{\text{mol } kg^{-1} H_2 C}{0.0}$	$\frac{A_{sm}}{41.81}$	$k = (1/C_{sm}) \log (A^{\circ}/A)$	
283.15	0.1300	40.01	0.1470	
	0.4524 0.9800	36.55 31.72	0.1291	
	0.9800 2.2877		0.1224 0.1125	
202.15		34.21		
293.15	0.0 0.1637	33.06	0.0907	
	0.3285 0.8376	31.52 27.83	0.1083	
	0.8376	27.83	0.1070 0.1045	
	1.4975 2.3706	23.86 19.96	0.0987	
303.15	0.0	29.00	_	
202.12		28.20		
	0.0916 0.2189	28.20 27.26	0.1228	
	0.4461 1.1180	25.80 22.11	0.1138 0.1054	
	1.6738	19.87	0.0981	
313.15	0.0	25.40	-	
515.15	0.1523	24.60	0.0913	
	0.2862			
	0.6897 1.1713	22.05 19.90	0.0891 0.0905	
	2,3879	15.75	0.0869	
	AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCEDURE:		SOURCE AND PURT	TY OF MATERIALS:	
The apparatus and procedure			in or impactance.	
sumably based on those desc Ben-Naim and Baer (1, 2).		No informat	ion given.	
The authors define the solu argon, A <sub>sm</sub> , as	ubility of			
$v^{\circ}$ (55.51M <sub>r.1</sub> + C <sub>sr</sub>	$n^{M}r.2$	1		
$A_{sm} = \frac{v^{\circ} (55.51M_{r,1} + C_{sm}M_{r,2})}{v_{p-p} 1000 \rho_{p-p}}$				
where $v^{\circ} = ml$ Ar at 101.325 kPa and standard conditions, $v_{p-p} = ml$ solu-		ESTIMATED ERROR	D•	
tion, $\rho_{p-p} \approx \text{ solution density, g ml}^{-1}$ ,		COLUMNED BRROT		
$M_{r,1}$ and $M_{r,2}$ = water and salt mol		$\delta A/A = 0$	.01 (Compiler)	
weight, respectively, and $C_{sm} = salt$ mol kg <sup>-1</sup> water (55.51 mol water). The authors also define $A_{sm}$ as ml Ar at 101.325 kPa and standard conditions (55.51 mol H <sub>2</sub> O) <sup>-1</sup> , but if that is				
		REFERENCES:		
		1 Bon-Maim	A · Baer S	
			h, A.; Baer, S. Caraday Soc. 1963, <u>59</u> ,	
the definition it appears	the definition it appears the 1000		an a	
should be deleted from the equation denominator.			ya, K. M.; Krestov, G. A. <u>Khim</u> . 1970, <u>44</u> , 1835.	
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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Water-d<sub>2</sub>; D<sub>2</sub>O; 7789-20-0</li> </ol>	Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.	
-	Izv. Vyssh. Uchebn. Zaved., Khim.	
3. Lithium Chloride; LiCl; 7447-41-8	<u>Khim</u> . <u>Tekhnol</u> . 1977, <u>20</u> , 1864 - 1866.	
VARIABLES:	PREPARED BY:	
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm)	H. L. Clever	
LiCl/mol (55.51 mol $D_2O$ ) <sup>-1</sup> : 0-2.6843		
EXPERIMENTAL VALUES: T/K Lithium	Argon Salt Effect Parameter	
Chloride/mol	Solubility	
$(55.51 \text{ mol } D_2C)$		
283.15 0.0 0.2455	46.40 - 43.69 0.1065	
0.6287	39.82 0.1056	
1.0229 2.1481	36.19 0.1055 28.14 0.1011	
293.15 0.0 0.2544	36.90 - 34.92 0.0942	
0.2344	32.69 0.0950	
1.0924	29.00 0.0958	
2.0923	23.66 0.0922	
303.15 0.0	30.74 -	
0.2562 0.7381	29.06 0.0953 26.21 0.0938	
1.3381	23.17 0.0918	
2.6843	18.13 0.0854	
313.15 0.0	26.68 -	
0.2926	25.24 0.0824	
0.6384 1.8226	23.66 0.0817 19.06 0.0801	
2.4194	17.10 0.0799	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The precision microgasometric appara- tus described earlier (1) is used.	<ol> <li>Argon. Specially purified sample, designated MRTU-6-02-376-66, with</li> </ol>	
	total impurities not exceeding	
The argon solubility is reported as the "solvomolal absorption coefficient		
A <sub>sm</sub> ." It is defined as the volume of	2. Water-d <sub>2</sub> . 99.8 atom % D.	
pure gas at a partial pressure of 101.325 kPa and normal conditions, ab-	3. Salt. Chemically pure.	
sorbed by the quantity of solvent		
which contains 55.51 moles of $D_2O$ .	• • • • • • • • • • • • • • • • • • •	
It is calculated from the formula		
$A_{sm} = \frac{\alpha (55.51 M_{r,2} + C_{sm,p-p}M_{r,3})}{\rho_{p-p}}$	ESTIMATED ERROR:	
$A_{sm} = \frac{\rho_{p-p}}{\rho_{p-p}}$	$\delta A/A = 0.002$ (authors)	
where a is the Bunsen coefficient.		
pp-p is the solution density, g	DEFEDENCIA	
$ml^{-1}$ ,	REFERENCES:	
$M_{r,2}$ and $M_{r,3}$ are the $D_2O$ and	1. Strakov, A. N.; Krestov, G. A.;	
salt molecular weights, respect- ively, and	Abrosimov, V. K.; Badelin, V. G.	
C <sub>sm,p-p</sub> is mol salt (55.51 mol	<u>Zh. Fiz. Khim</u> . 1975, <u>49</u> , 1583.	
$D_2^{(0)}$		
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COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1		Abrosimov, V. Krestov, G.	K.; Badelin, V. G.; A.	
<ol> <li>Water-d<sub>2</sub>; D<sub>2</sub>O; 7789</li> <li>Sodium Chloride; National Society</li> </ol>		Izv. Vyssh. U Khim. Tekhnol	<u>chebn. Zaved., Khim.</u> . 1977, <u>20</u> , 1864 - 1866.	
VARIABLES: T/K: 283.15 P/kPa: 101.32	5 (1 atm)	PREPARED BY: H.	L. Clever	
NaCl/mol (55.51 mol D <sub>2</sub> ) EXPERIMENTAL VALUES: T/K	Sodium	Argon	Salt Effect Parameter	
	Chloride/mol $(55.51 \text{ mol } D_20)$	$-1$ Solubility $A_{sm}$	$k = (1/C_{sm}) \log (A^{\circ}/A)$	
283.15	0.0 0.1572 0.5432 1.2667 2.3362	46.40 44.02 38.50 30.29 21.80	0.1455 0.1492 0.1462 0.1404	
293.15	0.0 0.3277 0.7173 1.1361 2.3068	36.90 33.33 29.16 26.04 19.41	0.1349 0.1425 0.1333 0.1209	
303.15	0.0 0.3360 0.5632 1.1938 2.1461	30.74 27.88 26.09 21.84 16.94	0.1262 0.1265 0.1244 0.1206	
313.15	0.0 0.3153 0.6936 1.2513 2.2377	26.68 24.40 22.01 19.29 15.27	0.1230 0.1205 0.1126 0.1083	
AUXILIARY		INFORMATION		
METHOD/APPARATUS/PROCEDURE: The precision microgasometric appara- tus described earlier (1) is used. The argon solubility is reported as the "solvomolal absorption coeffici- ent, A <sub>sm</sub> ." It is defined as the volume of pure gas at partial pressure of 101.325 kPa and normal conditions, ab- sorbed by the quantity of solvent which contains 55.51 moles of D <sub>2</sub> O. It is calculated from the formula		designated total impu 0.015%. 2. Water-d <sub>2</sub> .	Y OF MATERIALS: ecially purified sample, MRTU-6-02-376-66, with prities not exceeding 99.8 atom % D. emically pure.	
$A_{sm} = \frac{\alpha (55.51 \text{ M}_{r,2} + \rho_{p-p})}{\rho_{p-p}}$ where $\alpha$ is the Bunsen $\alpha$	C <sub>sm,p-p</sub> M <sub>r,3</sub> )	ESTIMATED ERROR: $\delta A/A = 0.002$	(authors)	
$\rho_{p-p}$ is the solution $m_{1}-1$ , $M_{r,2}$ and $M_{r,3}$ are salt molecular we ively, and $C_{sm,p-p}$ is moles $D_{2}^{(0)-1}$ .	e the D <sub>2</sub> O and eights, respect	Abrosimov,	A. N.; Krestov, G. A.; V. K.; Badelin, V. G. Khim. 1975, <u>49</u> , 1583.	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.		
2. Water-d <sub>2</sub> ; 7789-20-0			
3. Sodium Iodide; NaI; 7681-82-5	Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1977, 20, 1864 - 1866.		
VARIABLES:	PREPARED BY:		
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm) NaI/mol (55.51 mol $D_2$ 0) <sup>-1</sup> : 0-2.3982	H. L. Clever		
EXPERIMENTAL VALUES: T/K Sodium	Argon Salt Effect Parameter		
Iodide/mol (55.51 mol D <sub>2</sub> 0	Solubility		
283.15 0.0 0.3019 0.7255 1.3317 2.1122	46.40       -         41.83       0.1492         36.30       0.1469         29.88       0.1435         23.57       0.1393		
293.15 0.0 0.3371 0.6628 1.3673 2.3982	36.90       -         33.64       0.1192         30.64       0.1218         24.94       0.1244         18.80       0.1221		
303.15 0.0 0.4168 0.4573 1.1964 2.0201	30.74       -         27.61       0.1119         27.26       0.1141         23.07       0.1042         18.82       0.1055		
313.15 0.0 0.3123 0.6811 1.5363 1.9210	26.68       -         25.07       0.0866         23.04       0.0935         19.04       0.0954         17.52       0.0951		
AUXILIAR	Y INFORMATION		
METHOD/APPARATUS/PROCEDURE:			
The precision microgasometric apparatus described earlier (1) is used. The argon solubility is reported as the "solvomolal absorption coefficient, $A_{sm}$ ." It is defined as the volume of pure gas at partial pressure of 101.325 kPa and normal conditions	<ul> <li>designated MRTU-6-02-376-66, with total impurities not exceeding 0.015%.</li> <li>- 2. Water-d<sub>2</sub>. 99.8 atom % D.</li> </ul>		
absorbed by the quantity of solvent which contains 55.51 moles of $D_2O$ . It is calculated from the formula			
$A_{sm} = \frac{\alpha (55.51 \text{ M}_{r,2} + C_{sm,p-p}M_{r,3})}{\rho_{p-p}}$	ESTIMATED ERROR: $\delta n / n = 0.002$ (suthors)		
where $\alpha$ is the Bunsen coefficient.	$\delta A/A = 0.002$ (authors)		
$\rho_{p-p}$ is the solution density, $m_{r,2}$ and $m_{r,3}$ are the D <sub>2</sub> O and salt molecular weights, respec ively, and $C_{sm,p-p}$ is mol salt (55.51 mol $D_2O)^{-1}$ .	t- L. Strakov, A. N.; Krestov. G. A.; Abrosimov, V. K.; Badelin, V. G. <u>Zh. Fiz. Khim</u> . 1975, <u>49</u> , 1583.		

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Argon Solubilities up to 200 kPa

Argon Solubilities up to 200 kPa				
COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1		Abrosimov, V. Krestov, G.	K.; Badelin, V. G.; A.	
2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789	-20-0			
3. Potassium Bromide;	KBr; 7785-02-3	Izv. Vyssh. Uc Khim. Tekhnol.	hebn. Zaved., Khim. 1977, 20, 1864-1866.	
VARIABLES:				
ſ	5 - 313.15 325 (1 atm) ) <sup>-1</sup> : 0-2.6477	PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES: T/K	Potassium	Argon	Salt Effect Parameter	
	Bromide/mol (55.51 mol D <sub>2</sub> O)	Solubility	$K = (1/C_{sm}) \log (A^{\circ}/A)$	
283.15	0.0	46.40		
	0.2932 0.6842	42.20 37.45	0.1405 0.1360	
	1.2666	31.62	0.1315	
	2.3760	23.86	0.1216	
293.15	0.0	36.90	-	
	0.2920	34.10	0.1174	
	0.6478 1.1583	31.13 27.29	0.1140 0.1131	
	2.6477	18.96	0.1092	
303.15	0.0	30.74	-	
505.15	0.2774	28.77	0.1037	
	0.6872	25.81	0.1105	
	1.2930 2.2448	22.57 18.36	0.1038 0.0997	
212.15				
313.15	0.0 0.2878	26.68 25.09	0.0927	
	0.6562	23.11	0.0951	
	1.2689 2.2241	20.46 16.96	0.0909 0.0885	
AUXILIARY		INFORMATION		
METHOD /APPARATUS / PROCEDURE :		SOURCE AND PURITY	OF MATERIALS:	
The precision microgasometric appara- tus described earlier (1) is used. The argon solubility is reported as		designated	ecially purified sample MRTU-6-02-376-66, with rities not exceeding	
the "solvomolal absorpt ent, A <sub>sm</sub> ." It is defin	ion coeffici-	2. Water-d	99.8 atom % D.	
ume of pure gas at part	ial pressure	1 -		
of 101.325 kPa and normal conditions, absorbed by the quantity of solvent which contains 55.51 moles of D <sub>2</sub> O.		3. Salt. Che	mically pure.	
It is calculated from the formula		}		
$A_{am} = \alpha (55.51 M_{r,2} + C_{sm,p-p}M_{r,3})$		ESTIMATED ERROR:		
$A_{sm} = \frac{\alpha (55.51 M_{r,2} + C_{sm,p-p}M_{r,3})}{\rho_{p-p}}$		$\delta A/A = 0.002$ (authors)		
where $\alpha$ is the Bunsen coefficient, $\rho_{p-p}$ is the solution density, g ml <sup>-1</sup> , $M_{r,2}$ and $M_{r,3}$ are the D <sub>2</sub> O and salt molecular weights, respect- ively, and				
		REFERENCES:		
			N.; Krestov, G. A.;	
			V. K.; Badelin, V. G. him. 1975, <u>49</u> , 1583.	
$C_{sm,p-p}$ is mol sa $D_2^{(0)}$	alt (55.51 mol			
		<u> </u>		

COMPONENTS -	OPT CINAL MEACUDENTING		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Abrosimov, V. K.; Badelin, V. G.; Krestov. G. A.		
2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0	Izv. Vyssh. Uchebn. Zaved., Khim.		
3. Potassium Iodide; KI; 7681-11-0	<u>Khim</u> . <u>Tekhnol</u> . 1977, <u>20</u> , 1864 - 1866.		
VARIABLES:	PREPARED BY:		
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm) KI/mol (55.51 mol D <sub>2</sub> O) <sup>-1</sup> : 0 - 2.3613	H. L. Clever		
EXPERIMENTAL VALUES: T/K Potassium Iodide/mol	Argon Salt Effect Parameter Solubility		
(55.51 mol D <sub>2</sub> O)	$A_{\rm sm}$ , $k = (1/C_{\rm sm}) \log (A^{\circ}/A)$		
283.15 0.0	46.40 -		
0.2458 0.6899	43.06 0.1320 37.57 0.1329		
1.1170	33.21 0.1300		
1.8355	27.53 0.1235		
293.15 0.0	36.90 -		
0.2868	34.38 0.1071 30.90 0.1092		
0.7058 1.3792	30.90 0.1092 26.03 0.1099		
2.2743	21.43 0.1038		
303.15 0.0	30.74 -		
0.2845	28.74 0.1027		
0.7008	26.27 0.0974		
1.2538 2.3613	23.09 0.0991 18.65 0.0919		
313.15 0.0 0.3322	26.68 - 25.21 0.0741		
0.6554	23.53 0.0833		
1.2936 2.2325	20.77 0.0841 17.79 0.0788		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The precision microgasometric appara-	1. Argon. Specially purified sample,		
tus described earlier (1) is used.	designated MRTU-6-02-376-66, with total impurities not exceeding		
The argon solubility is reported as	0.015%.		
the "Solvomolal absorption coeffici- ent, $A_{sm}$ ." It is defined as the vol-	2. Water-d <sub>2</sub> . 99.8 atom % D.		
ume of pure gas at partial pressure	-		
of 101.325 kPa and normal conditions, absorbed by the quantity of solvent which contains 55.51 moles of $D_2O$ .	3. Salt. Chemically pure		
It is calculated from the formula			
$A_{sm} = \frac{\alpha (55.51 \ M_{r,2} + C_{sm,p-p} M_{r,3})}{\rho_{p-p}}$	ESTIMATED ERROR:		
q-q <sup>0</sup>	$\delta A/A = 0.002$ (authors)		
where $\alpha$ is the Bunsen coefficient,			
$p_{p-p}$ is the solution density, $g_{m1-1}$ ,	REFERENCES :		
$M_{r,2}$ and $M_{r,3}$ are the D <sub>2</sub> O and	1. Strakov, A. N.; Krestov, G. A.;		
salt molecular weights, respect	Abrosimov, V. K.; Badelin, V. G.		
ively, and	<u>Zh. Fiz. Khim</u> . 1975, <u>49</u> , 1583.		
C is mol salt (55.51 mol Sm,p-p	1		
$D_2^{0}^{-1}$ .			

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Argon Solubilities up to 200 kPa

Algon Solubilities up to 200 kFa			
COMPONENTS :	ORIGINAL MEASUREMENTS:		
l. Argon; Ar; 7440-37-1	Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.		
2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0			
3. Cesium Chloride; CsCl; 7647-17-8	Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1977, 20, 1864 - 1866.		
VARIABLES:	PREPARED BY:		
T/K: $283.15 - 313.15$ P/kPa: $101.325$ (1 atm) CsCl/mol (55.51 mol $D_2^{O}$ ) <sup>-1</sup> : $0-2.6544$	H. L. Clever		
EXPERIMENTAL VALUES: T/K Cesium	Argon Salt Effect Parameter		
Chloride/mol (55.51 mol D <sub>2</sub> O)	Solubility		
283.15 0.0	46.40 -		
0.3152	42.44 0.1229		
0.6591 1.3809	38.43 0.1177 32.35 0.1134		
2.4718	25.70 0.1038		
293.15 0.0	36.90 -		
0.2779	34.51 0.1046		
0.5910	31.91 0.1068		
1.2283 2.3145	27.79 0.1003 22.62 0.0918		
303.15 0.0 0.3970	30.74 - 28.27 0.0916		
0.7458	26.10 0.0953		
1.3052	23.46 0.0899		
2.6544	18.50 0.0831		
313.15 0.0	26.68 -		
0.3618	24.82 0.0867		
1.1447 1.3095	21.75 0.0775 21.02 0.0791		
2.1151	18.43 0.0760		
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The precision microgasometric appara-	1. Argon. Specially purified sample,		
tus described earlier (1) is used.	designated MRTU-6-02-376-66, with total impurities not exceeding		
The argon solubility is reported as	0.015%.		
the "Solvomolal absorption coeffici-	2 Water-d 99 9 atom 8 D		
ent, A <sub>sm</sub> ." It is defined as the vol- ume of pure gas at parital pressure	2. Water-d <sub>2</sub> . 99.8 atom % D.		
of 101.325 kPa and normal conditions,	3. Salt. Chemically pure.		
absorbed by the quantity of solvent which contains 55.51 moles of $D_2O$ .			
	}		
It is calculated from the formula			
$A_{sm} = \frac{\alpha (55.51 M_{r,2} + C_{sm,p-p}M_{r,3})}{\rho_{p-p}}$	ESTIMATED ERROR:		
	$\delta A/A = 0.002$ (authors)		
where $\alpha$ is the Bunsen coefficient,			
$\rho_{p-p}$ is the solution density, g ml-1,	REFERENCES :		
$M_{r,2}$ and $M_{r,3}$ are the $D_2O$ and			
salt molecular weights, respect-	1. Strakov, A. N.; Krestov, G. A.;		
ivelv, and	ADIOSIMOV, V. K.; Dadelin, V. G.		
C <sub>sm,p-p</sub> is mol salt (55.51 mol	<u>Zh. Fiz. Khim</u> . 1975, <u>49</u> , 1583.		
$D_2 O_2^{-1}$			

Salt Solutions (Aqueous)

Salt Solutions (Aqueous) 75				
COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 74403-7-1	Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.			
2. Water-d <sub>2</sub> ; D <sub>2</sub> O; 7789-20-0	Izv. Vyssh. Uchebn. Zaved., Khim.			
3. Cesium Bromide; CsBr; 7787-69-1	<u>Khim</u> . <u>Tekhnol</u> . 1977, <u>20</u> , 1864 - 1866.			
VARIABLES:	PREPARED BY:			
T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm) CsBr/mol (55.51 mol D <sub>2</sub> O) <sup>-1</sup> : 0-2.6713	H. L. Clever			
EXPERIMENTAL VALUES: T/K Cesium	Argon Salt Effect Parameter			
Bromide/mol (55.51 mol D <sub>2</sub> (	Solubility			
283.15 0.0	46.40 -			
0.2564	43.32 0.1163 39.30 0.1152			
0.6260 1.2141	34.18 0.1093			
2.2437	27.42 0.1018			
293.15 0.0	36.90 -			
0.2626	34.84 0.0950			
0.5314 1.0228	32.65 0.1000 29.47 0.0955			
2.0919	24.07 0.0887			
303.15 0.0	30.74 -			
0.2701	29.38 0.0728			
0.7004	26.58 0.0902			
1.3315 2.6713	23.63 0.0858 19.15 0.0769			
313.15 0.0	26.68 -			
0.3148	25.52 0.0613			
0.6238	23.87 0.0775			
1.0126 2.0249	22.52 0.0727 19.39 0.0685			
AUXILIAR	Y INFORMATION			
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
The precision microgasometric appara-	a, ingen, operand furnes,			
tus described earlier (1) is used.	designated MRTU-6-02-376-66, with total impurities not exceeding			
The argon solubility is reported as the "Solvomolal absorption coeffici-	0.015%.			
ent, A <sub>sm</sub> ." It is defined as the vol- ume of pure gas at partial pressure	- 2. Water-d <sub>2</sub> . 99.8 atom % D.			
of 101.325 kPa and normal conditions				
absorbed by the quantity of solvent which contains 55.51 moles of $D_2O$ .	3. Salt. Chemically pure.			
It is calculated from the formula				
$A_{sm} = \frac{\alpha (55.51 \text{ M}_{r,2} + C_{sm,p-p} \text{M}_{r,3})}{\rho_{p-p}}$	ESTIMATED ERROR:			
q-q <sup>0</sup>	$\delta A/A = 0.002$ (authors)			
where $\alpha$ is the Bunsen coefficient,				
$\rho_{p-p}$ is the solution density, g ml <sup>-1</sup> ,	REFERENCES:			
$M_{r,2}$ and $M_{r,3}$ are the $D_2O$ and				
salt molecular weights, respec	t- 1. Strakov, A. N; Krestov, G. A.; Abrosimov, V. K.; Badelin, V. G.			
ively, and $C_{sm,p-p}$ is mol salt (55.51 mol				
$D_{0}$				
L				

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COMPONENTS:		ORIGI	NAL MEASUREMEN	NTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Water-d<sub>2</sub>; D<sub>2</sub>O; 7789-20-0</li> </ol>			Abrosimov, V. K.; Badelin, V. G.; Krestov, G. A.		
3. Rubidium Chloride;		<u>Izv</u> Khi	. <u>Vyssh</u> . <u>Uc</u> m. <u>Tekhnol</u> .	<u>hebn. Zaved., Khim.</u> 1977, <u>20</u> , 1864 - 1866.	
VARIABLES:		PREPA	RED BY:		
T/K: 283 P/kPa: 101 RbC1/mol (55.51 mol D <sub>2</sub>	.15 - 313.15 .325 (1 atm) $0)^{-1}: 0-2.5745$		H. L.	Clever	
EXPERIMENTAL VALUES: T/K	Rubidium		Argon	Salt Effect Parameter	
	Chloride/mol (55.51 mol D <sub>2</sub> 0)	)-1	Solubility A <sub>sm</sub>	$k = (1/C_{sm}) \log (A^{\circ}/A)$	
283.15	0.0		46.40		
	0.3444		41.70	0.1347	
	0.6385		38.25	0.1314	
	1.2836		31.97	0.1260	
	2.4813		23.95	0.1158	
293.15	0.0		36.90	-	
1	0.2582		34.58	0.1092	
	0.5216		32.12	0.1155	
	1.0673 1.9297		27.95 22.98	0.1150 0.1066	
	1.9297		22.90	0.1000	
303.15	0.0		30.74	-	
	0.3645		28.14	0.1053	
	0.7764		25.46	0.1054	
	1.2388 2.1990		22.97 18.92	0.1021 0.0959	
	2.1990		10.72		
313.15	0.0		26.68	_	
	0.3520		24.59	0.1006	
	0.7620 1.3750		22.47 19.93	0.0979 0.0921	
1	2.5745		15.93	0.0870	
	AUXILIARY	INFOR	MATION		
METHOD/APPARATUS/PROCEDURE:		SOURC	E AND PURITY	OF MATERIALS:	
The precision microgas tus described earlier	(1) is used.	<ol> <li>Argon. Specially purified sample, designated MRTU-6-02-376-66, with total impurities not exceeding</li> </ol>			
The argon solubility i the "Solvomolal absrop			.015%.	2	
ent, A <sub>sm</sub> ." It is defi		2 14	ator-d 0	9.8 atom % D.	
ume of pure gas at par	tial pressure	2. w	acer-u <sub>2</sub> .	9.8 acom 8 D.	
of 101.325 kPa and nor absorbed by the quanti which contains 55.51 m	ty of solvent	3. S	alt. Chemi	cally pure.	
It is calculated from	the formula	1			
$A_{\rm sm} = \frac{\alpha (55.51  {\rm M_{r,2}} + {\rm C_{sm,p-p}}^{\rm M_{r,3}})}{\rho_{\rm p-p}}$		ESTIN	ATED ERROR:	<u></u>	
<sup>ρ</sup> p-p			$\delta A/A = 0$	.002 (authors)	
where $\alpha$ is the Bunsen	coefficient,				
$\rho_{p-p}$ is the solu g ml <sup>-1</sup> ,	tion density,	REFE	RENCES :	na da seren a de seren de seren a seren de sere	
g ml <sup>-1</sup> ,	e the D-O and	1			
M <sub>r,2</sub> and M <sub>r,3</sub> ar		1. s	trakov. A.	N.; Krestov, G. A.;	
salt molecular w	eights, respect	A	brosimov, V	V. K.; Badelin, V. G.	
ively, and $C_{sm,p-p}$ is mol s $D_2 0)^{-1}$ .	alt (55.51 mol	<u>Z</u>	<u>h. Fiz. Khi</u>	<u>m</u> . 1975, <u>49</u> , 1583.	
<u></u>					

Salt Solution	is (Aqueous)	77		
COMPONENTS :	ORIGINAL MEASUREMENTS:	٦		
1. Argon; Ar; 7440-37-1	Shkol'nikova, R. I.	ļ		
2. Water; H <sub>2</sub> O; 7732-18-5	<u>Uch. Zap. Leningr. Gos. Univ., Ser.</u> <u>Khim. Nauk</u> . 1959, Nr. 18, 64 - 86.			
3. Hydrated Aluminium Oxide; Al <sub>2</sub> O <sub>3</sub> 'x H <sub>2</sub> O;	<u>Chem</u> . <u>Abstr</u> . 1961, <u>55</u> , 25443b.			
VARIABLES: T/K: 293.15 - 313.15 P/kPa: 101.325 (1 atm) Al <sub>2</sub> O <sub>3</sub> /Wt %: 0 - 0.35	PREPARED BY: A. L. Cramer			
EXPERIMENTAL VALUES:				
Al <sub>2</sub> O <sub>3</sub> /Wt % Coeff	nsen ficient < 10 <sup>3</sup>			
303.15 0.35 25	7.7 5.2 2.2			
The enthalpy of solution of coefficient of the Bunsen co in water and 2020 in the 0.3 solution.	argon from the temperature pefficient is 2110 cal mol-1 35 wt % hydrated aluminium oxide			
The values for the solubilit given in the paper.	ty of argon in water were not			
The hydrated aluminium oxide	The hydrated aluminium oxide is described as a sol (colloidal).			
AUXILIARY	INFORMATION			
METHOD:	SOURCE AND PURITY OF MATERIALS:			
	<ol> <li>Argon. 99.9 per cent argon and 0.1 per cent nitrogen.</li> </ol>			
APPARATUS/PROCEDURE:	ESTIMATED ERROR:			
The apparatus and procedure of Lannung (1) were modified.				
	REFERENCES: L. Lannung, A. <u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68.			

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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Shkol'nikova, R. I.
2. Water; H <sub>2</sub> O; 7732-18-5	Uch. Zap. Leningr. Gos. Univ., Ser.
3. Hydrated Ferric Oxide;	<u>Khim. Nauk</u> . 1959, Nr. 18, 64 - 86.
Fe <sub>2</sub> 0 <sub>3</sub> * xH <sub>2</sub> 0;	<u>Chem</u> . <u>Abstr</u> . 1961, <u>55</u> , 25443b.
VARIABLES: T/K: 293.15 - 313.15	PREPARED BY:
P/kPa: 101.325 (1 atm) Fe <sub>2</sub> O <sub>3</sub> /Wt %: 0 - 0.8	A. L. Cramer
EXPERIMENTAL VALUES: T/K Hydrated	
Fe <sub>2</sub> 0 <sub>3</sub> /Wi	$\frac{\alpha \times 10^3}{\alpha \times 10^3}$
293.15 0.1 303.15	24.2 22.3
313.15	17.4
293.15 0.5	21.7
303.15 313.15	18.9 15.8
293.15 0.8	15.6 13.8
303.15 313.15	13.8 11.8
The hydrated ferric oxide :	is described as a sol (colloidal).
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
	1. Argon. 99.9 per cent argon and 0.1 per cent nitrogen.
	ESTIMATED ERROR:
APPARATUS/PROCEDURE:	
The apparatus and procedure of Lannung were modified.	
	REFERENCES :
	<pre>1. Lannung, A. J. <u>Am</u>. <u>Chem</u>. <u>Soc</u>. 1930, <u>52</u>, 68.</pre>

Salt Solutions (Non-Aqueou	ıs)
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Salt Solutions (	Non-Aqueous) 79
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Reddy, G. S.
2. Methanol; CH <sub>3</sub> OH; 67-56-1	<u>J</u> . <u>Chem</u> . <u>Eng</u> . <u>Data</u> 1963, <u>8</u> , 191 - 192.
3. Sodium Iodide; NaI; 7681-82-5	
VARIABLES: T/K: 303.15 P/kPa: 101.325 (1 atm) Salt/mol dm <sup>-3</sup> : 0 - 3.84	PREPARED BY: S. A. Johnson
EXPERIMENTAL VALUES:	
mol dm <sup>-3</sup> Solubil	$ \begin{array}{ccc} \text{wald} & \text{Salt Effect Parameter} \\ \text{lity Ratio} & \text{k} &\doteq (1/C)\log(L^{O}/L) \\ \text{S}^{O}/L & & \\ \end{array} $
0.762 1. 1.91 1. 2.47 2. 3.40 2.	ations was $\rho/g \text{ cm}^{-3} = 0.781 + 0.129 \text{ C}$
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was modeled after that of Markham and Kobe (1). A length of TRUEBORE tubing of 0.4643 cm <sup>2</sup> cross- section was used as the gas buret. The volume of argon, presaturated with the solvent vapor, taken up by a 103.1 cm <sup>3</sup> sample of the solvent was measured.	1. Argon. Matheson Co., Inc. Regular

Argon Solubilities up to 200 kPa

COMPONENTS:	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever
2. Water; H <sub>2</sub> O; 7732-18-5	Department of Chemistry Emory University
3. Polar Organic Compounds	Atlanta, GA 30322 U.S.A.
	July 1979

## CRITICAL EVALUATION:

In 1964 Ben-Naim and Baer (3) published the first careful study of the solubility of a gas in a binary water + organic compound mixed solvent. The paper on the solubility of argon in aqueous ethanol was interpreted in terms of the influence of alcohol on the water structure. The paper generated great interest. Since then several laboratories have contributed papers on the solubility of argon and other gases in aqueous-organic compound mixed solvents. There are now data on over 20 such systems.

Three laboratories have contributed most of the work on the systems. They are Ben-Naim and co-workers of the Hebrew University of Jerusalem, Israel; Krestov, Nedel'ko, Patsatsiya, Vinogradov and co-workers of the Ivanovo Chemical Technology Institute, USSR; and Morrison and Cargill of the Dundee College of Technology, U.K. In many of the papers the data were presented only in graphs. All three laboratories were contacted and asked if they would provide numerical data on the system reported only in graphs. Cargill sent numerical data which are used on the data sheets, Ben-Naim answered that the data were scattered in laboratory notebooks and would be too time consuming to collect, and the Russians did not answer the request. In the papers that contained large scale, well labelled graphs the compiler read numerical data from the graph for the data sheet (five systems). Most of the papers presented graphs that were unsuitable for direct reading and no data sheets were prepared for the papers.

There are problems with the gas solubility units in the papers of Krestov, et al. They report solubility in Ostwald coefficients and Ostwald coefficients at standard conditions. The later unit is not a conventional unit. We generally interpreted it to be a Bunsen coefficient, but there were papers in which it appears to be an absorption coefficient at some pressure other than atmospheric pressure. Krestov, et al. have used other units including the Bunsen coefficient, a unit of  $cm^3$  gas at normal conditions per mole of solvent, and a new unit called solvomolality. The solvomolality unit is defined as the  $cm^3$  gas at normal conditions and gas pressure of 101.325 kPa (1 atm) per 55.51 mole of solvent. On the data sheets the symbols and description of the unit as given in the paper are used.

In many of the Russian papers the solubility data are not tabulated, but shown only on a graph. In some of these papers the Gibbs energy of solution is tabulated. They define the Gibbs energy of solution for the transfer of one mole of gas from the gas phase at a concentration of one mole gas  $dm^{-3}$  to the hypothetical one molal gas solution (kg<sup>-1</sup> solvent) as

 $\Delta G^{\circ} = - RT \ln (\gamma/\rho) + RT \ln (0.082 T)$ 

where  $\gamma$  is sometimes the Ostwald coefficient and sometimes the "Ostwald coefficient under standard conditions", and  $\rho$  is the solvent density. The definition follows from the early discussions of Eley (6) who used

 $\Delta G^{\circ} = - RT \ln (Ostwald coefficient) + RT \ln (0.082 T)$ 

for the Gibbs energy change of transfer of gas from the gas phase at one mole gas dm<sup>-3</sup> to the solution of one mole gas dm<sup>-3</sup>. The equation does not have the same thermodynamic significance when used with a Bunsen coefficient ("Ostwald coefficient under standard conditions"). Regardless of its meaning, in principle the tabulated Gibbs energy values could be used to calculate the argon solubility value. This was not done because of questions about the solubility unit, the solution density, and the way the Gibbs energy values were rounded off. Not all of the Russian papers were available to the Solubility Data Project in time for use in the compilation for this volume.

There are some comments below about each of the mixed solvent systems for which argon solubility data have been reported. This is more a guide to the literature than an evaluation. However, the Evaluator classes the data on these systems as tentative because the various workers have used

different solubility units which makes comparison among their work difficult. Papers in which only a graph of the solubility data is presented are rejected, not because the data are necessarily poor, but because they are not of quantitative use to others.

Argon + Water + Methanol

Ben-Naim (1) reported the argon solubility over the entire concentration range at five degree intervals from 278.15 to 298.15 K. The data were presented on a graph which was read by the compiler for the data sheet. Krestov and Patsatsiya (22) reported a graph of the argon solubility over the entire concentration range at five degree intervals between 298.15 and 313.15 K. No data sheet was prepared. In another paper (31) they used the data to calculate thermodynamic characteristics of argon dissolution in solutions up to 0.8 mole fraction methanol at temperatures from 283 to 313 K.

2. Argon + Water + Ethanol

Ben-Naim and Baer (3) report on a graph the solubility of argon at nine ethanol mole fractions from 0.00 to 0.20 at six temperatures from 277.15 to 303.15 K. The graph was read by the compiler and a data sheet was prepared. Krestov and Nedel'ko (13) report the solubility of argon at 14 concentrations from 0.00 to 0.50 mole fraction alcohol at ten degree intervals from 303.15 to 343.15 K. They also calculated the number of molecules of argon per 100 molecules of solvent. For practical purposes this may be taken as the mole fraction times 100. See the data sheet. Krestov and Patsatsiya (22) show the solubility of argon in the system and the Gibbs energy of solution on graphs at five degree intervals from 298.15 to 313.15 K. No data sheet was prepared. Krestov, Nedel'ko, Vinogradov and Patsatsiya (31) discuss thermodynamic characteristics of argon dissolution in the system at ethanol mole fractions from 0.0 to 0.8 and temperatures from 283.15 to 313.15 K. Cargill and Morrison (5) report the solubility of argon at eight concentrations between 0.0 and 1.0 mole fraction ethanol at many temperatures between 277.75 and 336.95 K. See the data sheet. Lannung (37) reports the solubility of argon in 0.500 mole fraction ethanol at three temperatures. When his values are converted to suitable units they agree well with the work of both Cargill and Morrison (5) and Krestov and Nedel'ko (13).

3. Argon + Water + Methanol + Ethanol

Krestov and Vinogradov (25) report the solubility of argon 0.70 to 0.95 mole fraction water with various ratios of methanol and ethanol at temperatures of 283 - 313 K. The paper was not available and there is no data sheet.

4. Argon + Water + 1-Propanol

Krestov and Nedel'ko (11) report the solubility of argon in aqueous 1-propanol at six concentrations from 0.00 to 0.50 mole fraction alcohol and of 10 degree intervals from 303.15 to 343.15 K. See the data sheet.

5. Argon + Water + 2-Propanol

Krestov and Nedel'ko (12) report the solubility of argon at 15 concentrations from 0.00 to 0.50 mole fraction 2-propanol at 10 degree intervals from 303.15 to 343.15 K. See the data sheet.

6. Argon + Water + 1-Butanol

Argon + Water + 2-Butanol

8. Argon + Water + 2-Methyl-l-propanol

Krestov, Nedel'ko and Slyusar (17) presented graphs of argon Bunsen coefficient values up to 0.04 mole fraction alcohol at up to six temperatures from 288.15 to 313.15 K. No data sheets were prepared.

9. Argon + Water + 2-Methyl-2-propanol

Cargill and Morrison (5) measured the solubility of argon at nine alcohol mole fractions from 0.00 to 0.84 and at many temperatures from 277.75 to 333.95 K. See data sheet. Krestov, Nedel'ko and Slyusar (17) show a small graph of the argon Bunsen coefficient at 15 alcohol mole fractions from 0.0 to 1.0 mole fraction alcohol at six temperatures from 283 to 313 K. No data sheet was prepared. The authors (35) studied the system further in a paper that was not available to us.

10. Argon + Water + 1,2-Ethanediol

Ben-Naim (2) measured the solubility of argon in water + 1,2-ethanediol at 11 concentrations of 1,2-ethanediol over the entire composition range at five temperatures from 278.15 to 298.15 K. The compiler read values from a graph to prepare a data sheet. Krestov and Nedel'ko (9, 31) show a small scale graph of the argon solubility up to a mole fraction of 0.25 at temperatures from 298.15 to 343.15 K and discuss the thermodynamic characteristics of argon dissolution in the system. No data sheet was prepared.

11. Argon + Water + Methanol + 1,2-Ethanediol

Krestov and Vinogradov (26) report the solubility of argon from 0.60 to 0.95 mole fraction water, 0.025 - 0.30 mole fraction methanol and 0.025 - 0.30 mole fraction 1,2-ethanediol at 10 degree intervals from 283.15 to 313.15 K. In a second paper (19) they discuss thermodynamic characteristics of the solution process. See the data sheet.

12. Argon + Water + 1,2,3-Propanetriol

Krestov and Nedel'ko (8) reported the solubility of argon in the system at 13 1,2,3-propanetriol mole fractions from 0.00 to 0.30 at seven temperatures from 313.15 to 343.15 K. A data sheet was prepared. Krestov, Patsatsiya and Vinogradov (23) reported on a small graph the argon solubility at 1,2,3-propanetriol mole fractions up to 0.25 and four temperatures from 293.15 to 313.15 K. No data sheet was prepared. Krestov, Nedel'ko, Vinogradov and Patsatsiya (31) used the solubility data to calculate thermodynamic characteristics of argon dissolution in the system at temperatures of 283.15 to 343.15 K and 1,2,3-propanetriol mole fractions up to 0.25.

13. Argon + Water + Methanol + 1,2,3-Propanetriol

Krestov and Vinogradov (26) studied the system at mole fractions of water from 0.70 to 0.95, methanol 0.025 to 0.30 and 1,2,3-propanetriol from 0.025 to 0.30, and at ten degree temperature intervals from 283.15 to 313.15 K. A data sheet was prepared. Krestov, Vinogradov, Nedel'ko, and Patsatsiya (34) discussed thermodynamic properties of argon in tricomponent water + alcohol solvents and Krestov and Vinogradov (19) discussed specifically the thermodynamics of argon dissolution of this system.

14. Argon + Water + 1,2-Ethanediol + 1,2,3-Propanetriol

Krestov and Vinogradov (18) report the solubility and thermodynamics of argon dissolution in the system of mole fractions of water from 0.75 to 0.95, of 1,2-ethanediol and 1,2,3-propanetriol from 0.025 to 0.20 at ten degree intervals from 283.15 to 313.15 K. A data sheet was prepared.

15. Argon + Water + 2,2'-Oxybisethanol

Krestov, Egorova, and Trostin (28) reported the solubility of argon at ten 2,2'-oxybisethanol mole fractions from 0.00 to 0.50 and at five degree intervals from 293.15 to 313.15 K. The data were presented in a graph which the compiler read to prepare a data sheet.

16. Argon + Water + 1,4-Dioxane

Ben-Naim and Moran (4) measured the solubility of argon at 14 mole fractions over the entire composition range at five degree intervals from 278.15 to 298.15 K. The data were presented in a graph which was read by the compiler to prepare a data sheet. Krestov and Nedel'ko (10) measured the solubility of argon at eight 1,4-dioxane mole fractions from 0.00 to 0.50 and at six temperatures from 298.15 to 343.15 K. The values of the Gibbs energy of solution were tabulated but the solubility values were presented in a small graph. No data sheet was prepared.

17. Argon + Water + 2-Propanone

Krestov, Patsatsiya and Vinogradov (23) show a small scale graph of the solubility of argon at 15 2-propanone mole fractions from 0.00 to 0.60 at five degree intervals from 298.15 to 313.15 K. No data sheet was prepared. The thermodynamic characteristics of argon dissolution in the system are discussed by Krestov and Nedel'ko (24). Several other papers of Krestov et al. report argon solubilities in the system in the presence of added electrolytes. The papers are referenced in the argon + water + electrolyte evaluation section.

18. Argon + Water + Formic Acid

Krestov, Nedel'ko and Zheleznyak (21) report graphically the solubility of argon at twelve formic acid mole fractions from 0.00 to 1.00 at temperatures of 288.15, 298.15, 308.15, and 323.15 K. The Gibbs energies of solution are tabulated. No data sheet was prepared. The system is discussed further, and velocity of sound data given by Krestov and Zheleznyak (27).

19. Argon + Water + Acetic Acid

Krestov, Nedel'ko and Zheleznyak (20) report the solubility of argon at twelve acetic acid mole fraction from 0.00 to 1.00 at temperatures of 288.15, 298.15, 308.15, and 323.15 K. A data sheet was prepared. Also see (27).

20. Argon + Water + Butanoic Acid

Zheleznyak and Krestov (28) report argon solubility values of argon at twelve butanoic acid mole fractions from 0.00 to 1.00 at temperatures of 288.15, 298.15, 308.15, and 323.15 K. A data sheet was prepared. The paper also contains velocity of ultrasound data on the system.

21. Argon + Water + Formamide

Krestov, Nedel'ko and Polishchuk (15) show the solubility of argon at nine formamide mole fractions from 0.00 to 1.00 at temperatures of 283.15, 288.15, 298.15, and 308.15 K on small graphs. The thermodynamic characteristics of solution are tabulated. No data sheet was prepared.

22. Argon + Water + Dimethylformamide

Krestov, Nedel'ko and Polishchuk (16) show the solubility of argon at sixteen dimethylformamide mole fractions at temperatures of 283.15, 288.15, 298.15, and 308.15 K on small scale graphs. Gibbs energy of solution and other thermodynamic characteristics are tabulated. The paper also contains data on the effect of added LiCl, NaCl, KCl, and CsCl on argon solubility in the system. No data sheet was prepared.

23. Argon + Water + Nitromethane

Friedman (7) reports the solubility of argon at 298.00 K in water, nitromethane, water saturated nitromethane, and nitromethane saturated water. See the data sheet.

The Ivanovo Research Institute group of Krestov, et al. is very active in the area of gas solubility in mixed solvents. Not all of their papers are readily available. The following papers probably do not contain additional solubility data, but they do give further information on the argon + water + organic component systems studied by the group. They discuss the mixed solvent systems (29), thermodynamic calculations (30), solubility coeffici-ents (32) and temperature coefficients at solubility (33). They have calculated the change in heat capacity from their solubility data in the mixed solvent systems (14). A brief English summary of their work on aqueous alcohol systems is available (36).

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Ivanov. Khim. Tekhnol. Inst. 1973, 144; Chem. Abstr. 1974, 81, 42178s.
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Krestov, G. A.; Nedel'ko, B. E.; Slyusar, V. P. Deposited Doc. 1976,
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Krestov, G. A.; Nedel'ko, B. E. Conf. Int. Thermodynam. Chim. {C.R.}
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COMPONENTS :			ORIGINAL MEASUR	REMENTS:		
1. Argon; Ar; 7440	0-37-1	1	Ben-Naim, A.			
2. Water; H <sub>2</sub> O; 77			J. Phys. Chem. 1967, 71, 4002-4007.			
3. Methanol; CH <sub>3</sub> OH						
5						
VARIABLES:			PREPARED BY:	······································		
	.15 - 298.1	5		. L. Long		
P/kPa: 101	.325 (1 atm			2		
Mol Fraction/X <sub>3</sub> : (	0 - 1.00					
EXPERIMENTAL VALUES:					·····	
Mol Fraction		Ostwa	ald Coefficie	ent*/L		
Methanol/X3	278.15 K	283.15 K	288.15 K	293.15 к	298.15 K	
0.00	0.04825	0.04325	0.0395	0.03675	0.03425	
0.03	0.0510	0.04325	0.04175	0.0390	0.0370	
0.06	0.0510	0.04675	0.0435	0.04125	0.0395	
0.10	0.0510	0.0475	0.04475	0.0430	0.0415	
0.15	0.05025	0.04775	0.0460	0.04475	0.0440	
0.20	0.0510	0.04925	0.0480	0.0470	0.04675	
0.25	0.0530	0.05175	0.05125	0.05125	0.0515	
0.30	0.0560	0.0560	0.0560	0.05625	0.0570	
0.50	0.088	0.090	0.091	0.093	0.095	
0.70	0.146	0.146	0.148	0.150	0.154	
0.90	0.221	0.222	0.224	0.226	0.228	
1.00	0.264	0,266	0.268	0.268	0.270	
<u> </u>		AUXILIARY	INFORMATION			
ÆTHOD/APPARATUS/PR	OCEDURE :		SOURCE AND PUR	ITY OF MATERI	AIC.	
			l		ALO;	
The water-methanol by weight, and eac gassed by evacuati vessel is magnetic connected to a gas meter system. The immersed in a wate correction was mad change in the comp tions after degass	th solution on. The sa ally stirre buret and entire app thermosta le for the s position of	was de- turation d, and is a mano-, paratus is t. No slight the solu-		tion given.		
The apparatus (1) that the gas has t to the saturation lary tubes coming the vessel, and on ring of the liquid of the solution to ings from the mano and the vessel are ring. Readings ta is complete yield absorbed per volum	three entry vessel, two from the bo he at the to cleauses the orise, thus ometer, gas a noted befor ken after s the amount	points capil- ottom of pp. Stir- e level s read- buret, ore stir- saturation of gas	(author). REFERENCES: 1. Ben-Nai	ecision ± 0 tire range m, A.; Baer	of mixtures	

,

Argon Solubilities up to 200 kPa

86 Argon Solubilitie	es up to 200 kPa
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. Ethanol or Ethyl alcohol; C <sub>2</sub> H <sub>5</sub> OH 64-17-5	<u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68 - 80.
3. Water; H <sub>2</sub> O; 7732-18-5	
VARIABLES: T/K: 285.65 - 308.15 P/kPa: 101.325 (1 atm) Mole fraction: 0.500	PREPARED BY: P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	
T/K Bunsen Coefficient Co α	Ostwald Solubility/So pefficient cm3 Ar (STP) kg <sup>-1</sup> L solvent
285.65 0.109 291.15 0.109 308.15 0.110	0.114 125. 0.116 126. 0.124 129.
The above solubility values are in a so "equivalent amounts" of ethanol and wat fraction of 0.500.	olvent which is a mixture of ter. This apparently means a mole
The compiler calculated the Ostwald and solubility values. The later can be cor Cargill and Morrison on the next page. of data is satisfactory.	mpared directly with the values of
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
	l. Argon. Linde Liquid Air Factory.
	Contains 0.5 per cent by volume N2.
	2. Ethanol. Alcohol absolutes, pharm. dan. Distilled twice from over freshly prepared quicklime.
	3. Water. Conductivity, $\kappa = 2 \times 10^{-7}$ .
APPARATUS / PROCEDURE :	ESTIMATED ERROR:
ATAMIDS/TROCEDURE:	δ <b>T/K = 0.03</b>
	REFERENCES :
	<ol> <li>von Antropoff, A.</li> <li><u>Z</u>. <u>Elektrochem</u>. 1919, <u>25</u>, 269.</li> </ol>
	I Contraction of the second

Organic Solver	nts and Water 87
COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Argon; Ar; 7440-37-1	Ben-Naim, A.; Baer, S.
2. Water; H <sub>2</sub> O; 7732-18-5	Trans. Faraday Soc. 1964, 60,
3. Ethanol or Ethyl Alcohol:	1736 - 1741.
С <sub>2</sub> н <sub>5</sub> он; 64-17-5	
VARIABLES:	PREPARED BY:
T/K: 277.15 - 303.15 P/kPa: 101.325 (1 atm)	P. L. Long
Ethanol/X3: 0 - 0.20	
EXPERIMENTAL VALUES:	
Mol Fraction Ostwald	1 Coefficient*/L
Ethanol/X <sub>3</sub> 277.15K 281.15K	285.15K 289.15K 297.15K 303.15K
0.0 0.0495 0.045	0.0415 0.039 0.0345 0.032 0.043 0.0405 0.0365 0.034
0.015 0.051 0.0465 0.03 0.051 0.0465	0.043 0.0405 0.0365 0.034 0.0435 0.041 0.037 0.035
0.045 0.050 0.0465	0.043 0.041 0.0375 -
0.06 0.0485 0.045 0.09 0.0445 0.0445	0.0425 0.0405 0.0375 0.036 0.0405 0.039 0.0375 0.0365
0.12 0.042 0.0405	0.0385 0.0385 0.0375 0.037
0.15 0.041 0.0405 0.20 0.045 0.0455	
*Ostwald coefficients read from compiler. Values were read to	m graph in original paper by the
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
A calibrated dissolution vessel	1. Argon. No information given.
contains degassed solvent. Gas is introduced wet from a calibrated gas	
buret system. Stirring the liquid forces it up to 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 entire apparatus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 hrs. of	3. Ethanol. No information given.
slow stirring (1).	ESTIMATED ERROR:
	$\delta x_{1}/x_{1} = 0.002$
	REFERENCES :
	1. Ben-Naim, A.; Baer, S. <u>Trans. Faraday Soc</u> . 1963, <u>59</u> , 2735.

Mol Fraction	303	.15 K	313	.15 K	323	.15 К		ω.	N.	1.
Ethanol/X <sub>3</sub>	molecules Ar 100 molec <sup>-1</sup> solution x10 <sup>2</sup>	Ostwald Coefficient at $P_{tot} = 1$ atm $\gamma_0 \times 10^3$	molecules Ar 100 molec <sup>-1</sup> solution x10 <sup>2</sup>	Ostwald Coefficient at $P_{tot} = 1$ atm $\gamma_0 \times 10^3$	molecules Ar 100 molec <sup>-1</sup> solution x10 <sup>2</sup>	Ostwald Coefficient at $P_{tot} = 1$ atm $\gamma_0 \times 10^3$		Ethanol;	Water; H	1. Argon; Ar
0.00	0.222	28.10	0.1975	24.50	0.1735	22.00		с <sub>2</sub> н <sub>6</sub> о;	<sup>H</sup> 2 <sup>0;</sup>	F.
0.02	-	28.53	-	25.52	-	23.42		N	~	7
0.04	-	28.64	-	26.54	-	24.83		6	7732-18-	144
0.06	-	28.62	-	27.83	-	27.44		0	73	40-
0.08	-	29.01	-	29.72	-	29.73		5	N	μ
0.10	0.2895	30.02	0.2935	30.51	0.3150	32.72		4	10	7
0.15	-	34.83	-	36.74	-	39.91		Ļ	រ័	Ļ
0.20	0.4550	41.03	0.4970	44.83	0.5390	48.44		64-17-5	0	
0.25	-	49.34	-	54.84	-	58.63		տ		
0.30	0.7575	59.42	0.8575	65.02	0.8870	69.02				
0.35	-	70.24	-	76.01	-	80.03				
0.40	1.1680	80.72	1.2603	86.73	1.312	90.73				
0.45	-	92.02	-	97.83	-	103.02				
0.50	1.6650	102.4	1.7580	108.04	1.823	112.31				
	333	.15 К	343	.15 к			-			H E
0.00	0.1615	20.50	0.153	19.80					Izv. Vyssh. Uchebn. Zaved., Khim.	EVALUATOR: Krestov,
0.02	-	22.43	-	20.84					3	st
0.04	-	24.42	-	23.33					2	O OR
0.06	-	27.04	-	26.72					N G	
0.08	-	30.11	-	31.21						G.
0.10	0.3290	34.02	0.340	35.34					ז`∙ ר	•
0.15	-	44.03	-	46.83				1	Ľ۱۲	A.
0.20	0.600	54.02	0.634	57.02				-	Ĕ	~
0.25	-	65.01 75.32	1.000	68.11 78.02				ł		z
0.30 0.35	0.9625	75.32 85.74	1.000	88.53					712	Ned
0.40	1.450	96.41	1.442	99.44					163	le]
	1.4JU -	107.03	1.992	110.32				11		l'ko
0.45		117.42	1.960	120.73					219	~

Argon Solubilities up to 200 kPa

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Krestov, G. A.; Nedel'ko, B. E.
2. Water; H <sub>2</sub> O; 7732-18-5 3. Ethanol; C <sub>2</sub> H <sub>6</sub> O; 64-17-5	Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1971, 14, 1173-1177.
VARIABLES: T/K: $303.15 - 343.15$ P/kPa: $101.325$ (1 atm) $C_2^{H_6}O/X$ : $0.00 - 0.50$	PREPARED BY: P. L. Long H. L. Clever
EXPERIMENTAL VALUES:	eding page

ΔΗΥΤΙ	τάρν	INFORMATION
AUXIL	LAKI	INFORMATION

METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The apparatus is a modification of the apparatus of Ben-Naim and Baer (1). Modifications include a de- gassing vessel connected directly to the absorption cell, a bubbling ves- sel to presaturate the gas with solvent vapor, and means to maintain the gas supply at a constant pres- sure. The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (2,3).	<ol> <li>Argon. Specially pure grade designated MRTU-6-02-377-66. Contained not more than 0.004% N<sub>2</sub> and 0.001% O<sub>2</sub></li> <li>Water. Doubly distilled.</li> <li>Ethanol.</li> </ol>
The solvent is degassed by boiling four hours under vacuum. Degassed solvent is admitted to the 639 ml absorption cell. Gas, presaturated with solvent vapor, is admitted. After 30 minutes rapid stirring 98%	ESTIMATED ERROR: $\delta T/K = 0.005$ $\delta \gamma/\gamma = 0.002 - 0.004$
of the gas is dissolved. Slow stirring is continued for 2 hours to insure equilibrium. The mixed solvent is prepared by weight. The composition is checked after the solution process by density and refractive index measurements.	<pre>REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59, 2735. 2. Nedel'ko, B. E.; Krestov, G. A. Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1969, 12, 998. 3. Patsatsiya, K. M.; Krestov, G. A. Zh. Fiz. Khim. 1970, 44, 1835.</pre>

. Argon; Ar; 7440-37-1 . Ethanol or Ethyl Alcohol; $C_{2}H_{5}OH$ ; 64-17-5 . Water; $H_{2}O$ ; 7732-18-5 . Wol Fraction T/K $10^{4}$ T <sup>-1</sup> $log(s_{0}/cm^{3}kg^{-1})$ $s_{0}/cm^{3}$ . Ethanol/X <sub>2</sub> 0.00 277.75 36.01 1.670 46. 0.00 287.45 <sup>a</sup> 34.79 1.645 44. 0.00 297.55 <sup>a</sup> 33.61 1.493 31. 0.00 297.55 <sup>a</sup> 33.61 1.493 31. 0.00 297.55 <sup>a</sup> 33.01 1.452 28. 0.00 302.95 <sup>a</sup> 33.01 1.452 28. 0.00 320.95 <sup>a</sup> 33.01 1.452 28. 0.00 320.95 <sup>a</sup> 33.02 1.413 25. 0.00 320.95 <sup>a</sup> 33.61 1.328 21. 0.00 329.45 <sup>a</sup> 20.6 1.328 24. 0.00 329.45 <sup>a</sup> 30.6 1.328 24. 0.00 329.45 <sup>a</sup> 30.6 1.328 24. 0.00 329.45 <sup>a</sup> 30.6 1.328 24. 0.00 339.45 <sup>a</sup> 25.46 1.306 20. 0.004 277.85 36.00 1.679 47. 0.021 277.85 36.00 1.683 48. 0.044 277.85 36.00 1.683 48. 0.065 293.05 34.12 1.554 35. 0.065 313.05 31.96 1.471 29. 0.065 316.05 22.68 1.423 26. 0.105 297.65 34.77 1.563 36. 0.105 298.05 35.56 1.532 34. 0.105 298.05 35.56 1.532 34. 0.105 318.05 31.45 1.498 31. 0.105 322.85 30.97 1.491 31. 0.105 333.05 30.03 1.491 31.	2 13 <sub>kg</sub> -1 8 2 9 2 6 1 5 3 9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<sup>13</sup> kg-1 8 2 9 2 6 1 5 3 9
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$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	8 2 9 2 6 1 5 3 9
Ethanol/X2         Image: constraint of the second state of the second st	8 2 9 2 6 1 5 3 9
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2
0.065         313.05         31.96         1.471         29.           0.065         319.65         31.29         1.449         28.           0.065         336.95         29.68         1.423         26.           0.105         277.85         36.00         1.619         41.           0.105         287.65         34.77         1.563         36.           0.105         293.15         34.12         1.547         35.           0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	8
0.065         319.65         31.29         1.449         28.           0.065         336.95         29.68         1.423         26.           0.105         277.85         36.00         1.619         41.           0.105         287.65         34.77         1.563         36.           0.105         293.15         34.12         1.547         35.           0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	2
0.065         336.95         29.68         1.423         26.           0.105         277.85         36.00         1.619         41.           0.105         287.65         34.77         1.563         36.           0.105         293.15         34.12         1.547         35.           0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	6
0.105277.8536.001.619410.105287.6534.771.563360.105293.1534.121.547350.105298.0535.561.532340.105308.5532.411.503310.105318.0531.451.498310.105322.8530.971.49131	
0.105         287.65         34.77         1.563         36.           0.105         293.15         34.12         1.547         35.           0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	5
0.105         293.15         34.12         1.547         35.           0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	6
0.105         298.05         35.56         1.532         34.           0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	
0.105         308.55         32.41         1.503         31.           0.105         318.05         31.45         1.498         31.           0.105         322.85         30.97         1.491         31.	-
0.105 318.05 31.45 1.498 31. 0.105 322.85 30.97 1.491 31.	
0.105 322.85 30.97 1.491 31.	
0.220 293.35 34.10 1.681 48.	. 0
0.220 307.55 32.52 1.699 50.	
0.220 317.65 31.49 1.725 53.	1
0.415 288.25 34.70 1.994 98.	6
0.415 297.95 33.57 1.988 97.	
0.415 318.15 31.44 2.017 104.	1
0.513 288.65 34.65 2.119 132	
0.513 308.15 32.45 2.127 134	
0.513 318.15 31.44 2.130 135	
0.513 333.05 30.03 2.151 142	
0.770 280.55 35.65 2.325 211	
0.770 283.05 35.34 2.326 212	
0.770 290.35 34.45 2.322 210	
0.770 298.25 25.54 2.321 209	•
0.770 308.15 32.45 2.328 213	•
0.770 312.65 31.99 2.332 215	•
0.770 322.55 31.00 2.343 220 0.770 332.25 30.10 2.348 223	•

COMPONENTS :			
		ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1		Cargill, R. W.; Mor:	rison, T. J.
2. Ethanol or Ethyl Alcol 64-17-5	hol; C <sub>2</sub> H <sub>5</sub> OH;	J. <u>Chem. Soc</u> ., <u>Farac</u> 71, 618-634.	lay <u>Trans</u> <u>I</u> . 1975,
3. Water; H <sub>2</sub> O; 7732-18-5			
VARIABLES:		PREPARED BY:	
T/K: 277.75 - 336	5.95	P. L. L	ong
EXPERIMENTAL VALUES:		L	
Mol Fraction T/ Ethanol/X2	<sup>7</sup> K 10 <sup>4</sup> T-1	log(S <sub>O</sub> /cm <sup>3</sup> kg <sup>-1</sup> )	S <sub>o</sub> /cm <sup>3</sup> kg <sup>-1</sup>
	65 34.65		313
0.998 293. 0.998 298.	0534.252525.54	2.491 2.491	310 310
0.998 303.	05 33.01	2.484	305
0.998 308.	05 33.01 15 32.46	2.482	303
0.998 312. 0.998 328.	95 31.96 05 30.49 75 30.06	2.476 2.474	299 298
0.998 332.	75 30.06	2.473	297
<sup>a</sup> Values from refer Dr. Cargill kindly provid Data Project. The Solubility, S <sub>o</sub> , calcu sure of 1 atm per kg of s	led the log S nlated as cm <sup>3</sup> solvent.	-	
Language and the first		INFORMATION	
METHOD: Absorption of gas h of liquid. The Morrison an		NSOURCE AND PURITY OF MA	
of liquid. The Morrison an (1) method was modified by valve A with a constant fl by measuring the mass of t	nd Billett replacing ow pump, and the solvent	NSOURCE AND PURITY OF MA 1. Argon. British O: per cent pure, s ed brine.	kygen Co. Gas 99.9 tored over saturat-
of liquid. The Morrison an (1) method was modified by valve A with a constant fl	nd Billett replacing ow pump, and the solvent oe (instead	nSOURCE AND PURITY OF MA 1. Argon. British O: per cent pure, s	kygen Co. Gas 99.9 tored over saturat-
of liquid. The Morrison an (1) method was modified by valve A with a constant fl by measuring the mass of t leaving the absorption tub	nd Billett replacing ow pump, and the solvent oe (instead	nSOURCE AND PURITY OF MA 1. Argon. British O: per cent pure, so ed brine. 2. Ethanol. Source p	kygen Co. Gas 99.9 tored over saturat- not given. Spectro-
of liquid. The Morrison and (1) method was modified by valve A with a constant fl by measuring the mass of t leaving the absorption tub of the volume) on a top-pa APPARATUS/PROCEDURE: The solv degassed using the vapor p (1). Each determination ab 20 cm <sup>3</sup> of gas in up to 500	replacing ow pump, and he solvent of (instead in balance. rent is pump principl sorbs about o cm <sup>3</sup> of	<ul> <li>NSOURCE AND PURITY OF MA</li> <li>1. Argon. British O: per cent pure, seed brine.</li> <li>2. Ethanol. Source rescopic grade.</li> <li>3. Water. Deionized</li> <li>ESTIMATED ERROR: δT/K =</li> </ul>	kygen Co. Gas 99.9 tored over saturat- not given. Spectro- - - - 0.1 = 0.5 reproducible
of liquid. The Morrison and (1) method was modified by valve A with a constant fl by measuring the mass of t leaving the absorption tub of the volume) on a top-pa APPARATUS/PROCEDURE: The solv degassed using the vapor p (1). Each determination ab 20 cm <sup>3</sup> of gas in up to 500 solvent, which was recycle density of the solvent was after each run, so that th composition of the solutio	d Billett replacing ow pump, and the solvent be (instead in balance. rent is pump principl sorbs about o cm <sup>3</sup> of checked he exact	<ul> <li>NSOURCE AND PURITY OF MA</li> <li>1. Argon. British O: per cent pure, step ed brine.</li> <li>2. Ethanol. Source to scopic grade.</li> <li>3. Water. Deionized</li> <li>ESTIMATED ERROR: δP/mmHg = Solubility values to within 0.5 per cent</li> <li>REFERENCES:</li> <li>1. Morrison, T. J.</li> </ul>	<pre>kygen Co. Gas 99.9 tored over saturat- not given. Spectro- = 0.1 = 0.5 reproducible = (authors). Billett, F.</pre>
of liquid. The Morrison and (1) method was modified by valve A with a constant fl by measuring the mass of t leaving the absorption tub of the volume) on a top-pa APPARATUS/PROCEDURE: The solv degassed using the vapor p (1). Each determination ab 20 cm <sup>3</sup> of gas in up to 500 solvent, which was recycle density of the solvent was after each run, so that th	d Billett replacing ow pump, and the solvent be (instead in balance. rent is pump principl sorbs about o cm <sup>3</sup> of checked he exact	<ul> <li>NSOURCE AND PURITY OF MA</li> <li>1. Argon. British O: per cent pure, step ed brine.</li> <li>2. Ethanol. Source to scopic grade.</li> <li>3. Water. Deionized</li> <li>ESTIMATED ERROR: δP/mmHg = Solubility values to within 0.5 per cent</li> <li>REFERENCES:</li> <li>1. Morrison, T. J.</li> </ul>	<pre>kygen Co. Gas 99.9 tored over saturat- not given. Spectro- = 0.1 = 0.5 reproducible = (authors). ; Billett, F. 3, 2033; 1952,3819. ritical Tables,</pre>

92	Argon Solubilities up to 200 kPa					
COMPONE	NTS:			ORIGINAL MEASU	REMENTS:	
1. Ar	gon; Ar; 7440-3	7-1		Krestov, G. A.; Nedel'ko, B. E.		
2. Water; H <sub>2</sub> O; 7732-18-5				Izv. Vyssh. Khim. Tekhn	Uchebn. $\frac{\text{Uchebn. } 2}{\text{ol. } 1970}$	aved., Khim. 13, 490 - 493.
3.1-	Propanol; C <sub>3</sub> H <sub>8</sub> O	; 71-23-8				
VARIABLES: T/K: 303.15 - 343.15 P/kPa: 101.325 (1 atm) C <sub>3</sub> H <sub>8</sub> O/X <sub>3</sub> : 0.0 - 0.50				PREPARED BY:	P. L. Lo H. L. Cl	
EXPERIN	ÆNTAL VALUES:					
	Mol Fraction 1-Propanol			icient at te	emperature	т/ү т *
	×3	303.15 K	313.15	К 323.15 К	333.15 K	343.15 K
	0.00 0.10 0.20 0.30 0.40 0.50	32.0 36.4 54.1 97.0 126.9 144.2	29.7 41.8 70.7 114.7 145.0 162.4	29.7 50.6 85.6 131.0 149.7 187.2	31.2 70.7 117.2 180.1 215.7 235.2	35.7 99.8 163.7 250.9 298.37 327.5
		Ostwald	coeffici	ent at stand	ard condit	ions/Y'
	0.00 0.10 0.20 0.30 0.40 0.50 *In the notati to ml gas dm conditions pr	• of solv	ent. The	e Ostwald coe	efficient a	28.3 79.2 129.9 199.1 236.8 259.9
		<u> </u>	AUXILIARY	INFORMATION		
METHOD 'APPARATUS / PROCEDURE: The apparatus is a modification of the apparatus of Ben-Naim and Baer (1). Modifications include a de- gassing vessel connected directly to the absorption cell, a bubbling ves- sel to presaturate the gas with solvent vapor, and means to maintain the gas supply at a constant pressure. The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (2,3). The solvent is degassed by boiling four hours under vacuum. Degassed solvent is admitted to the 639 ml			designat Containe N <sub>2</sub> and 0 2. Water.	Specially ed MRTU-6- d not more .001% O <sub>2</sub> . Doubly dis pl. OR: &T/K = 0	pure grade 02-377-66. than 0.004% tilled.	
with After of th stirr insur is pr tion proce	absorption cell. Gas, presaturated with solvent vapor, is admitted. After 30 minutes rapid stirring 98% of the gas is dissolved. Slow stirring is continued for 2 hours to insure equilibrium. The mixed solvent is prepared by weight. The composi- tion is checked after the solution process by density and refractive			2. Nedel'ko Izv. Vyss Khim. Tel 3. Patsatsiy	, A.; Baer Soc. 1963, B. E.; Kr Sh. Uchebn Sh. Uchebn Sh. 1969 (a, K. M.;	0.002 - 0.004 , S. <u>Trans</u> . <u>59</u> , 2735. restov, G. A. . <u>Zaved</u> ., <u>Khim</u> . 9, <u>12</u> , 998. Krestov, G. A. 0, <u>44</u> , 1835.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Krestov, G. A.; Nedel'ko, B. E.
2. Water; H <sub>2</sub> O; 7732-18-5	Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1971, 14, 1006 - 1009.
<pre>3. 2-Propanol or Isopropyl alcohol; C<sub>3</sub>H<sub>8</sub>O; 67-63-0</pre>	<u>MIIII.</u> <u>IEKIIIOI</u> . 1971, <u>14</u> , 1000 - 1009.
VARIABLES: T/K: 303.15 - 343.15	PREPARED BY: P. L. Long
P/kPa: 101.325 (1 atm) $C_{3}H_8O/X$ : 0.0 - 0.50	H. L. Clever

Mol Fraction 2-Propanol					
2-FIOPANOI	Ostwald coe	fficient	at star	ndard condi	tions/y <sub>o</sub> x 10 <sup>3</sup>
x_3	303.15 3	13.15	323.15	333.15	343.15
0.00		24.50	22.00	20.50	19.80
0.02		27.02	25.01	24.02	23.54
0.04		28.12	26.34	25.73	25.43
0.06		29.11	27.63	27.04	27.02
0.08 0.10		30.14	28.94	28.53	28.54
0.10		30.93 33.02	30.02	30.02	30.01 35.04
0.12		38.44	33.01 39.02	34.01 40.03	43.02
0.20		46.51	48.33	50.64	56.63
0.25		56.12	58.04	61.04	70.23
0.30		64.83	68.52	71.23	86.22
0.35		75.04	79.01	82.02	96.01
0.40		85.52	90.02	92.51	107.5
0.45		96.43	100.0	103.5	119.0
0.50	101.1 1	06.1	109.2	113.9	130.0
	AUXILI	ARY INFO	RMATION		
METHOD / APPARATUS / PROCEDURE :			CE AND PUE	RITY OF MATER	
The apparatus is a mod the apparatus of Ben-N (1). Modifications in	aim and Baer clude a de-			Specially ed MRTU-6-	
the absorption cell, a	bubbling ve			ed not more ).001% 0 <sub>2</sub> .	than 0.004%
the absorption cell, a sel to presaturate the	bubbling ve gas with	s- 2.	N <sub>2</sub> and (	0.001% 0 <sub>2</sub> .	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath	s- in 3.	N <sub>2</sub> and (	).001% 0 <sub>2</sub> . Doubly dis	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling	s- in 2. 3.	N <sub>2</sub> and ( Water. 2-Propar	).001% O <sub>2</sub> . Doubly dis nol.	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed	s- in 2. 3.	N <sub>2</sub> and ( Water.	).001% O <sub>2</sub> . Doubly dis nol.	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml	s- in 3. ESTI	N <sub>2</sub> and ( Water. 2-Propar	D.001% O <sub>2</sub> . Doubly dis nol. DR:	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas,	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate	s- in 3. ESTI	N <sub>2</sub> and ( Water. 2-Propar	$0.001 \ 0_2.$ Doubly dis nol. $0R:$ $\delta T/K = 0$	than 0.004% tilled.
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted.	s- in 3. ESTI	N <sub>2</sub> and ( Water. 2-Propar	$0.001 \ 0_2.$ Doubly dis nol. $0R:$ $\delta T/K = 0$	than 0.004%
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is After 30 minutes rapid	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted. stirring 98	s- in 2. 3. EST) d	N <sub>2</sub> and ( Water. 2-Propar	$0.001 \ 0_2.$ Doubly dis nol. $0R:$ $\delta T/K = 0$	than 0.004% tilled.
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is After 30 minutes rapid of the gas is dissolve stirring is continued	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted. stirring 98 d. Slow for 2 hours	s- 2. 3. ESTI d %	N <sub>2</sub> and ( Water. 2-Propar MATED ERR	0.001% $O_2$ . Doubly dis nol. OR: $\delta T/K = 0$ $\delta \gamma/\gamma = 0$	than 0.004% tilled. .005 .002 - 0.004
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is After 30 minutes rapid of the gas is dissolve stirring is continued insure equilibrium. T	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted. stirring 98 d. Slow for 2 hours he mixed	s- 2. 3. ESTI d %	N <sub>2</sub> and ( Water. 2-Propar MATED ERRO ERENCES: Bgn-Naim	0.001% $O_2$ . Doubly dis nol. OR: $\delta T/K = 0$ $\delta \gamma/\gamma = 0$ , A.; Baer,	than 0.004% tilled. .005 .002 - 0.004 , S. Trans.
solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is After 30 minutes rapid of the gas is dissolve stirring is continued insure equilibrium. T solvent is prepared by	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted. stirring 98 d. Slow for 2 hours he mixed weight. Th	s- 2. 3. ESTI d % to REFI 1.	N <sub>2</sub> and ( Water. 2-Propar MATED ERR ERENCES: Ben-Naim Faraday Nedel'ko	$\delta T/K = 0$ $\delta T/K = 0$ $\delta \gamma/\gamma = 0$ $\delta \gamma = 0$ $\delta \gamma = 0$	than 0.004% tilled. .005 .002 - 0.004 .59, <u>Trans</u> . .59, 2735. cestov, G. A.
the absorption cell, a sel to presaturate the solvent vapor, and mea the gas supply at a co sure. The entire appa immersed in a 400 lite controlled to within 0 The solvent is degasse four hours under vacuu solvent is admitted to absorption cell. Gas, with solvent vapor, is After 30 minutes rapid of the gas is dissolve stirring is continued insure equilibrium. T	bubbling ve gas with ns to mainta nstant pres- ratus is r water bath .005 K (2,3) d by boiling m. Degassed the 639 ml presaturate admitted. stirring 98 d. Slow for 2 hours he mixed weight. Th after the	s- 2. 3. ESTI d % to REFI 1.	N <sub>2</sub> and ( Water. 2-Propar MATED ERR ERENCES: Ben-Naim Faraday Nedel'ko Izv. Vy	0.001% $O_2$ . Doubly dis hol. OR: $\delta T/K = 0$ $\delta \gamma/\gamma = 0$ , A.; Baer, <u>Soc</u> . 1963, <u>B.</u> E.; Ki ssh. Uchebi	than 0.004% tilled. .005 .002 - 0.004 , <u>S. Trans</u> . , <u>59</u> , <u>2735</u> .

n	A
J	4

COMPONENTS:			ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-	37-1		Cargill, R. W.; Morrison, T. J.		
<pre>2. 2-Methyl-2-propanol or t-Butanol; C<sub>4</sub>H<sub>9</sub>OH; 75-65-0</pre>			J. <u>Chem</u> . <u>Soc</u> ., <u>Farad</u> 1975, <u>71</u> , 618 - 634.	ay <u>Trans</u> . I.	
3. Water; H <sub>2</sub> O; 7732	-18-5				
EXPERIMENTAL VALUES	:				
Mol Fraction Alcohol/X <sub>2</sub>	Т/К	10 <sup>4</sup> T <sup>-1</sup>	log(S <sub>o</sub> /cm <sup>3</sup> kg <sup>-1</sup> ) <sup>b</sup>	S <sub>o</sub> ∕cm <sup>3</sup> kg <sup>-1</sup> c	
$\begin{array}{c} 0.00\\$	277.75 279.75 283.85 <sup>a</sup> 297.45 <sup>a</sup> 297.55 <sup>a</sup> 298.55 302.95 <sup>a</sup> 309.75 <sup>a</sup> 312.55 <sup>a</sup>	34.33 33.61 33.50 33.01 32.28 32.00	1.670 1.645 1.612 1.570 1.539 1.493 1.484 1.452 1.413 1.400	46.8 44.2 40.9 37.2 34.6 31.1 30.5 28.3 25.9 25.1	
0.00 0.00 0.00	320.95 <sup>a</sup> 329.45 <sup>a</sup> 339.45 <sup>a</sup>		1.364 1.328 1.306	23.1 21.3 20.2	
0.006 0.006 0.006 0.006 0.006 0.006 0.006	277.55 286.15 296.15 303.55 313.85 323.85 333.15	36.03 34.96 33.77 32.95 31.87 30.88 30.02	1.676 1.593 1.504 1.459 1.405 1.365 1.337	47.4 39.2 31.9 28.8 25.4 23.2 21.7	
0.018 0.018 0.018 0.018 0.018 0.018 0.018 0.018	277.75 285.65 296.75 305.15 316.65 323.35 332.25	26.01 35.02 33.71 32.78 31.59 30.93 20.10	1.658 1.587 1.504 1.454 1.400 1.387 1.359	45.5 37.8 31.9 28.4 25.1 24.4 22.9	
0.036 0.036 0.036 0.036 0.036 0.036	278.55 287.35 300.45 309.95 322.55 333.85	35.90 34.80 33.29 32.26 31.01 29.96	1.624 1.549 1.477 1.442 1.410 1.388	42.1 35.4 30.0 27.7 25.7 24.4	
0.058 0.058 0.058 0.058 0.058 0.058	278.25 286.55 295.55 304.45 322.15 332.65	35.94 34.91 33.84 32.85 31.05 30.07	1.548 1.528 1.509 1.501 1.498 1.499	35.3 33.7 32.3 31.7 31.5 31.6	
0.068 0.068 0.068 0.068 0.068 0.068 0.068	278.05 285.85 294.45 303.95 314.45 324.45 333.45	35.97 34.99 33.97 32.91 31.81 30.82 29.99	1.562 1.549 1.541 1.542 1.546 1.554 1.554	36.5 35.4 34.8 35.2 35.8 37.0	
0.102 0.102 0.102 0.102 0.102 0.102 0.102 0.102	277.85 286.45 295.15 303.75 313.65 322.75 333.95	36.00 34.92 33.89 32.93 31.89 30.99 29.95	1.672 1.676 1.681 1.687 1.697 1.704 1.716	47.0 47.4 48.0 48.6 49.8 50.6 52.0	

Organic Solvents and Water 95				
COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Cargill, R. W.; Morrison, T. J.			
2. 2-Methyl-2-propanol or t-Butanol; C <sub>4</sub> H <sub>9</sub> OH; 75-65-0	<u>J. Chem. Soc., Faraday</u> <u>Trans</u> <u>I</u> . 1975, <u>71</u> , 618 - 634.			
3. Water; H <sub>2</sub> O; 7732-18-5				
VARIABLES:	PREPARED BY:			
T/K: 277.75 - 333.95 P/kPa: 101.325 (1 atm)	P. L. Long			
EXPERIMENTAL VALUES:				
Mol Fraction T/K 10 <sup>4</sup> T <sup>-1</sup> Alcohol/X <sub>2</sub>	$\log (S_0/cm^3 kg^{-1})^b S_0/cm^3 kg^{-1} c$			
0.183 278.05 35.97				
0.183 286.85 34.87 0.183 298.95 33.46				
0.183 298.95 33.46 0.183 310.25 32.24	1.945 88.1			
0.183 321.95 31.06	1.946 88.3			
0.183 333.25 30.01	1.957 90.6			
0.356 277.75 36.01				
0.356 287.35 34.80				
0.356 303.55 32.95 0.356 312.85 31.97				
0.356 322.95 30.97				
0.356 333.65 29.98	3 2.223 167			
0.840 286.35 34.93	3 2.491 310			
0.840 286.35 34.93 0.840 295.15 33.89				
0.840 303.25 32.98 0.840 313.35 31.96				
0.840 323.75 30.89				
0.840 333.35 30.00				
Data Project. The Solubility, S <sub>o</sub> , calculated as cm <sup>3</sup> pressure at 101,325 kPa (1 atm) per ko	o values for the use of the Solubility gas at 273.15 K and an Ar partial g of solvent. INFORMATION			
METHOD: Absorption of gas by a thin	SOURCE AND PURITY OF MATERIALS:			
film of liquid. The Morrison and Billett (1) method was modified by replacing valve A with a constant	<ol> <li>Argon. British Oxygen Co. Stored over saturated brine. 99.9 % Ar.</li> </ol>			
flow pump. and by measuring the mass of the solvent leaving the absorption tube (instead of the volume) on a top-	2. 2-Methyl-2-propanol. Reagent grade, 98 percent, boils 82 - 83 oC.			
pan balance.	3. Water. Deionized.			
APPARATUS/PROCEDURE: The solvent is de-	ESTIMATED ERROR: $\delta T/K = 0.1$			
gassed using the vapor pump principle (1). Each determination absorbs about 20 cm <sup>3</sup> of gas in up to 500 cm <sup>3</sup> of	$\delta P/mmHg = 0.5$			
solvent, which was recycled. The	REFERENCES:			
density of the solvent was checked after each run, so that the exact composition of the solution could be determined (2)	1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; 1952,3819			
determined (2).	<ol> <li>International Critical Tables, Volume III, pp 112 - 118.</li> </ol>			
	3. Morrison, T. J.; Johnstone, N. B. J. Chem. Soc. 1954, 3441.			

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#### COMPONENTS: ORIGINAL MEASUREMENTS: 1. Argon; Ar; 7440-37-1 Ben-Naim, A. 2. Water; H<sub>2</sub>O; 7732-18-5 J. Phys. Chem. 1968, 72, 2998 - 3001. 3. 1,2-Ethanediol or Ethylene Glycol; C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>; 107-21-1 VARIABLES: PREPARED BY: T/K: 278.15 - 298.15 P/kPa: 101.325 (1 atm) P. L. Long 1,2-Ethanedio $1/X_3: 0 - 1.00$ **EXPERIMENTAL VALUES:** Mol Fraction Ostwald Coefficient\*/L 1,2-Ethanediol 278.15K 283.15K 288.15K 293.15K 298.15K X<sub>3</sub> 0.048 0.0435 0.0395 0.0365 0.034 0.0 0.0335 0.0355 0.0465 0.042 0.0385 0.015 0.040 0.032 0.044 0.037 0.0345 0.03 0.0305 0.040 0.0365 0.034 0.0325 0.06 0.0295 0.029 0.0315 0.10 0.035 0.0335 0.0255 0.0265 0.0265 0.0285 0.027 0.20 0.025 0.025 0.025 0.30 0.025 0.025 0.0255 0.025 0.025 0.025 0.40 -0.029 0.0285 0.029 0.60 -0.027 0.0325 0.033 0.0335 0.80 \_ 0.032 0.0371 0.0365 \_ 0.0360 1.00 -\*Ostwald coefficients read from graph in original paper by compiler. Values read to the nearest 0.0005. METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS; 1. Argon. No information given. A calibrated dissolution vessel contains degassed solvent. Gas is 3. 1,2-Ethanediol. Fluka's Pure Grade or Analar Grade. The introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to sidearms attached to first was used in most of the the top of the flask and the liquid measurements. returns via a central tube. The amount of gas dissolved is determined via the gas burets. The entire apparatus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 hrs. of slow stirring (1). ESTIMATED ERROR: $\delta X_{1}/X_{1} = 0.002$ **REFERENCES**: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59, 2735.

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Argon Solubilities up to 200 kPa

	Organic Solvents and water					97	
COMPONEN	TS:			ORIGINAL MEASUREMENTS:			
1		7440-37-1		Krestov, G. A.; Vinogradov, V. I.			
2. Wat	er; H <sub>2</sub> O;	7732-18-5		Zh. Fiz. K	him. 1975, <u>49</u> ,	794.	
•	3. Methanol; CH <sub>4</sub> O; 67-56-1				<u>Phys. Chem. 197</u>	), <u>49</u> , 46/.	
4. 1,2 C <sub>2</sub> H	1 <sub>6</sub> 0 <sub>2</sub> ; 107.	-21-1	ylene Glycol;	VINITI No. Deposited	2950-74 25th November 1	1974	
VARIABLES: T/K: 283.15 - 313.15 P/kPa: 101.325 (1 atm) H2O/X2: 0.60 - 0.95 CH4O/X3: 0.025 - 0.30 C2H6O2/X4: 0.025 - 0.30 EXPERIMENTAL VALUES:				PREPARED BY:	P. L. Long		
Solven	t Composi	tion	Ostwald coet	ficient at	standard condit	$ions/\gamma x10^3$	
	Fraction	1					
H <sub>2</sub> 0/X <sub>2</sub>	сн <sub>4</sub> 0/х <sub>3</sub>	<sup>C2<sup>H</sup>6<sup>O</sup>2<sup>/X</sup>4</sup>	283.15 K	293.15 K	303.15 к	313.15 к	
0.95					29.60	25.55	
0.90	0.075	0.025	41.65 38.55	36.30	31.45 29.70	27.50 26.85	
0.90	0.025	0.075	35.30	30.40	27.75	25.55	
0.85	0.10	0.05	39.10 36.40	34.65 32.50	31.15	29.70 27.50	
0.85	0.075 0.05	0.075 0.10	33.70	30.35	29.75 28.35	25.40	
0.80	0.15 0.10	0.05 0.10	40.35 36.35	37.45 32.05	34.20 29.55	32.65 28.15	
0.80	0.05	0.15	29.75	28.70	26.40	24.85	
0.70	0.25 0.20	0.05 0.10	46.50 36.50	46.0 36.60	45.35 36.75	45.60 37.90	
0.70	0.15	0.15	30.00	30.70	31.30	32.50	
0.70	0.10 0.05	0.20 0.25	26.10 26.35	26.85 26.80	27.30 26.00	28.00 26.60	
	0.30		46.65	46.50	47.60	48.90	
0.60	0.20 0.10	0.20 0.30	37.60 26.50	36.05 27.90	34.80 20.00	33.70 30.20	
	Ostwald c ficient.	coefficient	at standard	conditions	is probably the	: Bunsen	
			AUXILIARY	INFORMATION			
	PPARATUS/P				RITY OF MATERIALS		
the ap (1). gassing	paratus c Modificat g vessel		and Baer	<pre>1. Argon. Specially pure grade designated MRTU-6-02-377-66. Contained not more than 0.004% N<sub>2</sub> and 0.001% O<sub>2</sub>.</pre>			
sel to	presatur	ate the ga		2. Water.	Doubly distill	.ed.	
the gas	s supply	at a const	ant pressure	3. Methano	1.		
400 li within	ter water 0.005 K	(2,3).		4. 1,2-Ethanediol.			
		degassed b er vacuum.		ESTIMATED ERF	ROR:	الي ال حيالي المالي الم	
solven absorp with so	four hours under vacuum. Degassed solvent is admitted to the 639 ml absorption cell. Gas, presaturated with solvent vapor, is admitted. After 30 minutes rapid stirring 98% of the gas is dissolved. Slow stirring is continued for 2 hours to insure equilibrium. The mixed solvent is prepared by weight. The composition is checked after the solution process by density and refractive index measurements.				$\delta T/K = 0.005$ $\delta \gamma/\gamma = 0.002$		
of the stirrin insure solven compos solutio				2. Nedel'k Izv. Vy Khim. T 3. Patsats	m, A.; Baer, S. Soc. 1963, 59, o, B. E.; Krest ssh. Uchebn. Za ekhnol. 1969, 1 iya, K. M.; Kre . Khim. 1970, 4	, 2735. cov, G. A. aved., <u>Khim</u> . L2, 998. estov, G. A.	

		7.1901	Colubinatio	3 up to 200 ki	4		
COMPONENTS :				ORIGINAL MEAS	SUREMENTS:		
l. Argon; Ar	; 7440-37	-1	1	Krestov,	G. A.; Ne	del'ko, B	. E.
2. Water; H <sub>2</sub> O; 7732-18-5			Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1969, 12, 1685 - 1691.				
3. 1,2,3-Propanetriol or Glycerol: C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> ; 56-81-5							
VARIABLES:	······································			PREPARED BY:			
Сзня	T/K: 31 P/kPa: 10 O <sub>3</sub> /X3: 0	3.15 - 34 1.325 (1 - 0.30			P. L. H. L.		
EXPERIMENTAL VAL			I				
	0	stwald co	efficien	it in Stand	ard Condi	tions/y_	$\times 10^{3*}$
Mol Fraction 1,2,3-Propae- trial/X <sub>3</sub>	313.15 к	318.15 к	323.15	к 328.15 к	333.15 к	338.15 К	343.15 К
0.00 0.02 0.03 0.04 0.05 0.07 0.09 0.11 0.13 0.15 0.20 0.25 0.30 *The Ostwald Bunsen coef		21.7 20.9 20.2 19.4 18.1 16.8 16.0 15.2 14.5 12.7 11.0	22.0 19.9 19.2 18.5 17.8 16.7 16.6 16.7 16.3 15.8 13.8 11.2 7.7	19.7 19.0 18.3 17.6 16.7 16.8 16.9 16.7 16.2 14.3 12.0 9.4	18.8 18.2 17.5 17.0 16.7 17.9 18.3 18.0 17.6 16.2 13.8 10.7	20.3 18.1 15.1 12.8	19.3 17.9 17.4 17.0 17.5 20.3 21.6 21.6 21.1 20.5 18.4 16.1 13.9
		A	UXILIARY	INFORMATION			
METHOD/APPARATU The apparatu (1). Modifi gassing vess the absorpti sel to presa solvent vapo the gas supp The entire a 400 liter wa within 0.005 The solvent	s is a mo s of Ben- cations i el connec on cell, turate th r, and me ly at a c pparatus ter bath K (2,3).	dificatio Naim and nclude a ted direc a bubblin e gas wit ans to ma onstant p is immers controlle	Baer de- tly to g ves- h intain ressure. ed in a d to	Contain N <sub>2</sub> and 2. Water.	Speciall ted MRTU- ed not mo 0.001% 0 Doubly d	y pure gr 6-02-377- re than 0 istilled.	66. .004%
four hours u solvent is a absorption c with solvent After 30 min of the gas i stirring is insure equil solvent is p composition solution pro	nder vacu dmitted t ell. Gas vapor, i utes rapi s dissolv continued ibrium. repared b	um. Dega o the 639 , presatu s admitte d stirrin ed. Slow for 2 ho The mixed	ssed ml rated d. g 98% ours to	ESTIMATED EF REFERENCES: 1. Ben-Nai Faraday	δτ/κ δγ/γ 	= 0.005 = 0.002 er, S. 1 3, <u>59</u> , 27 Krestov,	rans.

	Organic Solvents and Water 99						
COMPONENTS :		ORIGINAL MEASUREMENTS:					
1. Argon; Ar; 7440-37-1		Krestov, G. A.; Vinogradov, V. I.					
<ol> <li>Water; H<sub>2</sub>O; 7732-18-5</li> <li>Methanol; CH<sub>4</sub>O; 67-56-3</li> </ol>	1	Russ. J. P		<u>9</u> , 794. 975, <u>49</u> , 467.			
4. 1,2,3-Propanetriol or ( C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> ; 56-81-5		VINITI No. Deposited	2950-74 25th November	r 1974			
VARIABLES: T/K: 283.15 P/kPa: 101.32 H2O/X2: 0.70 - CH4O/X3: 0.025 C3H8O3/X4: 0.025	PREPARED BY:	P. L. Long					
EXPERIMENTAL VALUES:							
Solvent Composition ( Mol Fraction	Ostwald coef	ficient at s	tandard cond	$itions/\gamma_0 x 10^3$			
H <sub>2</sub> O/X <sub>2</sub> CH <sub>4</sub> O/X <sub>3</sub> C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> /X <sub>4</sub>	283.15 K	293.15 K	303.15 K	313.15 К			
0.95 0.025 0.025	39.50	33.75	27.75	24.30			
0.90 0.075 0.025 0.90 0.05 0.05 0.90 0.025 0.075	40.35 35.85 30.60	34.60 30.10 26.10	29.10 25.75 22.60	25.45 24.10 21.95			
0.85 0.10 0.05 0.85 0.075 0.075 0.85 0.05 0.10	35.85 32.30 28.95	31.20 27.15 23.75	27.25 24.15 21.40	26.45 23.80 20.20			
0.80 0.15 0.05 0.80 0.10 0.10 0.80 0.05 0.15	37.30 28.55 22.50	33.15 25.20 19.80	29.35 24.00 18.80	28.70 23.00 18.65			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	42.90 33.10 26.00 21.60 17.65	39.95 29.70 24.40 20.25 16.70	36.80 28.85 23.45 19.25 15.60	36.60 28.00 22.90 19.90 15.50			
	AUXILIARY	INFORMATION					
METHOD/APPARATUS/PROCEDURE: The apparatus is a modific the apparatus of Ben-Naim (1). Modifications includ gassing vessel connected of the absorption cell, a bul sel to presaturate the gas solvent vapor, and means the gas supply at a consta The entire apparatus is in 400 liter water bath contra within 0.005 K (2,3).	and Baer de a de- directly to bbling ves- s with to maintain ant pressure nmersed in a	<ol> <li>Argon. designa Contain N<sub>2</sub> and</li> <li>Water.</li> <li>Methano</li> </ol>		ure grade 2-377-66. than 0.004%			
The solvent is degassed by four hours under vacuum. solvent is admitted to the absorption cell. Gas, pro- with solvent vapor, is adm After 30 minutes rapid st: of the gas is dissolved.	ESTIMATED ERR	δ <b>T/K</b> =	0.005 0.002 - 0.004				
stirring is continued for to insure equilibrium. The solvent is prepared by we composition is checked after solution process by densite refractive index measurement	<ol> <li>Ben-Nai Faraday</li> <li>Nedel'k Izv. Vy Khim. T</li> <li>Patsats</li> </ol>	ekhnol. 1969	59, 2735. estov, G. A. Zaved., <u>Khim</u> . , <u>12</u> , 998. Krestov, G. A.				

		ORIGINAL MEASURE	EMENTS:		
0-37-1		Krestov, G. A.; Vinogradov, V. I.			
32-18-5		Izv. Vyssh. Uchebn. Zaved., Khim.			
; C <sub>2</sub> H <sub>6</sub> O <sub>2</sub> ; :	L07-21-1	Khim. Tekhno	<u>1. 1976, 19,</u>	412 - 416.	
	-				
	- 313.15	PREPARED BY:	A L Cramor		
2: 0.75 - (	0.95				
$_4: 0.025 -$	0.20				
		<u></u>			
	twald coer	ricient at sta			
C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> /X <sub>4</sub>	283.15 K	293.15 К	303.15 K	313.15 К	
	<u></u>	29.30	25.50	23.60	
		25.90	24.15	22.50 21.30	
0.075	26.50	23.30	21.20	20.10	
0.05	25.50	23.10	20.90	20.30 19.10	
0.10	24.25	20.55	18.80	18.20	
0.05	23.70	21.40	20.10	19.50	
0.10	21.40 19.45	19.40		17.35 16.20	
0.05	22.40	20.80	20.25	19.80	
				17.40 15.80	
0.20	16.75	16.45	16.10	16.00	
	AUXILIARY	INFORMATION			
EDURE :		SOURCE AND PURIT	TY OF MATERIALS:		
ons include	a de-	Contained	l not more that		
ell, a bubb	ling ves-	2	2		
		2. Water. I	oubly distil	Led.	
t a constan	t pressure		nediol.		
oath contro			panetriol.		
		COTMATED CDDOD			
ted to the	639 ml	ESTIMATED ERROR	-		
				- 0.004	
rapid stir	ring 98%	DEPENDING -			
inued for 2	hours	1. Ben-Naim,	A.; Baer, S.	Trans.	
ced by weig	ht. The	Faraday Sc	<u>oc</u> . 1963, <u>59</u> ,	2735.	
		<ol> <li>Nedel'ko, B. E.; Krestov, G. A. Izv. Vyssh. Uchebn. Zaved., Khim.</li> </ol>			
		Izv. Vyssh	<u>uchebn. zav</u>	<u>vea., Knim</u> .	
by density measuremen	and	Khim. Tekh 3. Patsatsiya	1000000000000000000000000000000000000	2, 998. stov, G. A.	
	riol; C <sub>3</sub> H <sub>8</sub> C K: 283.15 a: 101.325 2: 0.75 - C 3: 0.025 - 4: 0.025 - 4: 0.025 - 4: 0.025 0.025 0.025 0.025 0.025 0.05 0.075 0.05 0.075 0.10 0.15 0.05 0.10 0.15 0.20 Efficient un Efficient un CEDURE: a modifica Ben-Naim a ons include onnected di elt a by the dist in mature canstant atus is imme bath contro 2,3). egassed by vacuum. D ted to the Gas, pressor, is admir rapid stir ssolved. S inued for 2 brium. The red by weig	32-18-5 ; $C_{2}H_{6}O_{2}$ ; 107-21-1 riol; $C_{3}H_{8}O_{3}$ ; K: 283.15 - 313.15 a: 101.325 2: 0.75 - 0.95 3: 0.025 - 0.20 4: 0.025 - 0.20 4: 0.025 - 0.20 4: 0.025 - 0.20 0.025 - 29.80 0.05 - 28.00 0.05 - 25.50 0.075 - 24.25 0.10 - 23.10 0.05 - 23.70 0.10 - 21.40 0.15 - 19.45 0.05 - 22.40 0.10 - 19.80 0.15 - 17.95 0.20 - 16.75 Efficient under standra AUXILIARY CEDURE: a modification of Ben-Naim and Baer onnected directly to ell, a bubbling ves- te the gas with nd means to maintain t a constant pressure atus is immersed in a bath controlled to 2,3). egassed by boiling vacuum. Degassed ted to the 639 ml Gas, presaturated or, is admitted. rapid stirring 98% ssolved. Slow inued for 2 hours brium. The mixed red by weight. The	0-37-1 32-18-5 ; $C_2H_6O_2$ ; $107-21-1$ riol; $C_3H_8O_3$ ; K: 283.15 - 313.15 a: $101.325$ 2: $0.75 - 0.95$ 3: $0.025 - 0.20$ 4: $0.025 - 0.20$ 4: $0.025 - 0.20$ fion Ostwald coefficient at state $C_3H_8O_3/X_4$ 283.15 K 0.025 34.45 0.025 29.80 2.500 24.60 0.075 26.50 2.300 0.05 25.50 0.05 25.50 0.05 23.70 0.10 21.40 0.10 21.40 0.15 19.45 0.05 22.40 0.10 21.40 0.15 19.45 0.05 22.40 0.10 19.80 0.15 17.95 0.20 16.75 0.20 10 0.12 12.2 Ethar 0.2 Water. In 0.2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	

COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Krestov, G. A.; Egorova, V. I.; Trostin, V. N.		
2. Water; H <sub>2</sub> O; 7732-18-5	<u>Zh. Strukt. Khim</u> . 1976, <u>17</u> , 373 -375.		
3. 2,2'-Oxybis-Ethanol or Diethylene Glycol; C <sub>4</sub> H <sub>10</sub> O <sub>3</sub> ; 111-46-6	$\underline{J}$ . <u>Struct</u> . <u>Chem</u> . 1976, <u>17</u> , 324 - 326.		
VARIABLES:	PREPARED BY:		
T/K: 293.15 - 313.15 P/kPa: 101.325 (1 atm) $C_4H_{10}O_3/X_3$ ; 0.0 - 0.50	P. L. Long H. L. Clever		
EXPERIMENTAL VALUES:	L		
Mol Fraction Ostwald	1 coefficient*/ $\gamma_{\rm T}$ x 10 <sup>3</sup>		
С <sub>4</sub> H <sub>10</sub> O <sub>3</sub> /Х <sub>3</sub> 293.15 К 298.15	5 K 303.15 K 308.15 K 313.15 K		
0.00 35.8 33.6	30.8 28.8 26.6		
0.05 30.0 27.8 0.10 26.2 24.5			
0.15 23.5 22.2	21.6 $21.2$ $21.0$		
0.20 21.6 21.1	20.8 20.6 20.4		
0.30 20.6 20.4 0.35 20.0 20.3	20.3 20.2 20.2 20.4 20.5 20.8		
0.40 20.3 20.6	21.0 21.2 21.6		
0.45 20.8 21.3 0.50 21.3 22.0	21.8 22.4 22.9		
0.50 21.3 22.0	22.7 23.4 24.2		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
The apparatus is a modification of the apparatus of Ben-Naim and Baer (1). Modifications include a de- gassing vessel connected directly to the absorption cell, a bubbling ves-	<pre>1. Argon. Specially pure grade designated MRTU-6-02-377-66. Contained not more than 0.004% N<sub>2</sub> and 0.001% O<sub>2</sub>.</pre>		
sel to presaturate the gas with solvent vapor, and means to maintain	2. Water. Doubly distilled.		
the gas supply at a constant pres- sure. The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (2,3).	3. 2,2'-Oxybis-Ethanol.		
sure. The entire apparatus is immersed in a 400 liter water bath	3. 2,2'-Oxybis-Ethanol. ESTIMATED ERROR: $\delta T/K = 0.005$ $\delta \gamma/\gamma = 0.002 - 0.004$		

102 Argon Solubilitie	es up to 200 kPa
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Ben-Naim, A.; Moran, G.
2. Water; H <sub>2</sub> O; 7732-18-5	Trans. Faraday Soc. 1965, 61,
3. 1,4-Dioxane; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; 123-91-1	821 - 825.
VARIABLES:	PREPARED BY:
T/K: 278.15 - 298.15 P/kPa: 101.325 (1 atm)	P. L. Long
1,4-Dioxane/X <sub>3</sub> : 0 - 1.00	
EXPERIMENTAL VALUES:	
Mol Fraction Os	twald Coefficient*/L
1,4-Dioxane/X <sub>3</sub> 278.15K 283	.15K 288.15K 293.15K 298.15K
	0435 0.0395 0.0365 0.034 0425 0.0395 0.037 0.035
	0425 0.0395 0.037 0.035 0415 0.039 0.037 0.035
0.06 0.0415 0.	0395 0.038 0.0365 0.0355
0.09 0.0405 0.	039 0.038 0.0375 0.037 0395 0.0395 0.039 0.039
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0395 0.0395 0.039 0.039 0415 0.042 0.042 0.0425
0.20 0.0465 0.	047 0.0475 0.048 0.049
	054 0.055 0.056 0.057 061 0.0625 0.064 0.0655
	061 0.0625 0.064 0.0655 078 0.088 0.082 0.084
0.6 0.106 0.	110 0.112 0.115 0.118
	134 0.138 0.142 0.146 - 0.162 0.167 0.172
	rom graph in original paper by
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A calibrated dissolution vessel	1. Argon. No information.
contains degassed solvent. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up to 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 entire apparatus is thermostated in a water bath. 97% of the gas dissolves in 30 min., the remainder in 4 hrs. of	3. 1,4-Dioxane. Source not given. Refluxed over KOH + Ag <sub>2</sub> O for 48 hours, distilled.
stirring (1).	ESTIMATED ERROR:
	$\delta x_1 / x_1 = 0.002$
1	
	REFERENCES: 1. Ben-Naim, A.; Baer, S. <u>Trans. Faraday Soc</u> . 1963, <u>59</u> , 2735.
	L

Mol Fraction	Ostw	ald coeffi	cient/y x	10 <sup>3</sup>	Buns	en coeffic	ient/γ <sub>o</sub> x	10 <sup>3</sup>	ЕХР	ω •	N •	•
Acetic Acid	288.15 K	298.15 K	308.15 K	323.15 K	288.15 K	298.15 K	308.15 K	323.15 K	ERIMENTAL	Acetic	Water;	Argon
0.00	36.2	30.6	25.3	19.4	34.3	28.0	22.4	16.4	UT2			~
0.05	30.1	28.1	25.5	21.2	28.5	25.7	22.6	17.9	F	Ac	H <sub>2</sub>	Ar
0.1	31.0	29.1	27.0	23.5	29.4	26.7	23.9	19.9	<	id;	°;	~•
0.2	36.9	34.5	32.5	28.2	35.0	31.6	28.8	23.8	VALUES		~ 1	74
0.3	46.9	44.6	41.9	37.4	44.5	40.9	37.1	31.6	g	Ê	71	4
0.4	59.5	56.9	53.8	47.8	56.4	52.1	47.7	40.4	S	ι 3	22	Ŷ
0.5	72.4	69.3	65.8	59.3	68.6	63.5	58.3	50.1	••	г <sub>з</sub> соон	占	ω N
0.6	85.6	82.8	78.8	70.8	81.1	75.8	69.8	59.8		ğ	ģ	Ĩ
0.7	102.4	98.8	93.9	85.0	97.1	90.5	83.2	71.8		Ξ,	ហំ	-
0.8	126.6	122.0	117.0	106.0	120.0	111.8	103.7	89.6		6		
0.9	149.1	144.7	139.8	129.0	141.3	132.5	123.9	109.0		4		
1.0	182.2	177.9	172.4	160.4	172.7	163.0	152.7	135.5		4		

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COMPONENTS: Argon; Ar; 7440-37-1 Ī Krestov, G. A.; Nedel'ko, B. E. Zheleznyak, N. I. Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1975, 18, 1893 - 1896. ORIGINAL MEASUREMENTS:

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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Krestov, G. A.; Nedel'ko, B. E.
2. Water; H <sub>2</sub> O; 7732-18-5	Zheleznyak, N. I. Izv. Vyssh. Uchebn. Zaved., Khim.
3. Acetic Acid; CH <sub>3</sub> COOH; 64-19-7	<u>Khim</u> . <u>Tekhnol</u> . 1975, <u>18</u> , 1893 - 1896.
<b>3</b> • •	
VARIABLES:	PREPARED BY:
T/K: 288.15 - 323.15	P. L. Long
P/kPa: 101.325 (1 atm) CH <sub>3</sub> COOH/X <sub>3</sub> : 0.0 - 1.0	-
EXPERIMENTAL VALUES:	
	eding Page
AUXILIARY	INFORMATION
METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus is a modification of the apparatus of Ben-Naim and Baer	1. Argon. Specially pure grade designated MRTU-6-02-377-66.
(1). Modifications include a de-	Contained not more than 0.004%
gassing vessel connected directly to the absorption cell, a bubbling ves-	N <sub>2</sub> and 0.001% O <sub>2</sub> .
sel to presaturate the gas with	2. Water. Doubly distilled.
solvent vapor, and means to maintain the gas supply at a constant pres-	3. Acetic Acid.
sure. The entire apparatus is	
immersed in a 400 liter water bath controlled to within 0.005 K (2,3).	
The solvent is degassed by boiling	
four hours under vacuum. Degassed solvent is admitted to the 639 ml	ESTIMATED ERROR:
absorption cell. Gas presaturated	$\begin{array}{rcl} \delta  \mathbf{T} / \mathbf{K} &= \ 0.005 \\ \delta  \gamma / \gamma &= \ 0.002 \ - \ 0.004 \end{array}$
with solvent vapor, is admitted. After 30 minutes rapid stirring 98%	6 y y y = 0.002 = 0.004
of the gas is dissolved. Slow	REFERENCES :
stirring is continued for 2 hours to insure equilibrium. The mixed	1. Ben-Naim, A.; Baer, S. Trans.
solvent is prepared by weight. The	Faraday Soc. 1963, 59, 2735. 2. Nedel'ko, B. E.; Krestov, G. A.
composition is checked after the solution process by density and	Izv. Vyssh. Uchebn. Zaved., Khim.
refractive index measurements.	<u>Khim. Tekhnol. 1969, 12, 998.</u> 3. Patsatsiya, K. M.; Krestov, G. A.
	Zh. Fiz. Khim. 1970, 44, 1835.

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COMPONENTS :								
COMPONENTS :			RIGINAL MEASUREMENTS:					
1. Argon; Ar; 7440-37-1			heleznyak, N. I.; Kre	estov, G. A.				
2. Water; H <sub>2</sub> O; 7732-18-5			h. Strukt. Khim. 1978	$, \frac{19}{10}, 818 - 823.$				
3. Butanoic Acid; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; 107-92-6			. Struct. Chem. 1978,	, <u>19</u> , 704 - 709.				
VARIABLES:			REPARED BY:					
P/kPa:	288.15 - 323. 101.325 (1 a		H. L. Cleve	er				
	0.0 - 1.00							
EXPERIMENTAL VALUES:								
Mol Fraction	Argon Solul	bility,	, Solvomolality/C <sub>sm</sub> x	$10^{3}$ -1				
C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> /X <sub>3</sub>	(mol Ar at T a	and 760	0 mmHg)(55.51 mol sol	vent) <sup>-1</sup>				
	288.15	298.15	308.15	323.15				
0.00	1.644	1.450		1.004				
0.05	1.992 2.913	1.761 2.651	1.545 2.430	1.174 1.918				
0.20 0.30	5.280 8.211	4.971 7.767	4.580 7.258	3.933 6.368				
0.40	11.99	11.48	10.91	9.609				
0.50 0.60		15.64 20.85	15.03 19.83	13.39 18.14				
0.70		26.40 32.66	25.38 31.56	23.14 29.01				
0.90 1.00	40.61	39.81 49.09	38.82 48.41	36.03 47.57				
	AUXILIARY INFORMATION							
METHOD APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Ben-Naim and Baer (1). Modifications include a degassing vessel connected directly to the absorption cell, a bubbling vessel to presaturate the gas with solvent vapor, and means to maintain the gas supply at a constant pressure. The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (2,3).			IFORMATION					
The apparatus is a mapparatus of Ben-Na Modifications inclusivessel connected di absorption cell, a presaturate the gas vapor, and means to supply at a constan- entire apparatus is liter water bath con-	JRE: modification of im and Baer (1) de a degassing rectly to the bubbling vesse with solvent maintain the t pressure. Th immersed in a	f the ). l to gas he 400	OURCE AND PURITY OF MATER	pure grade 02-377-66. than 0.004%				

106 Argon Solubilitie	s up to 200 ki a			
COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Friedman, H. L.			
2. Water; H <sub>2</sub> O; 7732-18-5	J. Am. Chem. Soc. 1954, 76,			
3. Nitromethane; CH <sub>3</sub> NO <sub>2</sub> ; 75-52-5	3294 - 3297.			
5 2				
VARIABLES:	PREPARED BY:			
T/K: 287.95 - 298.00	P. L. Long			
P/kPa: 93.33 (700 mmHg)				
EXPERIMENTAL VALUES:				
T/K Mol Fraction	Bunsen Ostwald			
x <sub>1</sub> x 10 <sup>3</sup> Co	efficient Coefficient α L			
Water				
287.95	0.0404			
	0.0403			
0.0309	0.0407			
1	0.0384 0.0405 Av.			
298.00	0.0342 0.0338			
0.0251	0.0312 0.0340 Av.			
Water saturated wit	h nitromethane (ca. 4 mol %)(2)			
298.00	0.0317			
······································	0.0317 0.0291 0.0317 Av.			
	ted with water (ca. 12 mol %)(2)			
298.00	0.139			
	0.141			
	0.128 0.140 Av.			
The author reported Ostwald coefficients measured at about 700 mmHg. The Bunsen coefficient and mole fraction solubilities at 101.325 kPa (1 atm) were calculated by the compiler with the assumptions that the gas is ideal, and that Henry's law is obeyed.				
The argon Ostwald coefficient at 298.0	0 K in dry nitromethane is 0.143.			
AUXILIARY	INFORMATION			
METHOD: Gas absorption. The method was	SOURCE AND PURITY OF MATERIALS:			
essentially that employed by Euken and Herzberg (1). Euken and Herzberg's				
method was modified by use of magnetic stirring and by use of electrical	2. Water. Conductivity water.			
contacts in the mercury manometer to aid in balancing the pressure.	-			
	3. Nitromethane. Source not given. Dried by filtering at 253 K, distilled.			
	ESTIMATED ERROR:			
APPARATUS/PROCEDURE: The solvent was de-	$\delta T/K = 0.05$ $\delta P/mmHg = 0.3$			
gassed by vacuum. The procedure, re- peated 5 - 10 times, was to alternate	$\delta L/L = 0.03$			
5 - 15 s evacuation and rapid stirring				
to produce cavitation. In the solubil- ity measurement, gas presaturated with				
solvent vapor, was brought into con-	1. Euken, A.; Herzberg, G.			
tact with about 80 ml of solvent in the saturation vessel. Initial con-	Z. Phys. Chem. 1950, 195, 1.			
ditions were established by a time	2. Corelli, R. M.			
extrapolation. Solubility equilibrium was approached from both under- and	Aerotecnica 1950, 30, 32.			
super-saturation.				
extrapolation. Solubility equilibrium was approached from both under- and	2. Corelli, R. M. <u>Aerotecnica</u> 1950, <u>30</u> , 32. <u>Chem. Abstr</u> . 1952, <u>46</u> , 3370e.			

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1 2. Pentane; C <sub>5</sub> H <sub>12</sub> ; 109-66-0	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
VARIABLES:	Hung. J. Ind. Chem. 1976, <u>4</u> , 269-280
T/K: 298.15 - 313.51 P/kPa: 101.325 (1 atm)	PREPARED BY: S. A. Johnson
EXPERIMENTAL VALUES:	

T/K Mol Fraction Bunsen Ostwald Coefficient Coefficient  $x_1 \times 10^3$ α L 2.84 0.550 0.600 298.15 313.15 2.14 0.403 0.462

The mole fraction solubilities and the Bunsen coefficients were calculated by the compiler.

Smoothed Data:  $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_{1} = -14,643 + 97,876 T$ 

The above equation reproduced exactly the two solubility values, but it is not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems, indicates the 298.15 K solubility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low.

AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.
	DATA CLASS:
	ESTIMATED ERROR:
	δx <sub>1</sub> /X <sub>1</sub> = 0.03 at 298.15 K
	REFERENCES :
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip</u>. Egy. Kozl. 1957, <u>1</u>, 55. Chem. Abstr. 1961, <u>55</u>, 3175h.</pre>

108 Argon S	Solubilities up to 200 kPa		
COMPONENTS:	EVALUATOR:		
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Hexane; C<sub>6</sub>H<sub>14</sub>; 110-54-3</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.		
CRITICAL EVALUATION: The solubility of argon in hexane at 101.325 kPa was measured in two labora- tories. Clever, Battino, Saylor, and Gross (1) reported three solubility values between 288.15 and 313.75 K. Makranczy, Megyery-Balog, Rusz, and Patyi (2) reported solubility values at 298.15 and 313.15 K.			
The Makranczy et al. value at 298.15 K is 2.0 per cent higher, and the 313.15 K value 16.7 percent lower than the Clever et al. solubility values.			

The Makranczy et al. 313.15 K argon solubility value appears to be low for all of the hydrocarbons. See the evaluation of argon in octane and argon in decane for further evidence.

The Clever et al. data and the Makranczy et al. value at 298.15 K were combined in a linear regression of Gibbs energy as a function of temperature to obtain a tentative set of thermodynamic functions and mole fraction solubility values for the argon in hexane system.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

> $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = -2,843.6 + 59.272 T$ Std. Dev.  $\Delta G^{\circ} = 26.4$ , Coef. Corr. = 0.9991  $\Delta H^{\circ}/J \mod^{-1} = -2,843.6, \Delta S^{\circ}/J K^{-1} \mod^{-1} = -59.272$

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

#### TABLE 1. Solubility of argon in hexane at 101.325 kPa. Tentative mole fraction solubility and Gibbs energy of solution as a function of temperature.

т/К	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
288.15	2.63	14,236
293.15	2.57	14,532
298.15	2.52	14,828
303.15	2.48	15,128
308.15	2.43	15,421
313.15	2.39	15,717
318.15	2.35	16,014

The partial and apparent molal volumes of argon dissolved hexane reported by Masterton, Robins and Slowinski (3) and by Ng and Walkley (4) are in Table 2.

TABLE 2. Partial and apparent molal volumes of argon in hexane.

Т/К	$v_1/cm^3 mo1^{-1}$	$\Phi V_1/cm^3 mol^{-1}$	Reference
288.15	46.1 ± 1		4
298.15	51.5 ± 1		4
303.15		50 ± 2	3
308.15	53.5 ± 1		4

1. Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.

Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. <u>Hung. J. Ind.</u> Chem. 1976, 4, 269. Masterton, W. L.; Robins, D. A.; Slowinski, E. J. <u>J. Chem. Eng. Data</u> 2.

3. 1961, <u>6</u>, 531.

4. Ng, W. Y.; Walkley, J. J. Phys. Chem. 1969, 73, 2274.

See page 273 for solubility data above 200 kPa (2 bar) on the system.

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Saturated Hy	vdrocarbons 109
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.
2. Hexane; C <sub>6</sub> H <sub>14</sub> ; 110-54-3	
	J. Phys. Chem. 1957, 61, 1078-1083.
VARIABLES:	PREPARED BY:
T/K: 288.15 - 313.75 P/kPa: 101.325 (1 atm)	P. L. Long A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
288.15 2.60 298.15 2.53 313.75 2.37	0.449 0.474 0.432 0.472 0.396 0.455
For the recommended Gibbs energy equa	Coef. Corr. = 0.9999
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addi- tion of a helical storage for the	dard and research grades were used with no difference in result
solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The solvent is degassed by a modification of the method of Baldwir and Daniel (2).	$\delta X_1 / X_1 = 0.03$ REFERENCES:
	<ol> <li>Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid.</u> 1952, 3819.</li> <li>Baldwin, R. R.; Daniel, S. G.</li> </ol>

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
2. Hexane; C <sub>6</sub> H <sub>14</sub> ; 110-54-3	
	<u>Hung. J. Ind. Chem. 1976, 4</u> , 269-280.
VARIABLES: T/K: 298.15 - 313.15 P/kPa: 101.325	PREPARED BY: S. A. Johnson
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
298.15 2.56 313.15 2.04	0.437 0.477 0.340 0.390
The mole fraction solubilities and Bur the compiler.	nsen coefficients were calculated by
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln$	X <sub>1</sub> = -11,751 + 89.029 T
The above equation reproduces exactly not recommended. Comparisons of the a for argon + octane and argon + decane bility value is probably reliable, but may be up to 30 per cent low.	author's data with the values of others systems indicates the 298.15 K solu-
See the evaluation sheet for this systemations and solubility values.	tem for the recommended Gibbs energy
	INFORMATION
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.
	DATA CLASS:
	ESTIMATED ERROR:
	$\delta x_1 / x_1 = 0.03 \text{ at } 298.15 \text{ K.}$
	REFERENCES:
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u>. <u>1957, 1, 55.</u> <u>Chem. Abstr</u>. 1961, <u>55</u>, 3175h.</pre>

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Heptane; C<sub>7</sub>H<sub>16</sub>; 142-82-5</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.

#### CRITICAL EVALUATION:

The solubility of argon in heptane at 101.325 kPa was reported by two laboratories. Clever, Battino, Saylor, and Gross (1) reported three solu-bility values between 288.15 to 313.45 K. Makranczy, Megyery-Balog, Rusz and Patyi (2) report solubility values at 298.15 and 313.15 K.

The Makranczy et al. solubility value at 298.15 K is 0.80 percent higher, and the 313.15 K solubility value is 20.2 percent lower than the Clever et al. values. The Makranczy et al. 313.15 K solubility value is consis-tently 20-30 percent lower than the values reported from other laboratories for the seven aliphatic hydrocarbons for which comparisons can be made. See the evaluations of argon + octane and argon + decane for comparisons with results from additional laboratories. It is possible there is an unknown, but systematic error in the 313.15 K data of Makranczy et al.

The solubility data of Clever et al. and the 298.15 K solubility value of Makranczy et al. were combined on a one to one weight basis to obtain a tentative equation and solubility values.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

> $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = -1246.52 + 54.007 T$ Std. Dev. AG° = 10.5, Coef. Corr. = 0.9998  $\Delta H^{\circ}/J \text{ mol}^{-1} = -1246.52, \Delta S^{\circ}/J K^{-1} \text{ mol}^{-1} = -54.007$

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

TABLE 1.	Solubility of argon i	in heptane at 101.325 kPa. 🦉	Tentative mole
	fraction solubility a	and Gibbs energy of solution	as a function
	of temperature.		

T/K	Mol Fraction $X_1 \times 10^3$	$\Delta G^{\circ}/J \text{ mol}^{-1}$
288.15	2.54	14,316
293.15	2.52	14,586
298.15	2.50	14,856
303.15	2.48	15,126
308.15	2.46	15,396
313.15	2.44	15,666
318.15	2.42	15,936

Walkley and Jenkins (3) report a partial molal volume of argon in heptane of  $48.3 \text{ cm}^3 \text{ mol}^{-1}$  at 298.15 K by dilatometry. Popov and Dakin (4) report an apparent molal volume of argon in heptane of 50.7 cm<sup>3</sup> mol<sup>-1</sup> at 298.15 K from density measurements over a pressure range.

Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1. 1957, <u>61</u>, 1078.

Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. Hung. J. Ind. 2. Chem. 1976, 4, 269. Walkley, J.; Jenkins, W. I. <u>Trans. Faraday Soc. 1968, 64, 19.</u> Popov, G. A.; Drakin, S. I. <u>Zh. Fiz. Khim. 1974, 48</u>, 631.

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112 Argon Solubiliti	es up to 200 kPa	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.	
2. Heptane; C <sub>7</sub> H <sub>16</sub> ; 142-82-5		
	<u>J. Phys. Chem</u> . 1957, <u>61</u> , 1078 - 1083.	
VARIABLES:	PREPARED BY:	
T/K: 288.15 - 313.45 P/kPa: 101.325 (l atm)	P. L. Long	
EXPERIMENTAL VALUES:		
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L	
288.15 2.53 298.15 2.50 313.45 2.43	0.390 0.411 0.380 0.415 0.363 0.416	
The solubility values were adjusted to 101.325 kPa by Henry's law.	o a partial pressure of argon of	
The Bunsen coefficients were calculate	ed by the compiler.	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	X <sub>1</sub> = -1220.5 + 53.935 т	
Std. Dev. $\Delta G^\circ = 6.9$ ,	Coef. Corr. = 0.9999	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed.	<ol> <li>Argon. Matheson Co. Both standard and research grades were used with no difference in results.</li> <li>Heptane. Phillips Petroleum Co. Pure grade, used as received.</li> </ol>	
The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference		
pressure, and an extra buret for use		
with highly soluble gases. The sol- vent is degassed by a modification of the method of Baldwin and Daniel (2).	ESTIMATED ERROR:	
	$\delta T/K = 0.05$ $\delta P/mmHg = 3$	
	$\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc., 1948, 2033;	

Saturated H	ydrocarbons 113
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Heptane; C<sub>7</sub>H<sub>16</sub>; 142-82-5</li> </ol>	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
VARIABLES:	Hung. J. Ind. Chem. 1976, <u>4</u> , 269-280. PREPARED BY:
T/K: 298.15 - 313.15 P/kPa: 101.325 (latm)	S. A. Johnson
EXPERIMENTAL VALUES:	
$x_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
298.15 2.51 313.15 1.94	0.383 0.418 0.290 0.333
The mole fraction solubilities and Bur the compiler.	nsen coefficients were calculated by
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln$	$X_1 = -13,331 + 94.494 T$
The above equation reproduces exactly not recommended. Comparisons of the a for argon + octane and argon + decane bility value is probably reliable, but may be up to 30 percent low. See the evaluation sheet for this syst equation and solubility values.	author's data with the values of others systems indicates the 298.15 K solu- t that the 313.15 K solubility value
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus of Bodor, Bor, Mohai and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.
	DATA CLASS:
	ESTIMATED ERROR:
	$\delta X_1 / X_1 = 0.03 \text{ at } 298.15 \text{ K.}$
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u> . 1957, <u>1</u> , 55. <u>Chem. Abstr</u> . 1961, <u>55</u> , 3175h.

COMPONENTS:	EVALUATOR:
l. Argon; Ar; 7440-37-1	H. L. Clever Department of Chemistry
2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	Emory University Atlanta, Georgia 30322 U.S.A.
	January 1979

### CRITICAL EVALUATION:

The solubility of argon in octane at 101.325 kPa (1 atm) was reported by four laboratories. Clever, Battino, Saylor and Gross (1) reported three values between 287.15 and 313.45 K. Makranczy, Megyery-Balog, Rusz and Patyi (2) reported two values at 298.15 and 313.15 K. Wilcock, Battino and Danforth (3) reported three values between 283.27 and 313.04 K. Graham and Weale (4) extrapolated three values between 323.15 and 373.15 K from their high pressure solubility measurements.

Only the 313.15 K value of Makranczy <u>et al</u>. departed from the Gibbs energy equation linear in temperature fitted to the data by the method of least squares. That value was omitted and the values of Clever <u>et al</u>., the 298.15 value of Makranczy <u>et al</u>. and the values of Wilcock <u>et al</u>. were fitted by the method of least squares to the equation

 $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_{1} = - 748.37 + 52.559 T$ Std. Dev.  $\Delta G^{\circ} = 49.8$ , Coef. Corr. = 0.9966  $\Delta H^{\circ}/J \text{ mol}^{-1} = - 748.37$ ,  $\Delta S^{\circ}/J K^{-1} \text{ mol}^{-1} = -52.559$ 

for the recommended changes in the thermodynamic properties for the transfer of one mole of argon at 101.325 kPa to the hypothetical unit mole fraction solution.

Table 1 gives the recommended mole fraction solubilities and Gibbs energy change at 101.325 kPa as a function of temperature.

TABLE 1. The solubility of argon in octane at 101.325 kPa. Recommended mole fraction solubility and Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction* X <sub>1</sub> x 10 <sup>3</sup>	∆G°/J mol-l
283.15	2.470	14,134
288.15	2.455	14,396
298.15	2.445	14,659
298.15	2.430	14,922
303.15	2.420	15,185
308.15	2.405	15,448
313.15	2.395	15,710
318.15	2.385	15,973

Rounded to the nearest 0.005 x 10<sup>-3</sup>

The recommended equation reproduces the Graham and Weale values by -1.3, -4.7, and -6.5 percent when extrapolated to 373.15 K.

When all four laboratories data are fitted to a Gibbs energy equation linear in temperature we obtain the equation

 $\Delta G^{\circ}/J \text{ mol}^{-1} = RT \ln X_1 = 244.10 + 49.231 T$ 

Std. Dev.  $\Delta G^{\circ} = 56.8$ , Coef. Corr. = 0.9992

Although the equation reproduces the solubility data fairly well, it is not recommended because it gives an endothermic enthalpy of solution change which is contrary to the sign of the enthalpy solution for other argon + aliphatic hydrocarbon solutions.

COMPONENTS :	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever Chemistry Department
2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	Emory University
	Atlanta, Georgia 30322 U.S.A.
CRITICAL EVALUATION:	
Masterton, Robins, and Slowinksi (5) r argon in octane of 48 $\pm$ 2 cm <sup>3</sup> mol <sup>-1</sup> at	eport an apparent molar volune of 303.15 K and 10132.5 kPa (100 atm).
<ol> <li>Clever, H. L.; Battino, R.; Saylor 1957, 61, 1078.</li> </ol>	, J. H.; Gross, P. M. J. Phys. Chem.
2. Makranczy, J.; Megyery-Balog, K.;	Rusz, L.; Patyi, L. <u>Hung</u> . <u>J. Ind</u> .

- <u>Chem</u>. 1976, <u>4</u>, 269. 3. Wilcock, R. J.; Battino, R.; Danforth, W. F. J. <u>Chem</u>. <u>Thermodyn</u>. 1978, 10, 816.
- 10, 816.
   Graham, E. B.; Weale, K. E. Progress in International Research on Thermodynamics and Transport Properties, Princeton, New Jersey 1962, pp.153-158.
- 5. Masterton, W. L.; Robins, D. A.; Slowinksi, E. J. <u>J. Chem. Eng. Data</u> 1961, <u>6</u>, 531.

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116 Argon Solubilitie	es up to 200 kPa		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;		
2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	Saylor, J. H.; Gross, P. M.		
	<u>J. Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1078 - 1083.		
VARIABLES:	PREPARED BY:		
T/K: 287.15 - 313.15 P/kPa: 101.325	P. L. Long		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L		
287.15         2.44           298.15         2.45           313.45         2.41	0.338 0.335 0.336 0.367 0.324 0.372		
The solubility values were adjusted to 101.325 kPa by Henry's law.	o a partial pressure of argon of		
The Bunsen coefficients were calculate	ed by the compiler.		
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	$X_1 = -388.96 + 51.340 \text{ T}$		
Std. Dev. AG° - 13.6,	Coef. Corr. = 0.9998		
AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1).	dard and research grades were used with no difference in results.		
The modifications include the addi-			
tion of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra bure for use with highly soluble gases. The solvent is degassed by a modifi- cation of the method of Baldwin and Daniel (2).	ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u> . 1952, 3819. 2. Baldwin, R.R.; Daniel, S.G.		

COMPONENTS :	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Graham, E. B.; Weale, K. E.	
2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	Progr. Internat. Res. Thermodynamic and Transport Properties, Symposium on Thermophysical Properties, 2nd., Princeton, 1962, 153 - 158. Chem. Abstr. 1962, 57, 1616i.	
VARIABLES: T/K: 323.15 - 373.15	PREPARED BY: A. L. Cramer	
EXPERIMENTAL VALUES:		

т/к	Mol Fraction $X_1 \times 10^3$	Bunsen Coefficient	Ostwald Coefficient L
323.15	2.4	0.32	0.38
348.15	2.5	0.32	0.41
373.15	2.5	0.35	0.48

The authors estimated the mole fraction solubility at 1 atm from their high pressure solubility values measured between pressure of 50 to 305 bar. See page 274 for the high pressure solubility values for the system.

The compiler calculated the Bunsen and Ostwald coefficients.

The high pressure data were fitted to an equation of the type  $s = aP + bp^2$  to obtain the one atm values given above. The symbol s represents the mole ratio of argon to octane in the saturated solution. The authors converted the calculated value of s at one atmosphere argon pressure to the mole fraction values above.

AUXILIARY INFORMATION					
METHOD: See the high pressure solubility data sheet for details.	SOURCE AND PURITY OF MATERIALS:				
APPARATUS/PROCEDURE:	ESTIMATED ERROR:				
	REFERENCES :				

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COMPONENTS:	ORIGINAL MEASUREMENTS:				
1. Argon; Ar; 7440-37-1 2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.				
	Hung. J. Ind. Chem.1976, 4, 269-280.				
VARIABLES:	PREPARED BY:				
T/K: 298.15 - 313.15 P/kPa: 101.325 (1 atm)	S. A. Johnson				
EXPERIMENTAL VALUES:					
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L				
298.15 2.49 313.15 1.89	0.342 0.373 0.255 0.292				
The mole fraction solubilities and Bun the compiler.	nsen coefficients were calculated by				
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln 2$	X <sub>1</sub> = - 14,268 + 97.204 т				
The above equation reproduces exactly not recommended. Comparisons of the for argon + octane and argon + decane bility value is probably reliable, buy may be up to 30 per cent low.	author's data with the values of others systems indicates the 298.15 K solu-				
See the evaluation sheet for this system equation and solubility values.	tem for the recommended Gibbs energy				
	INFORMATION				
METHOD / APPARATUS / PROCEDURE:	SOURCE AND PURITY OF MATERIALS;				
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.				
	DATA CLASS:				
	ESTIMATED ERROR:				
	$\delta X_1 / X_1 = 0.03 \text{ at } 298.15 \text{ K}$				
	REFERENCES :				
	1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u> . 1957, <u>1</u> , 55. <u>Chem. Abstr</u> . 1961, <u>55</u> , 3175h.				

Saturated Hydrocarbons				
COMPONENTS: ORIGINAL MEASUREMENTS:				
1. Argon; Ar; 7440-37-1	Wilcock, W. J.; Battino, R.; Danforth, W. F.; Wilhelm, E.			
2. Octane; C <sub>8</sub> H <sub>18</sub> ; 111-65-9	<u>J. Chem</u> . <u>Thermodyn</u> . 1978, <u>10</u> , 817 - 822.			
VARIABLES:	PREPARED BY:			
T/K: 283.27 - 313.04 P/kPa: 101.325 (1 atm)	A. L. Cramer			
EXPERIMENTAL VALUES:				
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient $\alpha$ L			
283.27 2.496 298.27 2.336 313.04 2.392	0.3487 0.3616 0.3207 0.3502 0.3228 0.3700			
The Bunsen coefficients were calculate	d by the compiler.			
A preliminary account of this work app $\{C.R.\}$ , 4th 1975, <u>6</u> , 122 - 128.	eared in <u>Conf</u> . <u>Int</u> . <u>Thermodyn</u> . <u>Chim</u> .			
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_{1}$	= -1,023.4 + 53.568 T			
Std. Dev. $\Delta G^{0} = 62.6$ ,	Coef. corr. = 0.9969			
AUXILIARY	INFORMATION			
METHOD: The solubility apparatus is	SOURCE AND PURITY OF MATERIALS:			
based on the design of Morrison and Billett (1), and the version used is described by Battino, Evans and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a	<ol> <li>Argon. Either Matheson Co., Inc. or Air Products and Chemicals. Purest available commercial grade.</li> <li>Octane. Phillips Petroleum Co. 99 mol per cent minimum.</li> </ol>			
residual pressure drops to five micron Solubility Determination. The de-	ESTIMATED ERROR:			
gassed solvent is passed in a thin film down a glass helical tube contain ing solute gas plus solvent vapor at a total ressure of one atm. The volume	$\delta T/K = 0.02 \delta P/mmHg = 0.5 \delta X_1/X_1 = 0.01$			
gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is	<pre>REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F.D.; Danforth, W.F. J.Am.Oil Chem.Soc. 1968, 45, 830. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. Anal. Chem. 1971, 43, 806.</pre>			

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Argon Solubilitie	5 up to 200 kFa				
COMPONENTS :	ORIGINAL MEASUREMENTS:				
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;				
	Saylor, J. H.; Gross, P. M.				
2. 3-Methylheptane; C <sub>8</sub> H <sub>18</sub> ; 589-81-1					
	J. Phys. Chem. 1957, 61, 1078 - 1083.				
VARIABLES:	PREPARED BY:				
<b>Т/К: 287.55 - 313.75</b>	P. L. Long				
P/kPa: 101.325 (1 atm)					
EXPERIMENTAL VALUES:					
T/K Mol Fraction					
$x_{1} \times 10^{3}$	Coefficient Coefficient α L				
287.55 2.46	0.342 0.360				
298.25 2.50 313.75 2.46	0.345 0.377 0.334 0.384				
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	$X_1 = -68.622 + 50.133 \text{ T}$				
Ctd Dow ACP - 22 0	- Coef. Corr. = 0.9994				
$\Delta H^{\circ}/J \text{ mol}^{-1} = -68.622$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -50.133$				
	tion \G°/J mol <sup>-1</sup>				
T/K Mol Frac X <sub>1</sub> x 1	$n^3$				
283.15 2.48					
288.15 2.48 293.15 2.47					
298.15 2.47					
303.15 2.47					
308.15 2.47					
313.15 2.47 318.15 2.47	15,631 15,881				
The solubility values were adjusted to	o a partial pressure of argon of				
101.325 kPa (1 atm) by Henry's law.					
The Bunsen coefficients were calculat	ed by the compiler.				
AUXILIARY	INFORMATION				
METHOD: Volumetric. The solvent is sat-	SOURCE AND PURITY OF MATERIALS:				
urated with the gas as it flows	1. Argon. Matheson Co., Standard				
through an 8 mm x 180 cm glass spiral attached to a gas buret. The total	and research grades used.				
pressure of solute gas plus solvent					
vapor pressure is maintained at 1 atm	2. 3-Methylheptane. Humphrey-				
as the gas is absorbed.	Wilkinson, Inc. Shaken with H <sub>2</sub> SO <sub>4</sub> , washed, dried				
	over Na, distilled through a				
	vacuum column.				
APPARATUS/PROCEDURE: The apparatus is a	ESTIMATED ERROR:				
modification of that of Morrison and	$\delta T/K = 0.05$				
Billett (1). The modifications in-	$\delta P/torr = 3$				
clude the addition of a spiral stor-	$\delta x_1 / x_1 = 0.03$				
age for the solvent, a manometer for a constant reference pressure, and an	REFERENCES:				
extra buret for highly soluble gases.	1. Morrison, T. J.; Billett, F.				
The solvent is degassed by a modifi-	J. Chem. Soc. 1948, 2033;				
cation of the method of Baldwin and	<u>ibid, 1952, 3819.</u>				
Daniel (2).	2. Baldwin, R. R.; Daniel, S. G.				
	J. Appl. Chem. 1952, 2, 161.				

Saturated Hydrocarbons 12				
COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.			
<pre>2. 2,3-Dimethylhexane; C<sub>8</sub>H<sub>18</sub>; 584-94-1</pre>				
	<u>J. Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1078 - 1083.			
VARIABLES:	PREPARED BY:			
T/K: 288.15 - 313.65 P/kPa: 101.325 (1 atm)	P. L. Long			
EXPERIMENTAL VALUES:				
T/K Mole Fraction	Bunsen Ostwald			
$x_{1} \times 10^{3}$	$\begin{array}{cc} \text{Coefficient} & \\ \alpha & \\ \end{array} L$			
288.15 2.56	0.361 0.381			
297.95 2.48 313.65 2.42	0.346 0.377 0.331 0.380			
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -1610.1$	2 + 55.237 T			
Std. Dev. ∆G° = 12.75	, Coef. Corr. = 0.9998			
$\Delta H^{\circ}/J \text{ mol}^{-1} = 1610.12$	, $\Delta S^{\circ}/J K^{-1} mol^{-1} = -55.237$			
T/K Mol Frac X <sub>1</sub> x 1	tion $\Delta G^{\circ}/J \text{ mol}^{-1}$			
$\frac{1}{288.15}$ $\frac{1}{2.55}$				
293.15 2.52				
298.15 2.49				
303.15 2.47				
308.15 2.44 313.15 2.42	•			
313.15 2.39				
The solubility values were adjusted t 101.325 kPa (1 atm) by Henry's law. The Bunsen coefficients were calculat				
AUXILIARY	INFORMATION			
METHOD: Volumetric. The solvent is sat	SOURCE AND PURITY OF MATERIALS:			
urated with the gas as it flows				
through an 8 mm x 180 cm glass spiral	<ol> <li>Argon. Matheson Co., Inc. Stan- datd and Research grades used.</li> </ol>			
attached to a gas buret. The total pressure of solute gas plus solvent	datu and Research grades used.			
vapor pressure is maintained at 1 atm	2. 2,3-Dimethylhexane. Humphrey-			
as the gas is absorbed.	Wilkinson, Inc.			
	Shaken with H <sub>2</sub> SO <sub>4</sub> , washed, dried,			
	over Na, distilled through a vacuum column.			
APPARATUS/PROCEDURE: The apparatus is a	ESTIMATED ERROR:			
modification of that of Morrison and	$\delta T/K = 0.05$			
Billett (1). The modifications in-	$\delta P/torr = 3$			
clude the addition of a spiral stor- age for the solvent, a manometer for	$\delta x_1 / x_1 = 0.03$			
a constant reference pressure, and an	REFERENCES :			
extra buret for highly soluble gases.				
The solvent is degassed by a modifi-	1. Morrison, T. J.; Billet, F.			
cation of the method of Baldwin and Daniel (2).	J. Chem. Soc. 1948, 2033; ibid, 1952, 3819.			
Duniet (2).				
	2. Baldwin, R. R.; Daniel, S. G.			
	J. <u>Appl. Chem</u> . 1952, <u>2</u> , 161.			

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COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;			
2. 2,4-Dimethylhexane; C <sub>8</sub> H <sub>18</sub> ;	Saylor, J. H.; Gross, P.M.			
2. 2,4-Dimethylnexane, C <sub>8</sub> n <sub>18</sub> , 589-43-5				
	J. Phys. Chem. 1957, 61, 1078 - 1083.			
VARIABLES:	PREPARED BY:			
T/K: 288.15 - 313.55	P. L. Long			
P/kPa: 101.325 (1 atm)				
EXPERIMENTAL VALUES:				
T/K Mol Fraction	Bunsen Ostwald			
,	Coefficient Coefficient			
	<u>α L</u>			
288.15 2.73 298.15 2.67	0.379 0.400 0.366 0.400			
298.15 2.67 313.15 2.62	0.353 0.405			
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -1,190.$	о ± 53 23 m			
Std. Dev. $\Delta G^\circ = 7.4$ ,	Coef. Corr. = 0.99994			
$\Delta H^{\circ}/J \text{ mol}^{-1} = -1,190.$	8, $\Delta S^{\circ}/J K^{-1} mol^{-1} = -53.23$			
T/K Mol Frac	tion ΔG°/J mol <sup>-1</sup>			
x <sub>1</sub> x 1	03			
288.15 2.72				
293.15 2.70 298.15 2.68				
303.15 2.66	•			
308.15 2.64	15,213			
313.15 2.62 318.15 2.60	•			
The solubility values were adjusted t 101.325 kPa (1 atm) by Henry's law. The Bunsen coefficients were calculat				
AUXILIARY	INFORMATION			
METHOD: Volumetric. The solvent is sat	SOURCE AND PURITY OF MATERIALS:			
urated with the gas as it flows through an 8 mm x 180 cm glass spiral	1. Argon, Matheson Co., standard			
attached to a gas buret. The total	and research grades used.			
pressure of solute gas plus solvent vapor pressure is maintained at 1 atm	2. 2,4-Dimethylhexane. Humphrey-			
as the gas is absorbed.	Wilkinson, Inc. Shaken with $H_2SO_4$ , washed, dried			
	over Na, distilled through a			
	vacuum column.			
	ESTIMATED ERROR:			
APPARATUS/PROCEDURE: The apparatus is a				
modification of that of Morrison and Billett (1). The modifications in-	$\delta T/K = 0.05$ $\delta P/torr = 3$			
clude the addition of a spiral stor-	$\delta X_1 / X_1 = 0.03$			
age for the solvent, a manometer for				
a constant reference pressure, and an extra buret for highly soluble gases.	1. Morrison, T. J.; Billett, F.			
The solvent is degassed by a modifi-	J. Chem. Soc. 1948, 2033;			
cation of the method of Baldwin and	<u>Ibid</u> , 1952, 3819.			
Daniel (2).	<ol> <li>Baldwin, R. R.; Daniel, S. G. J. <u>Appl</u>. <u>Chem</u>. 1952, 2, 161.</li> </ol>			
[				

Saturated Hydrocarbons

COMPONENTS :	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>2,2,4-Trimethylpentane or Isooctane C<sub>8</sub>H<sub>18</sub>; 540-84-1</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, GA 30322 U.S.A.
	June 1979

### CRITICAL EVALUATION:

The solubility of argon in 2,2,4-trimethylpentane was measured at an argon partial pressure of 101.325 kPa (1 atm) at three temperatures between 288.15 and 313.65 K by Clever, Battino, Saylor, and Gross (1) and at pressures of  $5.07 \times 10^3$  to  $25.33 \times 10^3$  kPa ( 50 to 250 atm) at temperatures of 323.15, 348.15, and 373.15 K by Graham and Weale (2) (see p. 275).

Graham and Weale extrapolated their data to 101.325 kPa (1 atm) by use of an equation of the type  $S = aP + bP^2$  where S is the mole ratio composition of the liquid phase. Below are summarized the mole fraction solubilities of argon at a partial pressure of 101.325 kPa extrapolated from the high pressure data of Graham and Weale and extrapolated from the data of Clever, et al., of lower temperatures and atmospheric pressure.

T/K	Mol	Fraction/X <sub>1</sub> x $10^3$		
	Graham &	Weale	Clever <u>et al</u> .	
323.15	2.7		2.7	
348.15	2.8		2.6	
373.15	2.6		2.4	

Considering the nature of the extrapolation the agreement is satisfactory and gives confidence in the reliability of both sets of data.

Tentative values of the changes in thermodynamic properties for the transfer of one mole of argon from the gas at 101.325 kPa to the hypothetical unit mole fraction solution are based on the data of Clever <u>et al</u>. The values are

 $\Delta G^{\circ}/J \mod^{-1} = - RT \ln X_{1} = -2201.9 + 55.904 T$ 

Std. Dev. ΔG° = 8.0, Coef. Corr. = 0.9999

 $\Delta H^{\circ}/J \mod^{-1} = -2201.9, \quad \Delta S^{\circ}/J K^{-1} \mod^{-1} = -55.904$ 

A table of tentative mole fraction solubility values at an argon partial pressure of 101.325 kPa and the Gibbs energy of solution as a function of temperature are given on the data sheet on the following page.

There are two reports of the partial molal volume of argon in 2,2,4-trimethyl pentane at 298.15 K. Both measurements were by dilatometry at 101.325 kPa pressure. Jolley and Hildebrand (3) report a value of  $50 \pm 1 \text{ cm}^3 \text{ mol}^{-1}$  and Walkley and Jenkins (4) report a value of 49.6  $\pm$  0.5 cm<sup>3</sup> mol<sup>-1</sup>.

 Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.

 Graham E. B.; Weale, K. E. in Progress in International Research on <u>Thermodynamics and Transport Properties</u>, Princeton University (Masi, J. F.; Tsai, D. H., Editors) Academic Press, New York, 1962, p. 153.
 Jolley, J. E.; Hildebrand, J. H. J. Am. Chem. Soc. 1958, 80, 1050.
 Walkley, J.; Jenkins, W. I. <u>Trans. Faraday Soc.</u> 1968, <u>64</u>, 19.

VARIABLES: T/K: 288.15 - 313.65 P/KPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald Coefficient Coefficient $\frac{1}{268.15}$ $\frac{1}{3.02}$ $0.413$ $0.436$ 298.15 2.91 $0.395$ $0.431$ 313.65 2.80 $0.371$ $0.426$ The Bunsen coefficients were calculated by the compiler. The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law. Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln X_1 = -2201.9 + 55.904 T$ Std. Dev. $\Delta G^{\circ} = 8.0$ , Coef. Corr. = $0.9999$ $\Delta H^{\circ}/J \mod^{-1} = -2201.9$ , $\Delta S^{\circ}/J K^{-1} \mod^{-1} = -55.904$ $\frac{1}{13,907}$ 293.15 2.92 14,466 303.15 2.88 14,745 306.15 2.80 15,305 318.15 2.76 15,584 AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The solvent is saturated with the gas 1. Argon, Both Matheson Co., Inc.	124	Argon Solubiliti	es up to 200 kPa				
Saylor, J. H.; Gross, P. M. Saylor, J. H.; Gross, J. M. Saylor, J. H.; Gross, J. H.; Gross, J. H.; Gross, J. M.; Gross, J. H.; Gross, J. M.; Gross, J. M.; J. H.; Gross, J. M.; Gross, J. M.; J. H.; Gross, J. M.; J.; J. H.; Gross, J. M.; J.; J. J. H.; J.; J. J. J.; J.; J.; J. J. J.; J.; J	COMPONENTS :		ORIGINAL MEASUREMENTS:				
octane; $C_{gH_{1g}}$ ; 540-84-1       I. Phys. Chem. 1957, 61, 1078 - 1083.         VARIABLES:       T/K: 288.15 - 313.65       PREPARED BY:         P/KPA: 101.325 (1 atm)       PREPARED BY:       P. L. Long         A. L. Cramer       A. L. Cramer         EXPERIMENTAL VALUES:       T/K NOI Fraction       Bunsen         288.15       2.91       0.395       0.431         298.15       2.91       0.395       0.431         313.65       2.80       0.371       0.426         The Bunsen coefficients were adjusted to an argon partial pressure of 101.325       kRa (1 atm) by Henry's 1aw.       Smoothed Data: $\Delta G^*/J mol^{-1} = -RT ln X_1 = -2201.9 + 55.904 T         Smoothed Data:       \Delta G^*/J mol^{-1} = -RT ln X_1 = -2201.9 + 55.904 T       303.15       2.97         298.15       3.01       13.907       14.166         293.15       2.92       14.466       303.15       2.88         293.15       2.92       14.466       303.15       2.84       15.205         313.15       2.76       15.305       13.505       14.466       2.2.2.4-Trimethylpentane.         METHOD/APPARATUS/PROCEDURE:       SOURCE AND PURITY OF MATERIALS:       1. Argon. Both Matheson Co., Inc.         The solvent is saturated with the gas       Standard and research grades us$	5						
T/K: 288.15 - 313.65 P/KPa: 101.325 (1 atm) EXPERIMENTAL VALUES: $\frac{7/K  MOI \ Fraction}{2 288.15} \frac{3.02}{3.02} \frac{a}{0.413} \frac{b}{0.436} \frac{L}{0.436} \frac{L}{0.433} \frac{a}{0.436} \frac{L}{0.436} \frac{L}{0.433} \frac{a}{0.436} \frac{L}{0.436} \frac{L}{0.4$	2. 2,2,4-Trime octane; C <sub>8</sub> H	thylpentane or Iso- 18; 540-84-1	J. Phys. Chem. 1957, 61, 1078 - 1083.				
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	T/K:	288.15 - 313.65 101.325 (1 atm)	P. L. Long				
$\frac{x_1 \times 10^3}{288.15} \frac{a}{3.02} \frac{a}{0.413} \frac{L}{0.436}$ $\frac{298.15}{298.15} \frac{2.91}{2.91} \frac{0.395}{0.395} \frac{0.431}{0.426}$ The Bunsen coefficients were calculated by the compiler. The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law. Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = -2201.9 + 55.904 T$ Std. Dev. $\Delta G^{\circ} = 8.0$ , Coef. Corr. = 0.9999 $\Delta H^{\circ}/J \mod^{-1} = -2201.9$ , $\Delta S^{\circ}/J \times^{-1} \mod^{-1} = -55.904$ $\frac{T/K}{298.15} \frac{2.97}{293.15} \frac{13.907}{293.15} \frac{13.907}{293.15} \frac{2.97}{293.15} \frac{14.186}{2.92} \frac{14.745}{316.15} \frac{306.15}{2.88} \frac{14.745}{313.15} \frac{306.15}{2.80} \frac{15.5364}{313.15} \frac{2.80}{2.86} \frac{15.5364}{313.15} \frac{2.80}{2.86} \frac{15.5364}{313.15} \frac{2.80}{2.86} \frac{15.5364}{313.15} \frac{2.2.2}{2.4-Trimethylpentane. Enjay}$ Kat how shrough an 8 mm x 180 cm pressure, and an extra burset for use with highly soluble gases. The sol- went is degassed by a modification of the method of Baldwin and Daniel (2). REFERENCES: 1. Morrison, T. J., Billett, F. J. Chem. Soc. 1948, 2033; Thind. 795.7 3819. 2. Baldwin, R. R. J Daniel, S. G.	EXPERIMENTAL VALUE	2S:					
$\frac{296.15}{313.65} 2.91 0.395 0.431}{313.65 2.80 0.371 0.426}$ The Bunsen coefficients were calculated by the compiler. The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law. Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln X_1 = -2201.9 + 55.904 T$ Std. Dev. $\Delta G^{\circ} = 8.0$ , Coef. Corr. = 0.9999 $\Delta H^{\circ}/J \mod^{-1} = -2201.9$ , $\Delta S^{\circ}/J K^{-1} \mod^{-1} = -55.904$ $\frac{1}{7/K} MOI \ Fraction \Delta G^{\circ}/J \mod^{-1} \\ \frac{X_1 \times 10^3}{286.15} \frac{3.01}{3.01} \frac{13.907}{13.907} \\ 293.15 2.97 14.466 \\ 303.15 2.88 14.745 \\ 303.15 2.80 15.305 \\ 318.15 2.76 15.584 \\ \frac{1}{5.305} \\ 318.15 2.76 15.584 \\ \frac{1}{5.305} \\ 318.15 2.76 \\ \frac{1}{5.584} \\ \frac{1}{5.305} \\ 2.2,2.4-Trimethylpentane. Enjay \\ Co. Used as received. \\ \frac{1}{7/K} a modification of the method of Baldwin and Daniel (2). \\ REFRENCES: \\ 1. More is on the solvent is a modification of the method of Baldwin and Daniel (2). \\ REFRENCES: \\ 1. More is on the solvent is a modification of the method of Baldwin and Daniel (2). \\ REFRENCES: \\ 1. More is on the solvent is a modification of the method of Baldwin and Daniel (2). \\ REFRENCES: \\ 1. More is on the solvent is a modification of the method of Baldwin and Daniel (2). \\ REFRENCES: \\ 1. More is on T. J., Billett, F. J. Chem. Soc. 1948, 2033; Ihid. 1952, 3819. \\ 2. Baldwin, R. R. J. Daniel, S. G. \\ 1. More is on T. J., Billet, F. J. Chem. Soc. 1948, 2033; Ihid. 1952, 3819. \\ 2. Baldwin, R. R. J. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 1. More is on T. J. S. Daniel, S. G. \\ 2. Baldwin, R. R. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. More is on T. J. S. Daniel, S. G. \\ 3. M$		X <sub>1</sub> × 10 <sup>3</sup>	Coefficient Coefficient				
The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law. Smoothed Data: $\Delta G^{\circ}/J mol^{-1} = - RT \ln x_1 = -2201.9 + 55.904 T$ Std. Dev. $\Delta G^{\circ} = 8.0$ , Coef. Corr. = 0.9999 $\Delta H^{\circ}/J mol^{-1} = -2201.9$ , $\Delta S^{\circ}/J K^{-1} mol^{-1} = -55.904$ T/K Mol Fraction $\Delta G^{\circ}/J mol^{-1}$ 293.15 2.97 14,186 298.15 2.92 14,466 303.15 2.88 14,745 308.15 2.88 14,745 308.15 2.76 15,584 AUXILLARY INFORMATION METHOD/APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The sol- vent is degased by a modification of the method of Baldwin and Daniel (2).		298.15 2.91	0.395 0.431				
Std. Dev. $\Delta G^{\circ} = 8.0$ , Coef. Corr. = 0.9999 $\Delta H^{\circ}/J \mod^{-1} = -2201.9$ , $\Delta S^{\circ}/J K^{-1} \mod^{-1} = -55.904$ T/K Mol Fraction $\Delta G^{\circ}/J \mod^{-1}$ $X_1 \times 10^3$ $\overline{288.15}$ $3.01$ $\overline{13,907}$ 293.15 $2.97$ $14,186296.15$ $2.92$ $14,466303.15$ $2.88$ $14,745308.15$ $2.84$ $15,025313.15$ $2.80$ $15,305313.15$ $2.80$ $15,305313.15$ $2.76$ $15,584METHOD/APPARATUS/PROCEDURE:The solvent is saturated with the gasas it flows through an 8 mm x 180 cmglass helix attached to a gas buret.The total pressure of solute gas plussolvent vapor is maintained at 1 atmas the gas is absorbed.The apparatus is a modification ofthat of Morrison and Billett (1).The modifications include the additionof a helical storage for the solvent,a manometer for a constant referencewith highly soluble gases. The sol-vent is degassed by a modification ofthe method of Baldwin and Daniel (2).REFERENCES:1. Morrison, T. J.; Billett, F.J. Chem. Soc. 1948, 2033;Thid. 1952, 3819.2. Baldwin, R. R.; Daniel, S. G.$	The solubility	values were adjusted to	d by the compiler. an argon partial pressure of 101.325				
$\Delta H^{\circ}/J \ mol^{-1} = -2201.9, \ \Delta S^{\circ}/J \ K^{-1} \ mol^{-1} = -55.904$ $\frac{1}{T/K} \ Mol \ Fraction \ \Delta G^{\circ}/J \ mol^{-1}} \\ \frac{X_1 \times 10^3}{288.15} \ 3.01 \ 13,907 \ 14,186 \ 298.15 \ 2.92 \ 14,466 \ 303.15 \ 2.88 \ 14,745 \ 308.15 \ 2.84 \ 15,025 \ 313.15 \ 2.80 \ 15,305 \ 318.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 313.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.76 \ 15,584 \ 318.15 \ 2.2,2,2,4-Trimethylpentane. Enjay \ Co. Used as received. \ 327 \ 2.2,2,4-Trimethylpentane. Enjay \ Co. Used as received. \ 327 \ 2.2,2,4-Trimethylpentane. Enjay \ Co. Used as received. \ 327$	Smoothed Data:	$\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln$	X <sub>1</sub> = -2201.9 + 55.904 T				
T/K Mol Fraction $X_1 \times 10^3$ $\Delta G^{\circ}/J \mod^{-1}$ $X_1 \times 10^3$ $X_1 \times 10^3$ 288.15 $3.01$ $13,907$ 293.15 $2.97$ $14,186$ 298.15 $2.92$ $14,466$ 303.15 $2.88$ $14,745$ 308.15 $2.84$ $15,025$ 313.15 $2.76$ $15,584$ AUXILIARY INFORMATIONMETHOD/APPARATUS/PROCEDURE:The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed.SOURCE AND PURITY OF MATERIALS:I. Argon. Both Matheson Co., Inc. Standard and research grades used with no difference in results.Co. Used as received.The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed.The apparatus is a modification of that of Morrison and Billett (1).The modifications include the addition of a helical storage for the sol- vent is degassed by a modification of the method of Baldwin and Daniel (2).ESTIMATED ERROR:ESTIMATED ERROR:ESTIMATED ERROR:Norrison, T. J., Billett, F. J. Chem. Soc. 1948, 2033; ibid. 1952, 3819.2. Baldwin, R. R.; Daniel, S. G.							
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$\begin{array}{c} 293.15 & 2.97 & 14,166 \\ 298.15 & 2.92 & 14,466 \\ 303.15 & 2.88 & 14,745 \\ 308.15 & 2.80 & 15,305 \\ 318.15 & 2.76 & 15,584 \\ \hline\end{array}$			ction \G°/J mol-1				
$\begin{array}{c} \hline \begin{array}{c} \hline 298.15 \\ \hline 303.15 \\ \hline 303.15 \\ \hline 2.88 \\ \hline 14,745 \\ \hline 303.15 \\ \hline 2.88 \\ \hline 15,205 \\ \hline 313.15 \\ \hline 2.80 \\ \hline 15,305 \\ \hline 318.15 \\ \hline 2.76 \\ \hline 15,584 \\ \hline \end{array}$							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		298,15 2,92	14,466				
$\frac{318.15}{2.76} \frac{15,584}{15,584}$ $\frac{318.15}{2.76} \frac{315,584}{15,584}$ $\frac{318.15}{2.76} \frac{315,584}{15,584}$ $\frac{318.15}{2.76} \frac{315,584}{15,584}$ $\frac{318.15}{2.76} \frac{315,584}{15,584}$ $\frac{318.15}{2.76} \frac{300}{15,584}$ $\frac{318.15}{2.76} \frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{16,58} \frac{14}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,584}$ $\frac{300}{15,58}$ $\frac{300}{15,584}$ $\frac{300}{15,58}$ $30$		308.15 2.84	15,025				
METHOD/APPARATUS/PROCEDURE:SOURCE AND PURITY OF MATERIALS:The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed.I. Argon. Both Matheson Co., Inc. Standard and research grades used with no difference in results.The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The sol- vent is degassed by a modification of the method of Baldwin and Daniel (2).DATA CLASS:ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta X_1/X_1 = 0.03$ ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; Ibid. 1952, 3819.Source AND PURITY OF MATERIALS:2. Baldwin, R. R.; Daniel, S. G.							
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as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with no difference in results. 2. 2,2,4-Trimethylpentane. Enjay Co. Used as received. DATA CLASS: $\Delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X1 = 0.03$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; ibid. 1952, 3819. 2. Baldwin, R. R.; Daniel, S. G.	METHOD/APPARATU	S/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The sol- vent is degassed by a modification of the method of Baldwin and Daniel (2). $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u> . 1952, 3819. 2. Baldwin, R. R.; Daniel, S. G.	as it flows the glass helix at The total press solvent vapor	rough an 8 mm x 180 cm tached to a gas buret. sure of solute gas plus is maintained at 1 atm	Standard and research grades used with no difference in results. 2. 2,2,4-Trimethylpentane. Enjay				
pressure, and an extra burlet for use with highly soluble gases. The sol- vent is degassed by a modification of the method of Baldwin and Daniel (2). $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T. J.; Billett, F. <u>J. Chem. Soc</u> . 1948, 2033; <u>ibid</u> . 1952, 3819. 2. Baldwin, R. R.; Daniel, S. G.	that of Morris The modification of a helical s a manometer for	on and Billett (l). ons include the addition torage for the solvent, r a constant reference	n				
REFERENCES: 1. Morrison, T. J.; Billett, F. <u>J. Chem. Soc</u> . 1948, 2033; <u>ibid</u> . 1952, 3819. 2. Baldwin, R. R.; Daniel, S. G.	with highly soluble gases. The sol- vent is degassed by a modification of		$\delta T/K = 0.05$ $\delta P/mmHg = 3$				
2. Baldwin, R. R.; Daniel, S. G. <u>J. Appl</u> . <u>Chem</u> . 1952, <u>2</u> , 161.			REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033;				
			2. Baldwin, R. R.; Daniel, S. G. J. <u>Appl. Chem</u> . 1952, <u>2</u> , 161.				

Saturated Hydrocarbons

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Nonane; C<sub>9</sub>H<sub>20</sub>; 111-84-2</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322
	U.S.A.

CRITICAL EVALUATION:

The solubility of argon in nonane at 101.325 kPa was determined in two laboratories. Clever, Battino, Saylor, and Gross (1) reported three values between 288.35 and 313.50 K. Makranczy, Megyery-Balog, Rusz and Patyi (2) report values at 298.15 and 313.15 K.

The Makranczy et al. solubility at 298.15 K agrees exactly, but the solubility at 313.15 K is 22.0 per cent below the smoothed values of Clever et al. The Makranczy et al. 313.15 K solubility value for argon dissolved in aliphatic hydrocarbons appears to be consistently 20-30 percent lower than results from other laboratories. One suspects a systematic error, which if it could be found and corrected, might bring the value into line with the other's values.

The Clever, et al. solubility data and the 298.15 K Makranczy et al. were combined in a Gibbs energy equation linear in temperature by the method of least squares.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \mod^{-1} = - \operatorname{RT} \ln X_{1} = -1,560.5 + 55.107 \operatorname{T}$ Std. Dev.  $\Delta G^{\circ} = 24.7$ , Coef. Corr. = 0.9991  $\Delta H^{\circ}/J \mod^{-1} = -1,560.5$ ,  $\Delta S^{\circ}/J \operatorname{K}^{-1} \mod^{-1} = -55.107$ 

The tentative values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

TABLE 1.	Solubilit	ty of argon	in	nonane	at 101	.325	5 kPa. T	entat:	ive mole
	fraction	solubility	and	Gibbs	energy	of	solution	as a	function
	temperatu	ure.							

т/к	Mol Fraction X <sub>1</sub> x 10 <sup>3</sup>	∆G°/J mol <sup>-1</sup>
288.15	2.54	14,319
293.15	2.51	14,594
298.15	2.48	14,870
303.15	2.46	15,145
308.15	2.43	15,421
313.15	2.41	15 <b>,</b> 696
318.15	2.39	15,972

 Clever. H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.
 Magyory-Palog, K. Pugg, L. Patui, L. Hung, L. Ind.

 Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. <u>Hung</u>. J. Ind. Chem. 1976, <u>4</u>, 269.

126 Argon Solubilitie	es up to 200 kPa
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;
2. Nonane; C <sub>oH20</sub> ; 111-84-2	Saylor, J. H.; Gross, P. M.
2. Nonane; C <sub>9</sub> H <sub>20</sub> ; 111-84-2	
	J. Phys. Chem. 1957, 61, 1078 - 1083.
VARIABLES:	PREPARED BY:
T/K: 288.35 - 313.50	P. L. Long
P/kPa: 101.325	A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
	coefficient Coefficient
$x_1 \times 10^3$	α L
288.35 2.56	0.322 0.340
297.95 2.45 313.50 2.42	0.310 0.338 0.298 0.342
The solubility values were adjusted to 101.325 kPa by Henry's law.	a partial pressure of argon of
The Bunsen coefficients were calculate	ed by the compiler.
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	1
Std. Dev. ΔG° = 30.2,	Coef. Corr. = 0.9991
Fraction solubility see the evaluation	n of the solubility of argon in nonane.
AUXILIARY	INFORMATION
METHOD / APPARATUS/PROCEDURE:	
METHOD / APPARAIOS/ PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm	<ol> <li>Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults.</li> </ol>
as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1) The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference	2. Nonane. Phillips Petroleum Co. Pure grade, used as received.
pressure, and an extra buret for use with highly soluble gases. The sol- vent is degassed by a modification of the method of Baldwin and Daniel (2).	ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$
	REFERENCES:
	<ol> <li>Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u>. 1952, 3819.</li> </ol>
	<ol> <li>Baldwin, R. R.; Daniel, S. G. J. <u>Appl. Chem</u>. 1952, <u>2</u>, 161.</li> </ol>

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		Saturated H	lydrocarbons				12
COMPONENTS:	ORIGINAL MEASUREMENTS:						
1. Argon; Ar; 7440-37-1 2. Nonane; C <sub>9</sub> H <sub>20</sub> ; 111-84-2			Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.				.og, K.;
-							
			Hung. J.	Ind.	Chem.	1976,	4, 269-280
VARIABLES:			PREPARED BY:				
	298.15 · 101.325		S	5. A.	Johnso	n	
EXPERIMENTAL VALU	ES:	<u></u>					
		Mol Fraction	Bunsen	·Os	stwald		
	-/	Coefficien		Coefficient			
			α		L	-	
	298.15 313.15		0.310 0.231		).338 ).265		
the compiler.		bilities and Bunner $mol^{-1} = - RT \ln In$					lated by
See the evalua equation and s		et for this sys y values.	tem for the	recon	nmended	Gibb	s energy
<u></u>		AUXILIARY	INFORMATION			<u></u>	
METHOD / APPARATU	JS/PROCED	URE:	SOURCE AND PURITY OF MATERIALS:				
Volumetric met Bodor, Bor, Mo used.	chod. Th bhai, and	e apparatus of Sipos (l) was	Both the grade of foreign or tion.	reagei	nts of	Hunga	rian or
		DATA CLASS:					
			ESTIMATED ER	ROR:		·····	· · · · · ·
			δx <sub>1</sub> /x	1 = 0	.03 at	298.1	5 K.
			Sip	os, G <u>remi</u> <u>1</u> , 5	• Vegyip 5.	Egy.	ohai, B.; <u>Kozl</u> .

COMPONENTS:	EVALUATOR:
1. Argon; Ar; 7440-37-1 2. Decane; C <sub>10</sub> H <sub>22</sub> ; 124-18-5	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.

## CRITICAL EVALUATION:

The solubility of argon in decane at 101.325 kPa was measured at three laboratories. Clever, Battino, Saylor, and Gross (1) reported three values between 287.25 and 313.50 K. Makranczy, Megyery-Balog, Rusz, and Patyi (2) reported values at 298.15 and 313.15 K. Wilcock, Battino, and Danforth (3) reported three values between 283.20 and 313.54 K.

The Clever <u>et al</u>. and the Wilcock <u>et al</u>. solubility data accord within 1.2-1.6 percent over the 283.15 - 313.15 K temperature interval. The Mak-ranczy <u>et al</u>. value at 298.15 K is 2.4 percent lower and the 313.15 K value is 26.0 percent lower than the values from the other laboratories. The Makranczy et al. 313.15 K value for argon dissolved in hydrocarbons appears to be consistently low by 20-30 percent. One suspects a systematic error, which if corrected might bring the value into line with the value of others.

Wilcock et al. use an improved degassing technique and apparatus. Their data should be the most reliable. However, for the recommended values we have combined the 298.15 K solubility value of Makranczy et al., the data of Clever et al., and the data of Wilcock et al. on a one to one weight basis.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = -1,501.1 + 54.925 T$ 

Std. Dev. AG° = 29.8, Coef. Corr. = 0.9989

 $\Delta H^{\circ}/J \mod^{-1} = -1,501.1, \Delta S^{\circ}/J K^{-1} \mod^{-1} = -54.925$ 

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

Solubility of argon in decane at 101.325 kPa. Mole fraction solubility and Gibbs energy of solution as a function of tempera-TABLE 1. ture.

T/K	Mol Fraction* $X_1 \times 10^3$	∆G°/J mol-l
283.15	2.56	14,051
288.15	2.53	14,325
293.15	2.505	14,600
298.15	2.48	14,875
303.15	2.455	15,149
308.15	2.43	15,423
313.15	2.405	15,699
318.15	2.385	15,973

\* To the nearest 0.005 x  $10^{-3}$ 

1. Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.

Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. Hung. J. Ind. 2. <u>Chem.</u> 1976, 4, 269. Wilcock, R. J.; Battino, R.; Danforth, W. F. <u>J. Chem. Thermodyn</u>. 1978,

3.

Saturated Hydrocarbons 129	
COMPONENTS:	ORIGINAL MEASUREMENTS:
<b>1</b>	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.
2. Decane; C <sub>10</sub> H <sub>22</sub> ; 124-18-5	
	<u>J. Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1078 - 1083.
VARIABLES:	PREPARED BY:
T/K: 287.25 - 313.50 P/kPa: 101.325	P. L. Long A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient
$x_1 \times 10^3$	coefficient Coefficient
287.25 2.57	0.300 0.315
298.15 2.48 313.50 2.44	0.285 0.311 0.276 0.317
The solubility values were adjusted to 101.325 kPa by Henry's law.	a partial pressure of argon of
The Bunsen coefficients were calculate	ed by the compiler.
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	$x_1 = -1428.7 + 54.602 T$
Std. Dev. ∆G° = 18.5, Coef. Corr. = 0.9997	
	n of the solubility of argon in decane.
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (2). The modifications include the addi- tion of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra bure for use with highly soluble gases. The solvent is degassed by a modifi- cation of the method of Baldwin and Daniel (2).	<ul> <li>dard and research grades were used with no difference in results.</li> <li>2. Decane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium, distilled.</li> </ul>
	ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$
	REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u> . 1952, 3819.
	<ol> <li>Baldwin, R. R.; Daniel, S. G. J. <u>Appl</u>. <u>Chem</u>. 1952, <u>2</u>, 161.</li> </ol>

130 Argon Solubiliti	es up to 200 kPa	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; AR; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.	
2. Decane; C <sub>10</sub> H <sub>22</sub> ; 124-18-5		
	<u>Hung. J. Ind. Chem. 1976, 4</u> , 269-280.	
VARIABLES: T/K: 298.15 - 313.15 P/kPa: 101.325 (1 atm)	PREPARED BY: S. A. Johnson	
EXPERIMENTAL VALUES:		
T/K Mol Fraction	Bunsen Ostwald	
$x_{1} \times 10^{3}$	Coefficient Coefficient $\alpha$ L	
298.15         2.44           313.15         1.79	0.279 0.305 0.201 0.231	
The mole fraction solubilities and Bun the compiler.	nsen coefficients were calculated by	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	$x_1 = -16,032 + 103.79 \text{ T}$	
The above equation reproduces exactly the two solubility values, but it is not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low.		
See the evaluation sheet for this system for the recommended Gibbs energy equation and solubiliby values.		
AUXILIARY	INFORMATION	
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.	
	DATA CLASS:	
	ESTIMATED ERROR:	
	$\delta x_1 / x_1 = 0.03$ at 298.15 K	
	<pre>REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u>. 1957, <u>1</u>, 55. Chem. Abstr. 1961, <u>55</u>, 3175h.</pre>	

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Wilcock, R. J.; Battino, R.; Danforth, W. F.; Wilhelm, E.
2. Decane; C <sub>10</sub> H <sub>22</sub> ; 124-18-5	J. Chem. Thermodyn. 1978, 10, 817-822.
VARIABLES:	PREPARED BY:
T/K: 283.20 - 313.54	H. L. Clever
P/kPa: 101.325 (1 atm)	A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_{1} \times 10^{3}$	Coefficient Coefficient αL
283.20 2.567	0.2988 0.3098
298.05 2.442 313.54 2.399	0.2800 0.3055 0.2706 0.3106
The Bunsen coefficients were calculat The solubility values were adjusted t	
Henry's law.	
Smoothed Data: $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln$	$x_1 = -1637.3 + 55.421 T$
Std. Dev. $\Delta G^{\circ} = 7.9$ ,	Coef. Corr. = 0.9999
$AH^{0}/I mol^{-1} = -1637.3$	$\Delta s^{0}/J \kappa^{-1} mol^{-1} = -55.421$
	$\frac{100}{\text{ction} \Delta G^{0}/\text{J mol}^{-1}}$
T/K Mol Fra X <sub>1</sub> x	
278.15 2.59 13,778 288.15 2.52 14,332	
298.15 2.4	7 14,886
308.15 2.4 318.15 2.3	
See the evaluation of the argon + dec mended free energy equation and a smo	ane system on page 128 for the recom- othed solubility values.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on	1. Argon. Matheson Co., Inc.
the design of Morrison and Billett (1) and the version used is described	99.995 per cent. 2. Decane. Phillips Petroleum Co.
by Battino, Evans, and Danforth (2). The degassing apparatus is that	99 mol % distilled, density.
described by Battino, Banzhof, Bogan,	°298.15 = 0.7264.
and Wilhelm $(3)$ .	ESTIMATED ERROR:
Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that	$\delta T/K = 0.02$ $\delta P/mmHg = 0.5$
the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum	$\delta x / x = 0.01$
is intermittently applied through a	
liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to	REFERENCES:
5 microns.	1. Morrison, T. J.; Billett, F. J. Chem. <u>Soc</u> . 1948, 2033.
Solubility Determination. The de- gassed solvent is passed in a thin	2. Battino, R.; Evans, F. D.;
film down a glass helical tube con-	Danforth, W. F. J. Am. Oil <u>Chem</u> . <u>Soc</u> . 1968,
taining solute gas plus the solvent vapor at a total pressure of one atm.	$\frac{1}{45}, \frac{1}{830}, \frac{1}{211}$
The volume of gas absorbed is found	3. Battino, R.; Banzhof, M.;
by difference between the initial and final volumes in the buret system.	Bogan, M.; Wilhelm, E. <u>Anal</u> . <u>Chem</u> . 1971, <u>43</u> , 806.
The solvent is collected in a tared flask and weighed.	
LIASS and weighted.	l

	bilities up to 200 kPa
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.
2. Undecane; C <sub>11</sub> H <sub>24</sub> ; 1120-21-4	Nusz, 2., 100,17 2.
	Hung. J. Ind. Chem. 1976, 4, 269-280.
VARIABLES:	PREPARED BY:
T/K: 298.15 - 313.15	S. A. Johnson
P/kPa: 101.325 (1 atm)	
EXPERIMENTAL VALUES:	
T/K Mol Fractio	n Bunsen Ostwald Coefficient Coefficient
$x_1 \times 10^3$	$\alpha$ L
298.15 2.56	0.271 0.296 0.187 0.214
313.15 1.79	
The mole fraction solubilities and by the compiler.	I the Bunsen coefficients were calculated
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT$	$x \ln x_1 = -18,516 + 111.22 \text{ T}$
The above equation reproduces exactly the two solubility values, but it is not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low.	
AUXIL	IARY INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method. The apparatus Bodor, Bor, Mohai, and Sipos (1) w used.	of Both the gas and liquid were analyti- vas cal grade reagents of Hungarian or foreign origin. No further informa- tion.
	DATA CLASS:
	ESTIMATED ERROR:
	$\delta X_1 / X_1 = 0.03 \text{ at } 298.15 \text{ K}$
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi</u> <u>Vegyip</u> . <u>Egy</u> . <u>Koz1</u> . 1957, 1, 55. <u>Chem</u> . <u>Abstr</u> . 1961, <u>55</u> , 3175h.

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COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Dodecane; C<sub>12</sub>H<sub>26</sub>; 112-40-3</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.
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CRITICAL EVALUATION:

The solubility of argon in dodecane was reported by two laboratories. Clever, Battino, Saylor, and Gross (1) reported three values between 287.45 and 313.65 K. Makranczy, Megyery-Balog, Rusz and Patyi (2) reported values at 298.15 and 313.15 K.

The Makranczy et al. value at 298.15 K is 4.7 percent lower, and the value at 313.15 K is 30.3 per cent lower than the Clever et al. solubility values. The 313.15 K Makranczy et al. value appears to be low for all of the argon in hydrocarbon solubility values. See the argon + octane and argon + decane evaluation sheets for further evidence.

The Clever <u>et al</u>. data for argon in dodecane is internally self-consistent. They are used for the tentative values of the thermodynamic functions and the mole fraction solubility values.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \mod^{-1} = - RT \ln X_{1} = -510.32 + 51.301 T$ Std. Dev.  $\Delta G^{\circ} = 15.7$ , Coef. Corr. = 0.9997  $\Delta H^{\circ}/J \mod^{-1} = -510.32$ ,  $\Delta S^{\circ}/J K^{-1} \mod^{-1} = -51.301$ 

The tentative values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

TABLE 1. Solubility of argon in n-dodecane at 101.325 kPa. Tentative mole fraction solubility and Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
283.15	2.60	14,016
288.15	2.59	14,272
293.15	2.58	14,529
298.15	2.57	14,785
303.15	2.56	15,042
308.15	2.55	15,298
313.15	2.54	15,555
318.15	2.54	15,811

- Clever. H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.
- Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. <u>Hung</u>. J. <u>Ind</u>. <u>Chem</u>. 1976, <u>4</u>, 269.

CONDONENTE	
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;
2. Dodecane; C <sub>12</sub> H <sub>26</sub> ; 112-40-3	Saylor, J. H.; Gross, P. M.
	<u>J. Phys. Chem</u> . 1957, <u>61</u> , 1078 - 1083.
VARIABLES:	PREPARED BY:
T/K: 287.45 - 313.65 P/kPa: 101.325	P. L. Long
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_{1} \times 10^{3}$	Coefficient Coefficient a L
287.45 2.60 298.25 2.55 2.55	0.258 0.271 0.252 0.275
313.65 2.55	0.246 0.282
The solubility values were adjusted to 101.325 kPa by Henry's law.	o a partial pressure of argon of
The Bunsen coefficients were calculate	ed by the compiler.
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	$X_1 = -510.3 + 51.3 T$
Std. Dev. ΔG° = 15.7,	Coef. Corr. = 0.9997
AUXILIARY	
METHOD /APPARATUS/PROCEDURE:	INFORMATION
The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addi- tion of a helical storage for the	INFORMATION SOURCE AND PURITY OF MATERIALS:
<pre>glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addi- tion of a helical storage for the</pre>	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re-
as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addi-	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults.</li> <li>2. Dodecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium.</li> </ul>

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
l. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.	
2. Dodecane; C <sub>12</sub> H <sub>26</sub> ; 112-40-3		
	<u>Hung. J. Ind. Chem</u> . 1976, <u>4</u> , 269-280.	
VARIABLES:	PREPARED BY:	
T/K: 298.15 - 313.15 P/kPa: 101.325 (1 atm)	S. A. Johnson	
EXPERIMENTAL VALUES:		
T/K Mol Fraction	Bunsen ,Ostwald	
$x_1 \times 10^3$	Coefficient Coefficient α L	
298.15 2.45	0.241 0.263	
313.15 1.77	0.171 0.196	
The mole fraction solubilities and Bun the compiler.	nsen coefficients were calculated by	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	X <sub>1</sub> = -16,825 + 106.41 T	
not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low. See the evaluation sheet for this system for the recommended Gibbs energy equation and solubility values.		
AUXILIARY INFORMATION		
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.	
	DATA CLASS:	
	ESTIMATED ERROR:	
	$\delta x_1 / x_1 = 0.03$ at 298.15 K.	
	<pre>REFERENCES: 1. Bodor, E.; Bor, By.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. 1957, 1, 55. Chem. Abstr. 1961, 55, 3175h.</pre>	

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.	
2. Tridecane; C <sub>13</sub> H <sub>28</sub> ; 629-50-5		
	Hung. J. Ind. Chem. 1976, 4, 269-280.	
VARIABLES: T/K: 298.15 - 313.15	PREPARED BY: S. A. Johnson	
P/kPa: 101.325 (1 atm)	S. A. Johnson	
EXPERIMENTAL VALUES:	Leen	
T/K: Mol Fraction	Bunsen Ostwald	
x <sub>1</sub> x 10 <sup>3</sup>	Coefficient Coefficient $\alpha$ L	
298.15 2.47 313.15 1.75	0.226 0.247 0.158 0.181	
The mole fraction solubilities and the by the compiler.	Bunsen coefficients were calculated	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	Х <sub>1</sub> = - 17,834 + 109.73 т	
The above equation reproduces exactly the two solubiliby values, but it is not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low.		
·	INFORMATION	
METHOD / APPARATUS / PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign orogin. No further informa- tion.	
	DATA CLASS:	
	ESTIMATED ERROR:	
	$\delta X_1 / X_1 = 0.03$ at 298.15 K.	
	PETERDUAN	
	REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u> . <u>1957, 1, 55.</u> <u>Chem. Abstr</u> . 1961, <u>55</u> , 3175h.	

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Tetradecane; C<sub>14</sub>H<sub>30</sub>; 629-59-4</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.

CRITICAL EVALUATION:

The solubility of argon in tetradecane was reported by two laboratories. Clever, Battino, Saylor and Gross (1) reported three values between 287.45 and 313.45 K. Makranczy, Megyery-Balog, Rusz, and Patyi (2) reported values at 298.15 and 313.15 K.

The Makranczy et al. value at 298.15 is 5.4 percent lower and the value at 313.15 K is 30.4 percent lower than the Clever et al. solubility values. The 313.15 K Makranczy et al. value appears to be low for all the argon in hydrocarbon solubility values.

The Clever <u>et al</u>. data for argon in tetradecane is internally self-consistent. They have been used for the tentative values of the thermodynamic functions and the mole fraction solubility values.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = -1,689.1 + 55.198 T$ Std. Dev.  $\Delta G^{\circ} = 3.6$ , Coef. Corr. = 0.9999  $\Delta H^{\circ}/J \mod^{-1} = -1,689.1$ ,  $\Delta S^{\circ}/J K^{-1} \mod^{-1} = -55.198$ 

The tentative values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperatures in Table 1.

TABLE 1. Solubility of argon in tetradecane at 101.325 kPa. Tentative mole fraction solubility and Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $X_1 \times 10^3$	$\Delta G^{/J} \text{ mol}^{-1}$
283.15	2.68	13,940
288.15	2.65	14,216
293.15	2.62	14,493
298.15	2.59	14,768
303.15	2.56	15,044
308.15	2.53	15,320
313.15	2.50	15,596
318.15	2.48	15,872

 Clever. H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.

 Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L. <u>Hung</u>. J. <u>Ind</u>. <u>Chem</u>. 1976, <u>4</u>, 269.

COMPONENTS:			
	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.;		
2. Tetradecane; C <sub>14</sub> H <sub>30</sub> ; 629-59-4	Saylor, J. H.; Gross, P. M.		
2. Tetradecane, $c_{14}a_{30}$ , $c_{25}b_{55}a_{4}$			
	J. Phys. Chem. 1957, 61, 1078-1083.		
VARIABLES:	PREPARED BY:		
т/к: 287.45 - 313.45	P. L. Long		
P/kPa: 101.325	A. L. Cramer		
EXPERIMENTAL VALUES:			
	Purseen		
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient		
$x_1 \times 10^3$	α L		
287.45 2.65	0.235 0.247		
298.25 2.59 313.45 2.50	0.229 0.250 0.218 0.250		
The solubility values were adjusted to 101.325 kPa by Henry's law.	o a partial pressure of argon of		
The Bunsen coefficients were calculate	ed by the compiler.		
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	X <sub>1</sub> = -1689.1 + 55.198 т		
Std. Dev. $\Delta G^{\circ} = 3.6$ .	- Coef. Corr. = 0.99999		
decane.			
AUXILIARY	INFORMATION		
AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS:		
METHOD /APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults.</li> <li>2. Tetradecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium</li> </ul>		
METHOD /APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults.</li> <li>2. Tetradecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium</li> </ul>		
METHOD /APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults.</li> <li>2. Tetradecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium</li> </ul>		
METHOD /APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The sol- vent is degassed by a modification of	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults. 2. Tetradecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium ESTIMATED ERROR:</pre>		
METHOD /APPARATUS/PROCEDURE: The solvent is saturated with the gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a constant reference pressure, and an extra buret for use with highly soluble gases. The sol- vent is degassed by a modification of	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. Both stan- dard and research grades were used with no difference in re- sults. 2. Tetradecane. Humphrey-Wilkinson Co., Inc. Shaken with H<sub>2</sub>SO<sub>4</sub>, washed, dried over sodium ESTIMATED ERROR:</pre>		

Saturated Hydrocarbons			
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.;		
2. Tetradecane; C <sub>14</sub> H <sub>30</sub> ; 629-59-4	Rusz, L.; Patyi, L.		
	<u>Hung. J. Ind. Chem. 1976, 4</u> , 269-280.		
VARIABLES:	PREPARED BY:		
T/K: $298.15 - 313.15$ P/kPa: 101.325 (1 atm)	S. A. Johnson		
EXPERIMENTAL VALUES:	-		
T/K Mol Fraction	Bunsen Ostwald		
$x_{1} \times 10^{3}$	Coefficient Coefficient		
298.15 2.45	0.211 0.230		
313.15 1.74	0.147 0.169		
The mole fraction solubilities and Buthe compiler. Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT$ In			
not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low. See the evaluation sheet for this system for the recommended Gibbs energy equation and solubility values.			
AUXILIAR	INFORMATION		
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti-		
	DATA CLASS:		
	ESTIMATED ERROR:		
	$\delta x_1 / x_1 = 0.03$ at 298.15 K		
	REFERENCES:		
	<ol> <li>Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G.</li> </ol>		
	<u>Veszpremi Vegyip. Egy. Kozl.</u> 1957, <u>1</u> , 55. <u>Chem. Abstr</u> . 1961, <u>55</u> , 3175h.		

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I.

COMPONENTS:	ORIGINAL MEASUREMENTS: Makranczy, J.; Megyery-Balog, K.;	
1. Argon; Ar; 7440-37-1	Rusz, L.; Patyi, L.	
2. Pentadecane; C <sub>15</sub> H <sub>32</sub> ; 629-62-9		
	<u>Hung. J. Ind. Chem</u> . 1976, <u>4</u> , 269-280.	
VARIABLES:	PREPARED BY:	
T/K: 298.15 - 313.15 P/kPa: 101.325 (1 atm)	S. A. Johnson	
EXPERIMENTAL VALUES:		
EXTENTED VALUES.		
T/K Mol Fraction	Bunsen Ostwald	
$x_1 \times 10^3$	Coefficient Coefficient α L	
$\frac{1}{298.15}$ 2.47	0.200 0.218	
313.15 1.75	0.140 0.160	
The mole fraction solubilities and th by the compiler.	e Bunsen coefficients were calculated	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	X <sub>1</sub> = - 17,834 + 109.73 T	
The above equation reproduces exactly	the two solubility values, but it is author's data with the values of others systems indicates the 298.15 K solu-	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.	
	DATA CLASS:	
	ESTIMATED ERROR:	
	$\delta X_1 / X_1 = 0.03 \text{ at } 298.15 \text{ K}$	
	<pre>REFERENCES: 1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. Veszpremi Vegyip. Egy. Kozl. 1957, 1, 55. Chem. Abstr. 1961, 55, 3175h.</pre>	

Saturated Hydrocarbons 141				
COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Makranczy, J.; Megyery-Balog, K.; Rusz, L.; Patyi, L.			
2. Hexadecane; C <sub>16</sub> <sup>H</sup> 34; 544-76-3				
	<u>Hung. J. Ind. Chem</u> . 1976, <u>4</u> , 269-280.			
VARIABLES:	PREPARED BY:			
T/K: 298.15 - 313.15 P/kPa: 101.325 (1 atm)	S. A. Johnson			
EXPERIMENTAL VALUES:				
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient			
$X_{1} \times 10^{3}$	α L			
298.15 2.47 313.15 1.66	0.189 0.206 0.125 0.143			
The mole fraction solubilities and th by the compiler.	e Bunsen coefficients were calculated			
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = - \text{ Rt ln}$	х <sub>1</sub> = - 20,566 + 118.89 т			
The above equation reproduces exactly the two solubility values, but it is not recommended. Comparisons of the author's data with the values of others for argon + octane and argon + decane systems indicates the 298.15 K solu- bility value is probably reliable, but that the 313.15 K solubility value may be up to 30 per cent low.				
AUXILIARY	INFORMATION			
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;			
Volumetric method. The apparatus of Bodor, Bor, Mohai, and Sipos (1) was used.	Both the gas and liquid were analyti- cal grade reagents of Hungarian or foreign origin. No further informa- tion.			
	DATA CLASS:			
	ESTIMATED ERROR:			
	$\delta X_1 / X_1 = 0.03 \text{ at } 298.15 \text{ K}$			
	REFERENCES:			
	<pre>1. Bodor, E.; Bor, Gy.; Mohai, B.; Sipos, G. <u>Veszpremi Vegyip. Egy. Kozl</u>. 1957, <u>1</u>, 55. <u>Chem. Abstr</u>. 1961, <u>55</u>, 3175h.</pre>			

142 Argon Solubili	Argon Solubilities up to 200 kPa		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Steinberg, M.; Manowitz, B.		
2. Amsco 123-15	<u>Ind. Eng. Chem</u> . 1959, <u>51</u> , 47 - 51.		
VARIABLES: T/K: 218.15 - 297.15 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:			
T/K	Absorption Coefficient <sup>*</sup> β		
218.15 297.15	0.42 0.29		
rected to 288.15 K and 101.325 kPa (1 pressure of 101.325 kPa per unit volu	coefficient as the volume of gas, cor- L atm), absorbed under a total system ime of solvent, corrected to 288.15 K. ir absorption coefficient as an Ostwald		
AUXILIAF	RY INFORMATION		
METHOD:	SOURCE AND PURITY OF MATERIALS:		
Van Slyke method (l).	<ol> <li>Argon. No information given.</li> <li>Amsco 123-15. American Mineral Spirits Solvent Co., No. 140. The composition is stated to be 59.6 wt % paraffin, 27.2 wt % naphthene, and 13.2 wt % aromatics.</li> </ol>		
APPARATUS/PROCEDURE:	ESTIMATED ERROR: $\delta\beta/\beta = 0.10$		
	REFERENCES: 1. Van Slyke, D. D. <u>J. Biol. Chem</u> . 1939, <u>130</u> , 545. Van Slyke, D. D.; Neill, J. M. <u>J. Biol</u> . <u>Chem</u> . 1924, <u>61</u> , 523.		

Saturated Hydrocarbons		
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Nasini, A. G.; Corinaldi, G.	
2. Paraffin oil	<u>Soc. Ital. Prog. Sci. Atti Riun</u> . 1932, <u>20</u> , 264 - 266.	
VARIABLES:	PREPARED BY:	
т/к: 305.15	A. L. Cramer	
P/kPa: 101.325 (1 atm)		
EXPERIMENTAL VALUES:		
T/K Bunser Coeffici	n Ostwald Lent Coefficient L	
305.15 0.1575	5 0.1760	
AUXILIARY	INFORMATION	
METHOD:	SOURCE AND PURITY OF MATERIALS:	
The apparatus and procedure were based on those of Lannung (1).	heating with metallic calcium at 1130 K.	
	2. Paraffin oil. Density, $\rho_{288.15} = 0.87 \text{ g cm}^{-3}$ .	
APPARATUS/PROCEDURE:	ESTIMATED ERROR:	
A TRANIDOTTROCEDORD.	δ <b>T/K = 0.1</b>	
	REFERENCES :	
	1. Lannung, A. J. <u>Am</u> . <u>Chem</u> . <u>Soc</u> . 1930, <u>52</u> , 68.	

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144		Argon Solubilities	up to 200 kPa		
COMPONENTS:			ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1			Ridenour, W. Capell, R. G.	P.; Weatherford, W. D.;	
2. Paraffin wax			Ind. Eng. Chem. 1954, <u>46</u> , 2376-2381.		
VARIABLES:			DEEADED BY.		
T/K:345.35 P/kPa: 38.84 - 102.22 (291.7 - 766.7 mmHg)			PREPARED BY: A. L. Cramer H. L. Clever		
EXPERIMENTAL VALUE	S:	L	<u></u>		
Т/К	Pressure/ mmHg	Mol Fraction $X_1 \times 10^3$		Solubility Coefficient cm <sup>3</sup> Ar (STP) g <sup>-1</sup> wax	
345.35	291.7 504.0 766.7	1.24 2.14 3.33	0.157 0.160 0.161	0.079 0.137 0.211	
		AUXILIARY	INFORMATION		
METHOD:			SOURCE AND PURIT		
The apparatus equilibrium ac described by H Teller (1) for surface area of A weighed amon the apparatus were equilibra utes. The gas system was cal gas law.	dsorption a Brunauer, E r the measu of a solid int of wax . The gas a ated for 20 volume in	apparatus commett, and arement of the catalyst. was placed in and solvent to 60 min- the buret	<ol> <li>Argon. Ohi was 99.8 p cent N<sub>2</sub>.</li> <li>Paraffin w English me Molecular point 123.</li> </ol>	T OF MATERIALS; o Chemical Co. The gas per cent Ar and 0.2 per vax. Described as "122 OF elting point wax. weight 350, actual melt 2  OF (323.8 K), density cm <sup>-3</sup> at 293.3 K and cm <sup>-3</sup> at 298.0 K.	
The results of the absorption measur- ments were checked by a desorption measurement. The two measurements agreed very well.		ESTIMATED ERROR: $\delta T/K = 2.$ $\delta P/mmHg = 0.2$ $\delta \alpha/cm^3 = 0.004 \text{ (low pressure}$ $- 0.001 \text{ (high pres}$ REFERENCES: 1. Brunaur, S.; Emmett, P. H.; Teller, E. J. Am. Chem. Soc. 1938, <u>60</u> , 309.			

Cyclic Hydrocarbons

COMPONENTS:	EVALUATOR:	
<pre>1. Argon; Ar; 7440-37-1 2. Cyclohexane; C<sub>6</sub>H<sub>12</sub>; 110-82-7</pre>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA	
	June 1979	

CRITICAL EVALUATION:

Three laboratories have reported on the solubility of argon in cyclohexane. Lannung (1) reported 14 values at temperatures of 283.15 to 310.15 K. Clever, Battino, Saylor and Gross (2) reported three values at temperatures of 287.35 to 313.65 K. Dymond (3) reported four values at temperatures of 290.95 to 309.45 K.

The smoothed values of both Lannung and of Dymond have a small positive temperature coefficient. The smoothed values of Clever, et al. have a small negative temperature coefficient. One solubility value was definitely out of line from the others, it was the 313.65 K value of Clever, et al. That value, along with the 290.95 K value of Dymond, were deleted. The remaining value, along with the 290.95 K value of Dymond, were deleted. The remaining values were fitted by a linear regression to an equation of Gibbs energy linear in temperature for the recommended thermodynamic values and solubilities.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

> $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = 527.96 + 52.359 T$ Std. Dev.  $\Delta G^{\circ} = 27.57;$ Coef. Corr. = 0.9982 $\Delta H^{\circ}/J \mod^{-1} = 527.96; \qquad \Delta S^{\circ}/J K^{-1} \mod^{-1} = -52.359$

The recommended values of the mole fraction solubility at an argon pressure of 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

Solubility of argon in cyclohexane at 101.325 kPa. Recommended Table 1. mole fraction solubility and Gibbs energy of solution as a function of temperature.

T/K	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
283.15	1.47	15,353
288.15	1.48	15,615
293.15	1.48	15,877
298.15	1.49	16,139
303.15	1.49	16,401
308.15	1.50	16,662
313.15	1.50	16,924
318.15	1.51	17,186

Walkley and Jenkins (4) measured the partial molal volume of argon in cyclohexane by dilatometry. Their value is  $47.6 \text{ cm}^3 \text{ mol}^{-1}$  at 298.15 K.

Lannung, A. J. Am. Chem. Soc. 1930, 52, 68. 1.

- Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 2. 1957, <u>61</u>, 1078. 3. Dymond, J. H. J. Phys. <u>Chem</u>. 1967, <u>71</u>, 1829. 4. Walkley, J.; Jenkins, W. I. <u>Trans</u>. <u>Faraday.Soc</u>. 1968, <u>64</u>, 19.

Sisskind and Kasarnowsky (5) measured one value of the solubility of argon at 298.15 K and 50.7 x  $10^2$  kPa (50.7 bar). Assuming Henry's law is obeyed, the argon mole fraction solubility at 101.325 kPa is 1.46 x  $10^{-3}$  which is in fair agreement with the recommended value above. (See data sheet, p. 277).

5. Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. 1933, 215, 385.

146	Argon Solubilities up to 200 kPa				
COMPONENTS:			ORIGINAL MEASU	REMENTS:	
1. Argon; Ar; 7440-37-1		Lannung, A.	Lannung, A.		
2. Cyclohexane; C <sub>6</sub> H <sub>12</sub> ; 110-82-7		<u>J. Am. Chem</u> . <u>Soc</u> . 1930, <u>52</u> , 68 - 80.			
VARIABLES: T/K: 283.15 - 310.15 P/kPa: 101.325 (1 atm)			PREPARED BY:	P. L. Long A. L. Cramer	
EXPERIMENTAL	VALUES:	······································			
	T/K	$X_{1} \times 10^{3}$	α	Ostwald Coefficient L	
	283.15 283.15	1.47 1.47	0.308 0.309	0.319 0.320	
	291.15 291.15 291.15	1.48 1.48 1.47	0.307 0.307 0.306	0.327 0.327 0.326	
	293.15 293.15 293.15	1.47 1.48 1.47	0.306 0.307 0.306	0.328 0.329 0.328	
	298.15 298.15 298.15	1.48 1.48 1.47	0.305 0.305 0.304	0.333 0.333 0.332	
	310.15 310.15 310.15	1.48 1.50 1.48	0.302 0.305 0.301	0.343 0.346 0.342	
The mol fra the compile		ities and Ostv	ald coeffici	ents were calculated by	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$			-		
Std. Dev. $\Delta G^\circ$ = 10.7, See the evaluation sheer for argon + c energy equation and solubility values.			yclohexane f	for the recommended Gibbs	
		AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCFDURE:			SOURCE AND PURITY OF MATERIALS;		
Gas absorption. The gas is presatu- rated with solvent vapor. The gas volume absorbed is the difference between initial and final gas vol- umes. The amount of solvent is deter- mined by the weight of mercury dis- placed. The apparatus is a modification of that of von Antropoff (1). A calibra- ted, combined all glass manometer and bulb is enclosed in an air thermostat. Mercury is used as the calibration and confining liquid. The solvent is degassed in the apparatus. The sol- vent and the gas are shaken together until equilibrium is established.		tory.	Linde's Liquid Air Fac- Contained 0.5 per cent by nitrogen.		
		Shaken with fuming H <sub>2</sub> SO <sub>4</sub> , water washed, dried over P <sub>2</sub> O <sub>5</sub> . Disti- led from P <sub>2</sub> O <sub>5</sub> with rejection of			
		first o sodium,	quarter. Distilled from , m.p. 6.3° C.		
		$\delta T/K = 0.03$			
		REFERENCES: 1. v. Antr <u>Z. Elec</u>	copoff, A. <u>strochem</u> . 1919, <u>25</u> , 269.		
				······································	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.	
2. Cyclohexane; C <sub>6</sub> H <sub>12</sub> ; 110-82-7	<u>J. Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1078 - 1083.	
VARIABLES: T/K: 287.35 - 313.65 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long	
EXPERIMENTAL VALUES:		
T/K Mol Fraction C $X_1 \times 10^3$	Bunsen Ostwald oefficient Coefficient α L	
287.35       1.50         298.15       1.49         313.65       1.45	0.314 0.330 0.306 0.334 0.294 0.338	
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	$X_1 = -999.0 + 57.512 T$	
	Coef. Corr. = 0.9999	
For the recommended Gibbs energy equat cyclohexane system.		
The solubility values were adjusted to kPa (l atm) by Henry's Law. The Bunsen coefficients were calculate		
kPa (l atm) by Henry's Law. The Bunsen coefficients were calculate	d by the compiler.	
kPa (l atm) by Henry's Law. The Bunsen coefficients were calculate AUXILIARY	d by the compiler. INFORMATION	
kPa (l atm) by Henry's Law. The Bunsen coefficients were calculate	<pre>d by the compiler. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. Both re- search and standard grades were used with no difference in re- sults. 2. Cyclohexane. Phillips Petroleum Co. Used as received.</pre>	

COMPONENTS:			
1 America America 7440-27-1	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Dymond, J. H.		
2. Cyclohexane; C <sub>6</sub> H <sub>12</sub> ; 110-82-7	<u>J. Phys</u> . <u>Chem</u> .1967, <u>71</u> , 1829-1831.		
VARIABLES: T/K: 290.95 - 309.45 P/kPa: 101.325 (1 atm)	PREPARED BY: M. E. Derrick		
EXPERIMENTAL VALUES:	· • • • • • • • • • • • • • • • • • • •		
$\begin{array}{rrrr} T/K & \text{Mol Fraction} \\ & & X_1 \times 10^3 \\ \hline 290.95 & 1.525 \\ 298.27 & 1.520 \\ 304.20 & 1.520 \\ 309.45 & 1.530 \\ \end{array}$	$\begin{array}{c c} \begin{array}{c} \text{Bunsen} & \text{Ostwald} \\ \hline \text{Coefficient} & \text{Coefficient} \\ \hline \alpha & L \\ \hline \hline \\ \hline \\ \hline \\ 0.318 & 0.338 \\ 0.314 & 0.343 \\ 0.311 & 0.347 \\ 0.311 & 0.353 \\ \end{array}$		
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = -RT \text{ lr}$ Std. Dev. $\Delta G^{\circ} = 7.49$ ,	x <sub>1</sub> = 104.29 + 53.584 T Coef. Corr. = 0.9998		
The Bunsen and Ostwald coefficients w	vere calculated by the compiler.		
	INFORMATION		
AUXILIAR METHOD/APPARATUS/PROCEDURE: Saturation of liquid with gas at par- tial pressure of gas equal to 1 atm. Dymond-Hildebrand apparatus (1) using an all-glass pumping system to spray slugs of degassed solvent into the gas/ Amount of gas dissolved calcu- lated from initial and final gas pressures.	SOURCE AND PURITY OF MATERIALS; - 1. Argon. Linde Co. Dried. 2. Cyclohexane. Matheson, Coleman and Bell chromatoquality reagent.		

Cyclic Hydrocarbons

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Methylcyclohexane; C<sub>6</sub>H<sub>11</sub>CH<sub>3</sub>; 108-87-2</li> </ol>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 U.S.A.
<u> </u>	June 1979

CRITICAL EVALUATION:

The solubility of argon in methylcyclohexane at an argon partial pressure of 101.325 kPa (l atm) was measured at four temperatures between 262.90 and 298.14 by Reeves and Hildebrand (1), at three temperatures between 298.15 and 316.25 K by Clever, Battino, Saylor, and Gross (2), and at the temperature of 298.15 K by Saylor, and Battino (3). Sisskind and Kasarnowsky (4) made one measurement at 298.15 K and a pressure of 5.07 x  $10^3$  kPa (50 atm).

The three sets of data measured at 101.325 kPa argon partial pressure agree within one percent which is well within experimental error. The Gibbs energy of solution values from the three papers were fitted to an equation linear in temperature by a linear regression. The recommended changes in thermodynamic properties for the transfer of one mole of argon from the gas at a pressure of 101.325 kPa to the hypothetical unit mole fraction solution are

> $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = -1346.9 + 56.842 T$ Std. Dev.  $\Delta G^{\circ} = 3.9$ , Coef. Corr. = 0.9999  $\Delta H^{\circ}/J \text{ mol}^{-1} = -1346.9, \Delta S^{\circ}/J K^{-1} \text{ mol}^{-1} = -56.842$

Table 1 gives the recommended mole fraction solubilities and Gibbs energy change as a function of temperature. If one assuems Henry's law, the Sisskind and Kasarnowsky mole fraction solubility at 298.15 K and 101.325 kPa is  $1.80 \times 10^{-3}$  which is in fair agreement with the recommended value.(p. 278)

The solubility of argon in methylcyclohexane. The recommended mole fraction solubility at 101.325 kPa argon pressure and the Gibbs energy of solution as a function of temperature. Table 1.

Т/К	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
258.15	2.011	13,327
268.15	1.964	13,895
278.15	1.922	14,464
288.15	1.884	15,032
298.15	1.849	15,601
308.15	1.816	16,169
318.15	1.786	16,738

Jolley and Hildebrand (5) report the partial molal volume of argon in methylcyclohexane to be (44  $\pm$  1) cm  $^3$  mol  $^{-1}$  at 298.15 K by a dilatometer method.

Reeves, L. W.; Hildebrand, J. H. J. Am. Chem. Soc. 1957, 79, 1313. Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1. 2.

- 1957, <u>61</u>, 1078.
- Saylor, J. H.; Battino, R. J. Phys. Chem. 1958, 62, 1334.
   Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. 1933, 214, 385.
   Jolley, J. E.; Hildebrand, J. H. J. Am. Chem. Soc. 1958, 80, 1050.

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150
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150 Argon Solubilitie	es up to 200 kPa		
COMPONENTS:	ORIGINAL MEASUREMENTS:		
l. Argon; Ar; 7440-37-1	Reeves, L. W.; Hildebrand, J. H.		
2. Methylcyclohexane; C <sub>6</sub> H <sub>11</sub> CH <sub>3</sub> ; 108-87-2	J. <u>Am</u> . <u>Chem</u> . <u>Soc</u> . 1957, <u>79</u> , 1313-1314.		
VARIABLES:	PREPARED BY:		
T/K: 262.90 - 298.14 P/kPa: 101.325 (1 atm)	T. D. Kittredge		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient		
262.90 1.9888	0.362 0.348		
272.53 1.9433 286.75 1.8872	0.350 0.349 0.344 0.361		
298.14 1.8543	0.324 0.354		
The Dungon and Octuald coefficients	and aplaulated by the compiler		
The Bunsen and Ostwald coefficients w			
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_{1}$	= -1296.6 + 56.660 T		
Std. dev. $\Delta G^0 = 3.8$ , c	oef. corr. = 0.9999		
$\Delta H^0 / T mol^{-1} = -1296 6$	$\Delta S^{0}/J K^{-1} mol^{-1} = -56.660$		
	he argon + methylcyclohexane ded equation and table of		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus is a modified version of the apparatus of Cook and Hanson (1). The gas is measured and admitted to the degassed solvent. The appara- tus is shaken for five minutes. The residual gas is measured. The proced- ure is repeated until the residual gas volume does not change.	<ol> <li>Argon. Linde Co. Standard grade, 99.9 per cent pure by spectro- scopic analysis.</li> <li>Methylcyclohexane. Source not given. Spectro-grade. Passed through a silica gel column, distilled through a vacuum jacketed</li> </ol>		
gas vorume does not enange.	column at a reflux ratio of 15:1. Normal boiling point 100.9 ± 0.05 °C., density 0.76505 g cm <sup>-3</sup> at 298.15 K.		
	ESTIMATED ERROR: $\delta T/K = 0.001$ $\delta X_1/X_1 = 0.001$		
	REFERENCES: 1. Cook, M. W.; Hanson, D. N. <u>Rev. Sci. Instr</u> . 1956, <u>60</u> , 615.		
	<b></b>		

COMPONENTS :		ORIGINAL MEASUF	REMENTS:		
1. Argon; Ar; 7440-37-1			L.; Battino, R.		
2. Methylcyclohexane; C <sub>6</sub> H <sub>11</sub> CH <sub>3</sub> ;		Saylor, J. i	H.; Gross, P. M.		
108-87-2		J. Phys. Che	<u>em</u> . 1957, <u>61</u> , 1078-1083	3.	
VARIABLES:			PREPARED BY:		••••••••
T/K: 28 P/kPa: 10	9.15 - 33	16.25	P. L. Long A. L. Cramer		
F/KF4. 10	1.323 (.		-		
EXPERIMENTAL VALUES	3 <b>:</b>				
-	Т/К	Mol Fraction	Bunsen	Ostwald	
		$X_{1} \times 10^{3}$	Coefficient	Cdefficient L	
			<u> </u>		
	289.15 303.15	1.86 1.83	0.330 0.319	0.349 0.354	
	316.25	1.79	0.307	0.355	
	-	<b></b>	· · -	<u></u>	
The solubility 101.325 kPa (1			a partial p	ressure of argon of	
The Bunsen coef	ficents w	were calculated	by the comp	iler.	
Smoothed Data:	∆G⁰/J mo	$pl^{-1} = -RT \ln X$	1 = -1077.2	+ 55.986 T	
	Std. de	$\Delta G^{\circ} = 6.4,$	Coef. corr.	= 0.9998	
	∆H⁰/J ma	$p1^{-1} = -1077.2,$	∆s°/J K <sup>-1</sup> r	$mol^{-1} = -55.986$	
			INFORMATION		
METHOD/APPARATUS	/PROCEDUI	RE:		ITY OF MATERIALS:	
The solvent is a as it flows in a 0.8 x 180 cm gl the top of a ga pressure of solvapor in mainta gas is absorbed	a thin f: ass heli: s buret. ute gas j ined at (	ilm through an x attached to The total plus solvent	and rese no diffe: 2. Methylcy Co. white	atheson Co. Both stands arch grades were used w rence in results. clohexane. Eastman Kods e label. Dried over Na d, corrected b.p. 100.9 C.	with ak
The apparatus i apparatus of Mo. The modification of a helical st a manometer for pressure, and a use with highly solvent is dega of the method o (2).	rrison an ns incluc orage fo: a consta n extra l soluble ssed by a	nd Billett (1). de the addition r the solvent, ant reference buret for the gases. The a modification	ESTIMATED ERRO REFERENCES: 1. Morrison J. Chem.		
			2. Baldwin,	R. R.; Daniel, S. G. Chem. 1952, 2, 161.	

	Argon Solubilitie	es up to 200 kPa		
COMPONENTS:		ORIGINAL MEASUREMENTS:		
l. Argon; Ar; 7440-37-1		Saylor, J. H.; Battino, R.		
<pre>2. Methylcyclohexane; C<sub>6</sub>H<sub>11</sub>CH<sub>3</sub>; 108-87-2</pre>		J. Phys. Chem	. 1958, <u>62</u> , 13	34 - 1337.
		PREPARED BY:		
	(l atm)	н.	L. Clever	
т/к	Mol Fraction $X_1 \times 10^3$			
298.15	1.85	0.324	0.354	
	AUXILIARY	INFORMATION	· · · · · · · · · · · · · · · · · · ·	
		SOURCE AND PURIT	Y OF MATERIALS:	
Billett	(1), and the	<ol> <li>Argon. Mat grade.</li> </ol>	heson Co. Rese	arch
			ohexane. No in	formation
al glass of solvent w of 1 atm. by and the co a bure tssolved w in the 1 at const	tube contain- vapor at a The gas saturated t system. The was determined iquid level in tant pressure	S ESTIMATED ERROR:	δT/K = 0.03 /mmHg = 1	
ouret syst	tem plus			
		REFERENCES:		
	as based of Billett s describe and Gross lvent was al glass solvent voi f l atm. ly and the to a buret isn the li	40-37-1 xane; C <sub>6</sub> H <sub>11</sub> CH <sub>3</sub> ; 298.15 101.325 (1 atm) T/K Mol Fraction X <sub>1</sub> x 10 <sup>3</sup> 298.15 1.85 value was adjusted to enry's law. The mole f by the compiler. AUXILIARY as based on the design Billett (1), and the s described by Clever, and Gross (2). Ivent was passed al glass tube contain- solvent vapor at a of 1 atm. The gas ly and the saturated to a buret system. The issolved was determined in the liquid level in	40-37-1       Saylor, J. H.         xane; C <sub>6</sub> H <sub>11</sub> CH <sub>3</sub> ;       J. Phys. Chem         298.15       I.atm)         T/K Mol Fraction X1 x 10 <sup>3</sup> PREPARED BY: H.         298.15       1.85         0.324         value was adjusted to a partial presenry's law. The mole fraction and Buby the compiler.         Source AND PURIT         as based on the design Billett (1), and the s described by Clever, and Gross (2).         Ivent was passed al glass tube contain- solvent vapor at a of 1 atm. The gas ly and the saturated to a buret system. The issolved was determined in the liquid level in m at constant pressure. me was the sum of puret system plus through the system.         REFERENCES: 1. Morrison, J. Chem. S 2. Clever, H.	40-37-1       ORIGINAL MEASUREMENTS:         xane; $C_6H_{11}CH_3$ ;       J. Phys. Chem. 1958, 62, 13         J. Phys. Chem. 1958, 62, 13         298.15       PREPARED EY:         T/K       Mol Fraction         Y       Y         298.15       1.85         0.324       0.354         Value was adjusted to a partial pressure of argon enry's law. The mole fraction and Bunsen solubility by the compiler.         AUXILIARY INFORMATION         Source AND PURITY OF MATERIALS:         1. Argon. Matheson Co. Rese grade.         2. Methylcyclohexane. No in given.         I glass tube contain-solvent vapor at a 51 atm. The gas ly and the saturated in the liquid level in the liquid level in the liquid level in the liquid level may bus through the system.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Geller, E. B.; Battino, R.;	
-	Wilhelm, E.	
2. $\frac{\text{cis-l}, 2-\text{Dimethylcyclohexane};}{C_8H_{16}}$ ; 2207-01-4	J. <u>Chem</u> . <u>Thermodyn</u> . 1976, <u>8</u> , 197-202.	
	157-202.	
VARIABLES:	PREPARED BY:	
T/K: 297.89 P/kPa: 101.325 (1 atm)	H. L. Clever A. L. Cramer	
EXPERIMENTAL VALUES:	Burr con	
T/K Mol Fraction X <sub>1</sub> x 10 <sup>3</sup> C	Bunsen Ostwald Coefficient Coefficient α L	
297.89 1.784	0.2829 0.3086	
The solubility value was adjusted to a 101.325 kPa (1 atm) by Henry's law. The Bunsen coefficient was calculated		
AUXILIARY	INFORMATION	
	INFORMATION SOURCE AND PURITY OF MATERIALS:	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described	SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products & Chemicals, Inc., or Matheson Co.,	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2).	SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products & Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better.	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Either Air Products &amp; Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better.</li> <li>2. cis-1,2-Dimethylcyclohexane. Chemical Samples Co. Fractionally</li> </ul>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan,	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Either Air Products &amp; Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better.</li> <li>2. cis-1,2-Dimethylcyclohexane. Chemical Samples Co. Fractionally distilled and stored in dark.</li> </ul>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3).	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Either Air Products &amp; Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better.</li> <li>2. cis-1,2-Dimethylcyclohexane. Chemical Samples Co. Fractionally distilled and stored in dark. Refractive index (NaD, 298.15 K)</li> </ul>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products &amp;    Chemicals, Inc., or Matheson Co.,    Inc. 99 mol per cent or better. 2. cis-1,2-Dimethylcyclohexane.    Chemical Samples Co. Fractionally    distilled and stored in dark.    Refractive index (NaD, 298.15 K)    1.4337.</pre>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products &amp;    Chemicals, Inc., or Matheson Co.,    Inc. 99 mol per cent or better. 2. cis-1,2-Dimethylcyclohexane.    Chemical Samples Co. Fractionally    distilled and stored in dark.    Refractive index (NaD, 298.15 K)    1.4337. ESTIMATED ERROR:</pre>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products &amp;    Chemicals, Inc., or Matheson Co.,    Inc. 99 mol per cent or better. 2. cis-1,2-Dimethylcyclohexane.    Chemical Samples Co. Fractionally    distilled and stored in dark.    Refractive index (NaD, 298.15 K)    1.4337. ESTIMATED ERROR:</pre>	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products &amp;    Chemicals, Inc., or Matheson Co.,    Inc. 99 mol per cent or better. 2. cis-1,2-Dimethylcyclohexane.    Chemical Samples Co. Fractionally    distilled and stored in dark.    Refractive index (NaD, 298.15 K)    1.4337. ESTIMATED ERROR:</pre>	
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METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass spiral tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial	SOURCE AND PURITY OF MATERIALS: 1. Argon. Either Air Products & Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better. 2. cis-1,2-Dimethylcyclohexane. Chemical Samples Co. Fractionally distilled and stored in dark. Refractive index (NaD, 298.15 K) 1.4337. ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 0.5$ $\delta x_1/X_1 = 0.005$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F. D.; Danforth, W. F. J. Am. Oil Chem. Soc. 1968, <u>45</u> , 830.	

54 Argon Solubilities up to 200 kPa			
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. <u>trans</u> -1,2-Dimethylcyclohexane; C <sub>8</sub> H <sub>16</sub> ; 6876-23-9	ORIGINAL MEASUREMENTS: Geller, E. B.; Battino, R.; Wilhelm, E. J. <u>Chem</u> . <u>Thermodyn</u> . 1976, <u>8</u> , 197-202		
VARIABLES: T/K: 298.01 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever A. L. Cramer		
EXPERIMENTAL VALUES:			
$\frac{T/K  Mol \; Fraction}{x_1 \; \times \; 10^3}$	Bunsen Ostwald Coefficient Coefficient α L		
298.001.994298.011.996298.021.993	0.3081 0.3361 0.3084 0.3365 0.3080 0.3360		
The Bunsen coefficients were calculat			
The solubility values were adjusted t 101.325 kPa (1 atm) by Henry's law.	o an argon partial pressure of		
AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is	2. trans-1,2-Dimethylcyclohexane. Chemical samples Co. Fraction- ally distilled and stored in dark. Refractive index (NaD, 298.15 K) 1.4248. ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 0.5$ $\delta X_1/X_1 = 0.005$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F. D.; Danforth, W. F. J. Am. Oil Chem. Soc. 1968, 45, 830. 3. Battino, R.; Banzhof, M.;		
found by difference between the initial and final volumes in the buret system. The solvent is col- lected in a tared flask and weighed.	Bogan, M.; Wilhelm, E. <u>Anal. Chem</u> . 1971, <u>43</u> , 806.		

Cyclic Hydrocarbons	
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. <u>cis</u> -1,3-Dimethylcyclohexane, 59 mol %; C <sub>8</sub> H <sub>16</sub> ; 638-04-0 3. <u>trans</u> -1,3-Dimethylcyclohexane, 41 mol %; C <sub>8</sub> H <sub>16</sub> ; 2207-03-6	ORIGINAL MEASUREMENTS: Geller, E. B.; Battino, R.; Wilhelm, E. J. <u>Chem</u> . <u>Thermodyn</u> . 1976, <u>8</u> , 197-202.
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient αL
298.15 1.985	0.3053 0.3333
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing appara- tus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and	<ol> <li>Argon. Either Air Products &amp; Chemicals, Inc., or Matheson Co., Inc. 99 mol per cent or better.</li> <li><u>cis</u>-1,4-Dimethylcyclohexane.</li> <li><u>trans</u>-1,4-Dimethylcyclohexane. Chemical Samples Co. Binary mixture used as received. Authors analyzed mixture by refractive index.</li> <li>ESTIMATED ERROR:</li> </ol>
vacuum is intermittently applied through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con-	$\delta T/K = 0.03$ $\delta P/mmHg = 0.5$ $\delta X_1/X_1 = 0.005$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.
taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is col- lected in a tared flask and weighed.	<ol> <li>Battino, R.; Evans, F. D.; Danforth, W. F. J. Am. Oil Chem. Soc. 1968, 45, 830.</li> <li>Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. Anal. Chem. 1971, 43, 806.</li> </ol>

T56 Argon Solubilitie	es up to 200 kPa
	ORIGINAL MEASUREMENTS: Geller, E. B.; Battino, R.; Wilhelm, E. J. Chem. Thermodyn. 1976, 8, 197-202. PREPARED BY: H. L. Clever A. L. Cramer Bunsen Ostwald Coefficient Coefficient $\alpha$ L 0.3110 0.3394 by the compiler.
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the	2. <u>cis</u> -1,4-Dimethylcyclohexane.

Cybild Hyd	rocarbons 157
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. Cyclooctane; C <sub>8</sub> H <sub>16</sub> ; 292-64-8	ORIGINAL MEASUREMENTS: Wilcock, R. J.; Battino, R.; Wilhelm, E. J. Chem. <u>Thermodyn</u> . 1977, <u>9</u> , Ill-II5.
VARIABLES: T/K: 298.11 - 313.54 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever A. L. Cramer
$\frac{X_1 \times 10^3}{289.11} \frac{X_1 \times 10^3}{1.226}$ $\frac{298.14}{1.300}$ The Bunsen coefficient was calculated The solubility values were adjusted to 101.325 kPa by Henry's law. Smoothed Data: $\Delta G^0/J \text{ mol}^{-1} = -RT \ln Std.$ Dev. $\Delta G^0 = 53.7$ ,	to an argon partial pressure of $X_1 = 1413.8 + 50.715 T$
$\Delta H^{O}/J \mod^{-1} = 1413.8,$ $T/K \mod Fra$ $288.15 \qquad 1.2$ $293.15 \qquad 1.2$ $298.15 \qquad 1.2$ $303.15 \qquad 1.2$ $308.15 \qquad 1.2$ $313.15 \qquad 1.3$	$\Delta S^{0}/J K^{-1} mol^{-1} = -50.715$
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing appara- tus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass spiral tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is col- lected in a tared flask and weighed.	purity 99.995 mol per cent. 2. Cyclooctane. Chemical Samples Co. 99 mol percent, distilled, refractive index (NaD, 298.15 K) 1.4562. ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 0.5$ $\delta X_1/X_1 = 0.005$ REFERENCES: 1. Morrison, T. J.; Billett, F. <u>J. Chem. Soc</u> . 1948, 2033. 2. Battino, R.; Evans, F. D.; Danforth, W. F. <u>J. Am. Oil Chem. Soc</u> . 1968, <u>45</u> , 830. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. <u>Anal</u> . <u>Chem</u> . 1971, <u>43</u> , 806.

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COMPONENTS :	EVALUATOR:			
<pre>1. Argon; Ar; 7440-37-1 2. Benzene; C<sub>6</sub>H<sub>6</sub>; 71-43-2</pre>	H. L. Clever Emory University Department of Chemistry Atlanta, Georgia 30322 June, 1979			
CRITICAL EVALUATION:				
The solubility of argon in benzene has been measured by Lannung (1), Clever, Battino, Saylor, and Gross (2), and by Byrne, Battino, and Danforth (3). Linford and Hildebrand measured the argon solubility in several benzene + 1,1,2-trichloro-1,2,2-trifluoroethane (Freon-113) mixtures, but not in the pure benzene (4).				

The smoothed data of Lannung and of Clever, et al. agree within one percent at 283.15 K and 0.5 percent at 308.15 K. The values of Byrne, et al. agrees to 0.7 percent or better. The data are well within experimental error. All of the data points were used in a linear regression of Gibbs energy linear in temperature to obtain the recommended values of thermodynamic parameters and mole fraction solubility values.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa to the hypothetical unit mole fraction solution are:

> $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = 1534.72 + 53.334 T$ Std. Dev.  $\Delta G^{\circ} = 24.48$ , Coef. Corr. = 0.9987

 $\Delta H^{\circ}/J \text{ mol}^{-1} = 1534.72, \quad \Delta S^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1} = -53.334$ 

The recommended values of the mole fraction solubility at an argon partial pressure of 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

TABLE 1. Solubility of argon in benzene at 101.325 kPa. Recommended mole fraction solubility and Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction $X_1 \times 10^3$	∆G°/J mol~1
283.15	0.853	16,636
288.15	0.862	16,903
293.15	0.872	17,170
298.15	0.882	17,436
303.15	0.891	17,703
308.15	0.899	17,970
313.15	0.908	18,236
318.15	0.917	18,503

Walkley and Jenkins (5) measured the partial molal volume of argon in ben-zene by dilatometry. Their value is  $44.6 \text{ cm}^3 \text{ mol}^{-1}$  at 298.15 K. Popov and Drakin (6) measured the partial molal volume by a density method at high pressure. Their values are:

P/atm	7.0	15.70	23.10	25.00	34.72	41.10	44.25
$\frac{P/atm}{V_1/cm^3}$ mol <sup>-1</sup>	36.6	37.6	37.7	38.5	39.2	39.6	39.4

The uncertainties in  $\overline{V}_1$  decrease from ± 0.8 at 7 atm to ± 0.1 at pressures above 40 atm.

 Lannung, A. J. Am. Chem. Soc. 1930, 52, 68.
 Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem.
 Byrne, J. E.; Battino, R.; Danforth, W. F. J. Chem. Thermodynamics 1974, 6, 245.

Linford, R. G.; Hildebrand, J. H. J. Phys. Chem. 1969, 73, 4410.
 Walkley, J.; Jenkins, W. J. <u>Trans. Faraday Soc.</u> 1968, 64, 19.
 Popov. G. A.; Drakin, S. I. <u>Zh. Fiz. Khim.</u> 1974, 48, 631.

See page 279 for high pressure data on the system. The mole fraction solubility at 280.15 K and 101.325 kPa (Henry's law) is 5-9 % lower than recommended

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	Aromatic H	yurucai	00113				159
COMPONENTS:		ORIGIN	AL MEASUR	EMENTS:			
1. Argon; Ar; 7440-37-1		Lann	ung, A.				
2. Benzene; C <sub>6</sub> H <sub>6</sub> ; 71-43-2		<u>J. A</u>	<u>n. Chem</u> .	<u>Soc</u> ., 193	30, <u>52</u> ,	68 <b>-</b>	80.
VARIABLES: T/K: 286.15 - 308.15 P/kPa: 101.325 (1 atm)		PREPAF		P. L. Long A. L. Crame			
EXPERIMENTAL VALUES:							
· · · · · · · · · · · · · · · · · · ·	Fraction $x_1 \times 10^3$	Buns Coeff: a		Ostwald Coefficier L	nt		
	0.864 0.861	0.22		0.230 0.229			
287.15	0.864	0.23	27	0.228			
291.15	0.870 0.858 0.873	0.22 0.22 0.22		0.234 0.231 0.236			
293.15	0.876 0.860 0.880	0.22	17	0.237 0.233 0.238			
298.15	0.885 0.865 0.889	0.2	17	0.242 0.237 0.243			
308.15 308.15 308.15	0.904 0.884 0.916	0.22	19	0.253 0.247 0.256			
Smoothed Data: $\Delta G^{\circ}/J$ mol <sup>*</sup> Std. Dev. For the recommended Gibbs of argon in benzene. The mole fraction solubility	$\Delta G^{\circ} = 27.2,$ free energy	Coe: equa	f. Corr. tion see	= 0.9978 the crit:	ical eva		
the compiler.	AUXILIARY	TNEOPM		<u> </u>			
METHOD/APPARATUS/PROCEDURE:				ITY OF MATER	TALCA		
Gas absorption. The gas i rated with solvent vapor. volume absorbed is the dif between initial and final The amount of solvent is d	s presatu- The gas ference gas volumes, etermined	1.	Argon. tory. ( cent nit Benzene	Linde's L Contained	iquid A 0.5 vol m, "zur	ume pe Moleł	er kul-
by the weight of mercury displaced. The apparatus is a modification of that of von Antropoff (1). A calibra- ted, combined all glass manometer and bulb is enclosed in an air thermostat. Mercury is used as the calibration and			point 5				,
Mercury is used as the cal confining liquid. The sol gassed in the apparatus. and the gas are shaken tog equilibrium is established	vent is de- The solvent ether until	ESTIM		R: = 0.03			
		REFER 1.	ENCES: v. Antro Z. Elec	opoff, A. trochem. 1	.919, <u>25</u>	<u>,</u> 269	•

0.01/10.01/10/00				
COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.			
2. Benzene; C <sub>6</sub> H <sub>6</sub> ; 71-43-2	J. Phys. Chem. 1957, 61, 1078 - 1083.			
VARIABLES:	PREPARED BY:			
T/K: 287.15 - 313.45	P. L. Long			
P/kPa: 101.325 (1 atm)	A. L. Cramer			
EXPERIMENTAL VALUES:				
T/K Mol Fraction	Bunsen Ostwald			
$\qquad \qquad $	Coefficient Coefficient			
287.15 0.870	0.221 0.232			
298.15 0.877 313.45 0.906	0.220 0.240 0.223 0.256			
Smoothed Data: $\Delta G^{\circ} / J \mod^{-1} = - RT \ln$	$X_1 = 1191.8 + 54.473 T$			
Std. Dev. $\Delta G^\circ = 14.0$ ,	Coef. Corr. = 0.9998			
For the recommended free energy equati solubility of argon in benzene.	on see the critical evaluation of the			
The Bunsen coefficients were calculate	d by the compiler			
The Bunsen Coefficients were carculate	a by the complicit			
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;			
Volumetric. The solvent is saturated	1. Argon. Matheson Co. Both stan-			
with gas as it flows through an 8 mm	T. Argon, nachebon co, both both			
	dard and research grade were used			
x 180 cm glass spiral attached to a gas buret. The total pressure is	dard and research grade were used with no difference in results.			
gas buret. The total pressure is maintained at 1 atm as the gas is	<ul><li>dard and research grade were used</li><li>with no difference in results.</li><li>2. Benzene. Jones &amp; Laughlin Steel</li></ul>			
gas buret. The total pressure is maintained at 1 atm as the gas is absorbed.	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over</li> </ul>			
gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled.</li> </ul>			
gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled.</li> </ul>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a</pre>	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled.</li> </ul>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for</pre>	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled.</li> </ul>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is</pre>	<pre>dard and research grade were used with no difference in results. 2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled. ESTIMATED ERROR: δT/K = 0.05</pre>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for</pre>	<ul> <li>dard and research grade were used with no difference in results.</li> <li>2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled.</li> </ul>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	<pre>dard and research grade were used with no difference in results. 2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled. ESTIMATED ERROR:</pre>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	<pre>dard and research grade were used with no difference in results. 2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled. ESTIMATED ERROR:</pre>			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	dard and research grade were used with no difference in results. 2. Benzene. Jones & Laughlin Steel Co., Pittsburgh, PA. Shaken with $H_2SO_4$ , water washed, dried over sodium, and distilled. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.02$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033;			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	dard and research grade were used with no difference in results. 2. Benzene. Jones & Laughlin Steel Co., Pittsburgh, PA. Shaken with $H_2SO_4$ , water washed, dried over sodium, and distilled. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.02$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u> . 1952, 3819.			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	dard and research grade were used with no difference in results. 2. Benzene. Jones & Laughlin Steel Co., Pittsburgh, PA. Shaken with $H_2SO_4$ , water washed, dried over sodium, and distilled. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.02$ REFERENCES: 1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033; <u>ibid</u> . 1952, 3819. 2. Baldwin, R. R.; Daniel, S. G.			
<pre>gas buret. The total pressure is maintained at 1 atm as the gas is absorbed. The apparatus is a modification of that of Morrison and Billett (1). The modifications include the addition of a spiral storage for the solvent, a manometer for a constant reference pressure, and an extra buret for highly soluble gases. The solvent is degassed by a modification of the</pre>	<pre>dard and research grade were used with no difference in results. 2. Benzene. Jones &amp; Laughlin Steel Co., Pittsburgh, PA. Shaken with H<sub>2</sub>SO<sub>4</sub>, water washed, dried over sodium, and distilled. ESTIMATED ERROR:</pre>			

		16
COMPONENTS :	ORIGINAL MEASU	REMENTS:
1. Argon; Ar; 7440-37-1	Byrne, J. E Danforth,	.; Battino, R.; W. F.
2. Benzene; C <sub>6</sub> H <sub>6</sub> ; 71-43-2	$\frac{J}{245} - \frac{Th}{250}$	ermodynamics 1974, <u>6</u> , •
VARIABLES:	PREPARED BY:	
T/K: 310.64, 310.69 P/kPa: 101.325 (1 atm)		H. L. Clever
EXPERIMENTAL VALUES:		
T/K Mol Fraction $x_1 \times 10^3$	Bunsen Coefficient α	Ostwald Coefficient L
310.64 0.906 310.69 0.906	0.2238 0.2237	0.2545 0.2544
The mole fraction solubilities and Bun the compiler.	sen coeffici	ents were calculated by
AUXILIARY		
	INFORMATION	
METHOD / APPARATUS / PROCEDURE:		DITY OF MATERIALS.
METHOD/APPARATUS/PROCFDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wil- helm (3).	SOURCE AND PUR 1. Argon. Better 2. Benzene	RITY OF MATERIALS: Matheson Co., Inc. than 99 mol per cent. e. Baker Analyzed Reagent Thiophene free, 99.9 mol nt,
The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wil-	SOURCE AND PU 1. Argon. Better 2. Benzen Grade. per cel ESTIMATED ERR $\delta T, \delta P/m$	Matheson Co., Inc. than 99 mol per cent. e. Baker Analyzed Reagent Thiophene free, 99.9 mol nt.

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Methylbenzene or Toluene; C<sub>6</sub><sup>H</sup><sub>5</sub><sup>CH</sup><sub>3</sub>; 108-88-3</li> </ol>	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 U.S.A. June 1979

## CRITICAL EVALUATION:

The solubility of argon in methylbenzene at an argon partial pressure of 101.325 kPa (1 atm) was measured at 11 temperatures between 288.22 and 303.31 K by Reeves and Hildebrand (1) and at four temperatures between 288.15 and 328.15 K by Saylor and Battino (2). Sisskind and Kasarnowsky (3) made measurements of the solubility at 273.15 and 280.15 K at pressures between 2.53 x  $10^3$  and 7.60 x  $10^3$  kPa argon pressure.

A linear regression of the Gibbs energy and temperature indicated the 288.15 and 298.15 K values of Saylor and Battino were slightly below the other values (1,2). The recommended values come from a linear regression of Gibbs energy and temperature using all of the Reeves and Hildebrand data and the values at 313.15 and 328.15 K of Saylor and Battino.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = 728.50 + 54.225 T$ 

Std. Dev.  $\Delta G^{\circ} = 5.18$ , Coef. Corr. = 0.99996

 $\Delta H^{\circ}/J mol^{-1} = 728.50, \quad \Delta S^{\circ}/J K^{-1} mol^{-1} = -54.225$ 

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1. If the data of Sisskind and Kasarnowsky are assumed to obey Henry's Law the solubility at 273.15 K is  $0.973 \times 10^{-3}$  mole fraction argon which is about 9 per cent below the value predicted by the recommended equation.

Table 1. Solubility of argon in methylbenzene. Recommended mole fraction solubility at 101.325 kPa argon pressure and Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
288.15	1.085	16,354
298.15	1.096	16,896
308.15	1.107	17,438
318.15	1.117	17,980
328.15	1.126	18,523

Jolley and Hildebrand (4) report the partial molal volume of argon in methylbenzene to be (45  $\pm$  1) cm<sup>3</sup> mol<sup>-1</sup> at 298.15 K by a dilatometer measurement.

11.	Saylor, J. H.; Battino, R.	J. Phy	ys. Cher	n. 1958	3, 62, 1334	•
2.	Reeves, L. W.; Hildebrand,	J. H.	J. Am.	Chem.	Soc. 1957,	79, 1313.
3.	Sisskind, B.; Kasarnowsky,	I. Z.	Anorg.	Chem.	1933, 214,	385.
4.	Jolley, J. E.; Hildebrand,	J. Н.	J. Am.	Chem.	Soc. 1958,	<u>80</u> , 1050.

Aromatic H	ydrocarbons 163
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7740-37-1	Saylor, J. H.; Battino, R.
2. Methylbenzene (Toluene); C <sub>7</sub> H <sub>8</sub> 108-88-3	J. Phys. Chem. 1958, 62, 1334-1337.
VARIABLES:	PREPARED BY:
VARIABLES .	
T/K: 288.15 - 328.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
288.15       1.07         298.15       1.09         313.15       1.11         328.15       1.13	0.228 0.240 0.228 0.249 0.229 0.262 0.229 0.275
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln$	$X_{-} = A + BT = 1049.4 + 53.2 T$
	1 Coef. Corr. = 0.99999
	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -53.2$
$\Delta H^{\circ}/J \mod = 1,049.4$	$\Delta S^{2}/J K^{2} mot^{2} = -33.2$
The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law.	
The Bunsen coefficients were calculat	ed by the compiler.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was based on the design by Morrison and Billett (1), and the	<ol> <li>Argon. Matheson Co., Research grade.</li> </ol>
version used was described by Clever, Battino, Saylor, and Gross (2).	
The degassed solvent was passed through a helical glass tube contain- ing the gas. The gas dissolves ra- pidly and the saturated liquid flows into a buret system. The volume of gas dissolved was determined by the	water washed, dried over Drierite, distilled b.p. 110.40- 110.60° C.
increase in the liquid level in the	ESTIMATED ERROR:
buret system at constant pressure. The volume of the solvent was deter- mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$
	δx/x = 0.02
	REFERENCES:
	1. Morrison, T. J.; Billett, F. J. <u>Chem</u> . <u>Soc</u> . 1948, 2033.

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COMPONENTS :			ORIGINAL MEAS	UREMENTS:
1. Argon; Ar; 7440-37-1		Reeves, L.	W.; Hildebrand, J. H.	
2. Methylbenzene or Toluene; C <sub>6</sub> H <sub>5</sub> (CH <sub>3</sub> ); 108-88-3		<u>J. Am. Che</u>	<u>m</u> . <u>Soc</u> . 1957, <u>79</u> , 1313-1314	
I				
VARIABLES:			PREPARED BY:	
	288.22 - 101.325 (		i	T. D. Kittredge A. L. Cramer
EXPERIMENTAL VALU	ES:			
	T/K	Mol Fraction $X_1 \times 10^3$	Bunsen Coefficient a	Ostwald Coefficient L
	288.23 288.22	1.0882 1.0875	0.231 0.231	0.244 0.244
	293.04 293.03	1.0918 1.0921	0.231 0.231	0.248 0.248
	297.86	1.0949	0.230 0.230 0.230 0.230 0.230 0.230	0.251 0.251 0.251 0.251 0.251 0.251
	303.31		0.229	0.254 0.255
Smoothed Data:				
	Std. Dev	$\Delta G^{\circ} = 1.7,$	Coef. Corr.	. = 0.9999
	∆H°/J mc	$1^{-1} = 479.60,$	∆S°/J K <sup>-1</sup> n	$n01^{-1} = -55.067$
See the evalua and table of se	tion of th olubility	ne argon + tolu values.	ene system i	for the recommended equation
		AUXILIAPY	INFORMATION	
METHOD:			1. Argon.	RITY OF MATERIALS: Linde Co. Standard grade, ercent pure by spectroscopi is.
			Distil	benzene. Source not given. led, normal b.p. (110.60 ± C, density 0.8623 g cm <sup>-3</sup> at
			ESTIMATED ER	ROR:
APPARATUS/PROCEDURE: The apparatus is a modified version of the apparatus of Cook and Hanson (1). The gas is meas- ured at various pressures and admitted		δX	$\delta T/K = 0.001$ $1/X_1 = 0.001$	
to the degasse tus is shaken ual gas is mea repeated until does not chang	for 5 min sured. The the reside	. The appara- . The resid- he procedure is dual gas volume	REFERENCES: 1. Cook, <u>Rev. S</u> 374.	M. W.; Hanson, D. N. <u>ci</u> . <u>Instr</u> . 1957, <u>28</u> , 370-

Argon Solubilities up to 200 kPa

COMPONENTS: 1. Argon; Ar; 7440-37-1	ORIGINAL MEASUREMENTS: Byrne, J. E.; Battino, R.; Wilhelm,E.
2. 1,2-Dimethylbenzene or <u>o</u> -Xylene; C <sub>8</sub> H <sub>10</sub> ; 95-47-6	<u>J. Chem</u> . <u>Thermodyn</u> . 1975, <u>7</u> , 515-522.
VARIABLES:	PREPARED BY:
T/K: 283.06 - 313.11 P/kPa: 101.325 (1 atm)	H. L. Clever A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction X <sub>1</sub> x 10 <sup>3</sup>	Bunsen Ostwald Coefficient Coefficient α L
283.06 1.080	0.2028 0.2102
283.25 1.069	0.2007 0.2081
283.71 1.085	0.2035 0.2114
298.16 1.084 298.24 1.080	0.2006 0.2190 0.1999 0.2183
313.10 1.089	0.1988 0.2279 0.1990 0.2281
<u>313.11 1.090</u>	
The Bunsen coefficients were calculate values were adjusted to an argon parts by Henry's law.	ial pressure of 101.325 kPa (1 atm)
Smoothed Data: $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln J$	
Std. Dev. $\Delta G^{\circ} = 10.8$ ,	
$A_{\rm H}^{\rm O}$ (T mol <sup>-1</sup> = 260.89	$\Delta s^{o}/J \kappa^{-1} mol^{-1} = -55.892$
T/K MOl Frac	ction $\Delta G^{O}/J \text{ mol}^{-1}$
x <sub>1</sub> x :	10 <sup>3</sup>
$\frac{1}{278.15}$ $\frac{1}{1.0}$	
288.15 1.0	78 16,366
298.15 1.0	
308.15 1.04 318.15 1.05	
510.13	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on	1. Argon. Either Air Products & Chemicals, Inc., or Matheson Co.,
the design of Morrison and Billett (1) and the version used is described	
by Battino, Evans, and Danforth (2).	_
The degassing apparatus is that	2. 1,2-Dimethylbenzene. Phillips
described by Battino, Banzhof, Bogan, and Wilhelm (3).	Petroleum Co. Pure grade.
Degassing. Up to 500 cm3 of solvent	ESTIMATED ERROR:
is placed in a flask of such size	$\delta T/K = 0.03$
that the liquid is about 4 cm deep. The liquid is rapidly stirred, and	$\delta P/mmHg = 0.5$
vacuum is intermittently	$\delta X_1 / X_1 = 0.005$
applied through a liquid N <sub>2</sub> trap	REFERENCES :
until the permanent gas residual pressure drops to 5 microns.	1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.
Solubility Determination. The de-	2. Battino, R.; Evans, F. D.;
gassed solvent is passed in a thin	Danforth, W. F.
film down a glass helical tube con- taining solute gas plus the solvent	J. Am. Oil Chem. Soc. 1968, 45,
vapor at a total pressure of one	830.
atm. The volume of gas absorbed is	3. Battino, R.; Banzhof, M.;
found by difference between the	Bogan, M.; Wilhelm, E. Anal. <u>Chem</u> . 1971, <u>43</u> , 806.
initial and final volumes in the buret system. The solvent is col-	Anar. Chem. 1971, 43, 800.
lected in a tared flask and weighed.	
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Argon Solubilities up to 200 kPa		
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. 1,3-Dimethylbenzene or <u>m</u> -Xylene; C <sub>8</sub> H <sub>10</sub> ; 108-38-3	ORIGINAL MEASUREMENTS: Byrne, J. E.; Battino, R.; Wilhelm, E. <u>J. Chem. Thermodyn</u> . 1975, <u>7</u> , 515-522.	
VARIABLES: T/K: 283.21 - 313.71 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever A. L. Cramer	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is applied intermittently through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops to 5 microns.	REFERENCES: 1. Morrison, T. J.; Billett, F.	
Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is collected in a tared flask and weighed.	<u>J. Chem. Soc</u> . 1948, 2033. 2. Battino, R.; Evans, F. D.; Danforth, W. F. <u>J. Am. Oil Chem. Soc</u> . 1968, <u>45</u> 830. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. <u>Anal. Chem</u> . 1971, <u>43</u> , 806.	

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Aromatic H	yarocarbons 167
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H.L.
2. l,4-Dimethylbenzene ( <u>p</u> -Xylene); C <sub>8</sub> H <sub>10</sub> ; 106-42-3	J. <u>Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1082-1083.
VARIABLES:	PREPARED BY:
T/K: 303.15 P/kPa: 101.325 (1 atm)	C.E. Edelman A.L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald oefficient Coefficient α L
303.15 1.25	0.225 0.250
The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law.	a partial pressure of argon of
AUXILIARY	INFORMATION
METHOD: Volumeteric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is absorbed	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co.</li> <li>2. 1,4-Dimethylbenzene. Eastman Kodak white label. Fractionally crystalized twice, dried over Na, distilled, b.p. 138.0-138.2°C.</li> </ul>

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Argon Solubilities up to 200 kPa

68 Argon Solubilities up to 200 kPa		
COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>1,4-Dimethylbenzene or p-Xylene;</li> </ol>	Byrne, J. E.; Battino, R.; Wilhelm, E.	
C <sub>8</sub> H <sub>10</sub> ; 106-42-3	J. <u>Chem</u> . <u>Thermodyn</u> . 1975, <u>7</u> , 515-522.	
VARIABLES:	PREPARED BY:	
T/K: 288.10 - 313.21 P/kPa: 101.325 (1 atm)	H. L. Clever	
EXPERIMENTAL VALUES: T/K Mol Fraction $X_{1} \times 10^{3}$	Bunsen Ostwald oefficient Coefficient α L	
288.10 1.246 288.17 1.245	0.2279 0.2404 0.2278 0.2403	
298.06 1.241 298.08 1.247 298.17 1.246	0.2247 0.2452 0.2259 0.2465 0.2256 0.2463	
313.11 1.246 313.21 1.241	0.2223 0.2548 0.2213 0.2537	
The Bunsen coefficients were calcula	ted by the compiler.	
The solubility values were adjusted 101.325 kPa (l atm) by Henry's law.		
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	$X_1 = -50.7 + 55.785 \text{ T}$	
Std. Dev. $\Delta G^0 = 2.3$ ,		
$\Delta H^0 / J mol^{-1} = -50.7,$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -55.785$	
T/K Mol Frac X <sub>1</sub> x 1	tion $\Delta G^{\circ}/J \text{ mol}^{-1}$	
$\frac{1}{288.15}$ 1.245		
298.15 1.244	16,582	
308.15 1.244 318.15 1.243		
	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
See data sheets for either the 1,2- or the 1,3-dimethylbenzene + argon system from this paper for	<ol> <li>Argon. Matheson Co., Inc. 99.995 per cent.</li> </ol>	
details of the method.	2. 1,4-Dimethylbenzene. Phillips Petroleum Co. Pure Grade. Used as received.	
EVALUATION:		
Clever, see preceding page, reported a value of the argon solubility in 1,4-dimethylbenzene at 303.15 K which agrees within 0.5 per cent of the		
smoothed value from this paper.	ESTIMATED ERROR:	
The smoothed data of Byrne, Battino, and Wilhelm is classed at tentative data for the argon + 1,4-dimethy1-	$\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta X_1/X_1 = 0.01$	
benzene. It is classed as tetntative because there is no confirmation of the temperature coefficient of solubility at this time.	REFERENCES:	
June 1979		

COMPONENTS :	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever Department of Chemistry
<ol> <li>Alcohols, Aldehydes, Ketones, and Carboxylic Acids</li> </ol>	Emory University Atlanta, GA 30322 U.S.A.
	July 1979

#### CRITICAL EVALUATION:

There are individual evaluation sheets for the solubility of argon in methanol, ethanol, l-propanol, and l-butanol. The evaluation sheets give either tentative or recommended values of the mole fraction solubility at an argon partial pressure of 101.325 kPa (l atm) over a temperature interval.

The argon solubility data at high pressure have not been correlated with the low pressure data. Sisskind and Kasarnowsky (11) report the solubility of argon in many polar oxygen containing compounds. Their data and others' data are compiled in a later section of the volume. One can use Henry's Law to approximate the atmospheric pressure solubility,  $x_1 = P_1/K_1$  from the high pressure data. Graham and Weale (5) showed that for many systems the solubility isotherm is better reproduced by an equation  $S = aP + bP^2$  or S/P = a + bP. When the solubility data is over a range of pressure the Graham and Weale approach may be more useful than Henry's law.

There are other solubility data that either we could not obtain or we could not use in the form the data are presented in the original papers. Krestov and Nedel'ko report thermodynamic characteristics of argon dissolution in alcohols (6), and in ketones, aldehydes and carboxylic acids (7) at temperatures between 273 and 313 K. The solubility values are not given in the papers, but the Gibbs energy of solution, calculated from  $\Delta G_{SOIN}^{\circ} =$ - RT ln (L/ $\rho$ ) + RT ln (0.082 T), are given at temperatures of 273, 283, 293, 298, 303, and 308 K. In the Gibbs energy equation L is the Ostwald coefficient and  $\rho$  is the solution density. The calculation could be reversed to obtain the Ostwald coefficient from the Gibbs energy. We have not done the calculation. See page 80 for additional comment on the equation.

The compounds for which Krestov and Nedel'ko report the Gibbs energy of solution are alcohols: methanol, ethanol, 1-propanol, 1-butanol, 2-butanol, 2-methyl-1-propanol, 1-pentanol, 1-hexanol, and 1-octanol; ketones: 2-propanone, 2-butanone, 2-pentanone, 3-pentanone, 3-hexanone, and 4-heptanone; aldehydes: propanal, butanal, and pentanal; and carboxylic acids: acetic acid acid, propanoic acid and butanoic acid.

Krestov and Nedel'ko (9, 10) have reported thermodynamic data on the dissolution of argon in saturated hydrocarbons, cyclohexane, benzene and other aromatic hydrocarbons and amines. However, the papers were not available to us.

There are several systems that require specific comment.

## Argon + 2-Methyl-l-propanol

Battino, Evans, Danforth, and Wilhelm (1) report the solubility of argon in 2-methyl-l-propanol at seven temperatures between 274 and 328 K. Krestov and Slyusar (8) report one value at 298.15 K. The Ostwald coefficients at 298.15 K from the two laboratories agree within 0.8 per cent, which is well within experimental error. The 298.15 K solubility value can be recommended, but the values at other temperatures are classed as tentative until confirmed by other workers.

#### Argon + 1-Pentanol

The solubility values of Boyer and Bircher (3) are five percent higher than the values of Gjaldbaek and Niemann (4). In general, the results from both the laboratories of Gjaldbaek and of Bircher have been reliable. Both sets of data are classed as tentative. However, the values of Gjaldbaek and Niemann are slightly preferred.

Argon + 1-Octanol

The solubility values of Boyer and Bircher (3) are 8 to 12 per cent higher than the values reported by Wilcock, Battino, Danforth and Wilhelm (12). Although both sets of data are classed as tentative the Wilcock et al. values are preferred because of their improved apparatus, better degassing

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Alcohols, Aldehydes, Ketones, and Carboxylic Acids.</li> </ol>	H. L. Clever Department of Chemistry Emory University Atlanta, Georgia 30322 U.S.A.
	July 1979

CRITICAL EVALUATION:

technique, and the fact that their solubility values decrease with temperature, as expected, for the system.

Argon + 1,2-Ethanediol

Both Gjaldbaek and Niemann (4) and Ben-Naim (2) report values of the solubility of argon in 1,2-ethanediol which differ by about six per cent. The values of Ben-Naim were read from a graph which adds uncertainty to the overall experimental uncertainty. Both sets of values are classed as tentative.

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- Battino, R.; Evans, F. D.; Danforth, W. F.; Wilhelm, E. J. Chem. <u>Thermodyn</u>. 1971, <u>3</u>, 743.
- 2. Ben-Naim, A. J. Phys. Chem. 1968, 72, 2998.
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- 5. Graham, E. B.; Weale, K. E. <u>Progress in International Research on</u> <u>Thermodynamics and Transport Properties</u>, Masi, J. F.; Tsai, D. H., Editors, Academic Press, New York, 1962, page 153.
- 6. Krestov, G. A.; Nedel'ko, B. E. <u>Izv. Vyssh. Uchebn. Zaved.</u>, <u>Khim.</u> <u>Khim. Tekhnol</u>. 1972, <u>15</u>, 42.
- 7. Krestov, G. A.; Nedel'ko, B. E. Ibid, 1973, 16, 214.
- 8. Krestov, G. A.; Slyusar, V. P. Ibid, 1978, 21, 1294.
- 9. Krestov, G. A.; Nedel'ko, B. E. <u>Tr. Ivanov. Khim.-Tekhnol. Inst.</u> 1972, No. 14, 61.
- 10. Krestov, G. A.; Nedel'ko, B. E. Ibid, No. 15, 65.
- 11. Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. 1933, 214, 385.
- Wilcock, R. J.; Battino, R.; Danforth, W. F.; Wilhelm, E. J. Chem. <u>Thermodyn</u>. 1978, <u>10</u>, 817 - 822.

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1.</li> <li>Methanol; CH<sub>3</sub>OH; 67-56-1</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA March, 1979

CRITICAL EVALUATION:

Lannung (1) reported 20 values of the solubility of argon in methanol between 278.25 and 318.15 K, Boyer and Bircher (2) one value at 298.15 K, Clever and Reddy (3) one value at 303.15 K, and Ben-Naim (4) five values between 278.15 and 298.15 K.

The data of Lannung and of Ben-Naim agree within a few tenths of one percent over the common range of measurement between 278.15 and 298.15 K. The values of both Boyer and Bircher and of Clever and Reddy are 2 to 2.5 percent lower.

The recommended values are based on the data of Ben-Naim and of Lannung. Four of Lannung's values were not used. They were one value at 281.15 K, two values at 310.15 K, and one value at 318.15 K. The remaining values were fitted to a Gibbs energy of solution equation linear in temperature by a linear regression.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \text{ mol}^{-1} = -RT \ln X_1 = -994.36 + 67.454 T$ 

Std. Dev. ∆G° = 7.08, Coef. Corr. = 0.9999

 $\Delta H^{\circ}/J \text{ mol}^{-1} = -994.36$ ,  $\Delta S^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1} = -67.454$ 

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

Table 1. Solubility of argon in methanol. Recommended mole fraction solubility at 101.325 kPa argon and Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
278.15	0.461	17,768
283.15	0.457	18,105
288.15	0.454	18,442
293.15	0.451	18,780
298.15	0.447	19,117
303.15	0.442	19,454
308.15	0.439	19,792
313.15	0.439	20,129

The apparent molar volume of argon in methanol was measured at 100 atm at 303.15 K by Masterton, Robins, and Slowinski (5) to be  $46 \pm 1 \text{ cm}^3 \text{ mol}^{-1}$ and by a high pressure density method by Popov and Drakin (6) at 298.15 K who reported values of  $48.5 \pm 0.3$ ,  $48.9 \pm 0.2$ ,  $48.7 \pm 0.1$ , and  $48.4 \pm 0.1$  cm<sup>3</sup> mol<sup>-1</sup> at pressures of 12.2, 21.6, 32.8, and 53.8 atm, respectively.

1.

2.

- 3.
- 4.
- Lannung, A. J. Am. Chem. Soc. 1930, 52, 68. Boyer, F. L.; Bircher, L. J. J. Phys. Chem. 1960, 64, 1330. Clever, H. L.; Reddy, G. S. J. Chem. Eng. Data 1963, 8, 191. Ben-Naim, A. J. Phys. Chem. 1967, 71, 4002. Masterton, W. L.; Robins, D. A.; Slowinski, E. J. J. Chem. Eng. Data 5. 1961, <u>6</u>, 531.
- Popov, G. A.; Drakin, S. I. Moskov. Khimiko-technol. Inst. Trudy 1972, 6. 71, 43.

See Page 282 for high pressure data on the system. The mole fraction solubility at 273.35 and 101.325 kPa (Henry's law) is 12 to 23 per cent higher than the value calculated from the recommended equation.

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172 Argon Solubili	ties up to 200 kPa
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. Methanol; CH <sub>4</sub> O; 67-56-1	<u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68-80.
VARIABLES: T/K: 275.05 - 318.15	PREPARED BY: P. L. Long/A. L. Cramer
P/kPa: 101.325 (1 atm)	
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient $\alpha$ L
278.25 0.459 279.15 0.461	0.259 0.259 0.265 0.265
281.15 0.458 281.15 0.458 281.15 0.475 281.15 0.475	0.257 0.265 0.257 0.265 0.267 0.275 0.264
286.15 0.455 287.15 0.455 286.15 0.455 291.15 0.452	0.254 0.266 0.254 0.267 0.254 0.266 0.251 0.268
291.15 0.452 291.15 0.450 293.15 0.450 293.15 0.451	0.250 0.266 0.249 0.267 0.250 0.268
293.15 0.451 298.15 0.447 298.15 0.445	0.250 0.268 0.246 0.269 0.245 0.267
298.15 0.445 310.15 0.442 310.15 0.446 310.15 0.442	0.245 0.267 0.240 0.272 0.242 0.275 0.240 0.272
318.15 0.445	0.239 0.278 lities were calculated by the compiler.
Smoothed Data: $\Lambda G^{\circ}/J \mod 1^{-1} = -RT I$	n X <sub>1</sub> = -881.13 + 67.044 T , Coef. Corr. = 0.9996 3, ΔS°/J K <sup>-1</sup> mol <sup>-1</sup> = -67.044
	INFORMATION
METHOD:	
Gas absorption. The absorbed volume of gas is calculated from the initia and final volumes, both saturated with solvent vapor. The amount of solvent is determined from the weigh	<pre>1 tory contained 0.5% by volume nitrogen. t 2. Methanol. B.A.S.F. Distilled</pre>
of the displaced mercury.	from over freshly cut block magnesium, rejected first one- third.
APPARATUS/PROCEDURE:	ESTIMATED ERROR:
The apparatus used is a modification of that of von Antropoff (1). A calibrated combined all-glass mano-	
meter and bulb enclosed in an air thermostat is employed. Mercury is used as the calibration and confinin liquids. The solvent was degassed in the apparatus. The liquid and ga were shaken together until equilib- rium was established.	1919, <u>25</u> , 269.
L	

Organic Compound	s Containing Oxygen 173
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.
2. Methanol; CH <sub>3</sub> OH; 67-56-1	<u>J</u> . <u>Phys</u> . <u>Chem</u> . 1960, <u>64</u> , 1330 - 1331.
VARIABLES: T/K: 298.15	PREPARED BY: M. E. Derrick
Total P/kPa: 101.325 (1 atm)	M. E. Deffick
EXPERIMENTAL VALUES:	
T/K Mol Fractior X <sub>1</sub> x 10 <sup>3</sup>	a Bunsen Ostwald Coefficient Coefficient α L
298.15 0.445	0.245 0.267 ± 0.003
equation given in the thesis $\log X_1 = -3$ . where C is the number of carbon in t	381 + 0.573 log C he alcohol.
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Commercial Van Slyke blood gas apparatus (E. H. Sargent Co.) was modified by the authors for their use. The total pressure of gas and solvent vapor in the solution chamber was adjusted to a pressure of one atm. The pressure was maintained at one atm during the solution process.The saturated solution was transferred to a bulb below the lower stopcock of	dried and distilled.
the the extraction vessel and sealed off. The gas and solvent vapor were then brought to volume over mercury. See (1) for details of the extraction procedure.	ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta L/cm^3 = 0.003$ REFERENCES:
	<ol> <li>Peters, J. P.; Van Slyke, D. D. "Quantitative Clinical Chemistry" Williams and Wilkins Co., Baltimore, MD, 1932, Volume II.</li> <li>Boyer, F. L. Ph.D. Dissertation</li> </ol>

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H. L.; Reddy, G. S.
2. Methanol; CH <sub>4</sub> O; 67-56-1	<u>J. Chem. Eng. Data</u> 1963, <u>8</u> , 191-192.
VARIABLES:	PREPARED BY:
T/K: 303.15 P/kPa: 101.325 (1 atm)	P. L. Long
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
303.15 0.420	0.230 0.255
The mole fraction solubi by the compiler.	lity value was calculated
See the evaluation sheet for the recommended solu	t for the argon + methanol system ubility values.
AUXILIARY	INFORMATION
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was modeled after that of Markham and Kobe (1). A length of TRUEBORE tubing of 0.4643 cm <sup>2</sup> cross section was used as the gas buret.	<ol> <li>Argon. Matheson Co., Inc. Regu- lar grade stated to be 99.998 per cent pure.</li> </ol>
The volume of gas, presaturated with solvent, absorbed by 103.1 cm <sup>3</sup> of solution was measured.	2. Methanol. Merk Chemical Co. Anhydrous grade.
	ESTIMATED ERROR:
	REFERENCES :
	<pre>1. Markham, A. E.; Kobe, K. A. J. <u>Am</u>. <u>Chem</u>. <u>Soc</u>. 1941, <u>63</u>, 449.</pre>

		rganic Compounds			175
COMPONENTS :			ORIGINAL MEASU	REMENTS:	
1. Argon; Ar; 7440-37-1			Ben-Naim, A	•	
2. Methanol; CH <sub>3</sub> OH; 67-56-1			J. Phys. Ch	<u>em</u> . 1967, <u>71</u> , 4002-40	07.
VARIABLES:			PREPARED BY:		
T/K: 278.15 - 298.15 P/kPa: 101.325 (1 atm)				P. L. Long H. L. Clever	
EXPERIMENTAL VALUES					
	T/K N	Nol Fraction X <sub>1</sub> × 10 <sup>3</sup>	Bunsen Coefficient α	Ostwald Coefficient L	
	278.15	0.460	0.259	0.264	
	283.15 288.15	0.459 0.456	0.257 0.254	0.266 0.268	
	293.15 298.15	0.451 0.449	0.250 0.247	0.268 0.270	
•	230.10	V•77J	V • 2 7 /		
compiler from t	he Ostwald	l coefficient	read from gr	culated for 1 atm by aph in the original p	the paper.
Smoothed Data:	∆G°/J mo:	$l^{-1} = - RT \ln ln$	$x_1 = -912.72$	+ 67.150 T	
	Std. Dev.	$\Delta G^{\circ} = 5.546$	, Coef. Co	orr. = 0.9999	
	∆H°/J mo]	$1^{-1} = -912.72$	∆s°/j k⁻	$1 \text{ mol}^{-1} = -67.150$	
**************************************		AUXILIARY	INFORMATION	<u> </u>	
METHOD/APPARATUS	/PROCEDURI	E:	SOURCE AND PUL	RITY OF MATERIALS:	
See the argon + sheet of Ben-Na		+ water data	No informa	tion given.	
			ESTIMATED ERR	OR:	
			δL/L =	= 0.003	
			REFERENCES :		
			1. Ben-Nai	im, A.; Baer, S. Faraday Soc. 1963, <u>5</u>	<u>9</u> ,

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Argon Solubilities up to 200 kPa

COMPONENTS :	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Ethanol; C<sub>0</sub>H<sub>0</sub>OH; 64-17-5</li> </ol>	H. L. Clever Chemistry Department
2. Ethanol; C <sub>2</sub> H <sub>5</sub> OH; 64-17-5	Emory University Atlanta, Georgia 30322 USA March, 1979

#### CRITICAL EVALUATION:

The solubility of argon in ethanol was reported by three laboratories. Lannung (1) reported eight solubility values between 275.05 and 313.15 K., Boyer and Bircher (2) reported one value at 298.15 K, and Cargill and Morrison (3) reported eight values between 288.65 and 332.75 K.

At 298.15 K and 101.325 kPa argon pressure the mole fraction solubilities of argon in ethanol range from  $(0.620 - 0.636) \times 10^{-3}$  (2.5 percent). The solubility values of Lannung and of Cargill and Morrison overlap over the 25 degree range between 288.65 and 313.15 K. Cargill and Morrison's data is higher valued over the temperature interval by 2.2 percent at 288 K and 0.5 percent at 313 K. Lannung distilled the alcohol twice before use from over quicklime. His argon contained 0.5 percent nitrogen but nitrogen and argon have similar solubilities. Cargill and Morrison used spectrograde absolute ethanol stated to be 99.8 mol percent ethanol. Their argon was stated to be 99.9 percent pure. The agreement between the two laboratories is within experimental error.

The solubility data from the three references was combined and a linear regression made of the standard Gibbs energy linear in temperature for the recommended values.

The recommended thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

> $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X_1 = -580.60 + 63.278 T$ Std. Dev.  $\Delta G^{\circ} = 24.9$ , Coef. Corr. = 0.9996

 $\Delta H^{\circ}/J \mod^{-1} = -580.60, \quad \Delta S^{\circ}/J K^{-1} \mod^{-1} = -63.278$ 

The recommended values of the mole fraction solubility at 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

The solubility of argon in ethanol. Recommended mole fraction Table 1. solubility at an argon partial pressure of 101.325 kPa, and Gibbs energy of solution as a function of temperature.

Т/К	Mol Fraction $X_1 \times 10^3$	∆G°∕J mol <sup>-1</sup>
273.15 278.15 283.15 288.15 293.15 298.15 303.15	0.6393 0.6364 0.6335 0.6308 0.6282 0.6257 0.6233	16,704 17,020 17,337 17,653 17,969 18,286 18,602
308.15 313.15 318.15 323.15 328.15 328.15 333.15	0.6210 0.6188 0.6166 0.6145 0.6125 0.6105	18,919 19,235 19,551 19,868 20,184 20,501

 Lannung, A. J. Am. Chem. Soc. 1930, 52, 68.
 Boyer, F. L.; Bircher, L. J. J. Phys. Chem. 1960, 64, 1330.
 Cargill, R. W.; Morrison, T. J. J. Chem. Soc., Faraday Trans. <u>1</u> 1975 <u>71</u>, 618.

See page 283 for high pressure data on the system. The mole fraction solubility at 273.35 K and 101.325 kPa (Henry's law) is 4 to 25 per cent higher than the value calculated from the recommended equation.

0.0	Containing Oxygen 177
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. Ethanol; C <sub>2</sub> H <sub>6</sub> O; 64-17-5	J. Am. Chem. Soc. 1930, 52, 68-80.
VARIABLES: T/K: 275.05 - 318.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction	PREPARED BY: P. L. Long Bunsen Ostwald Coefficient Coefficient
$\begin{array}{r} & x_1 \times 10^3 \\ \hline 275.05 & 0.633 \\ 291.15 & 0.628 \\ 293.15 & 0.622 \\ 293.15 & 0.619 \\ 293.15 & 0.632 \\ 298.15 & 0.620 \\ 308.15 & 0.614 \\ 313.15 & 0.625 \\ \hline \end{array}$	α         L           0.248         0.250           0.242         0.258           0.239         0.256           0.238         0.255           0.243         0.261           0.237         0.259           0.232         0.262           0.235         0.269
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln$ Std. Dev. $\Delta G^{\circ} = 20.9$ ,	Coef. Corr. = 0.9996 , $\Delta S^{\circ}/J K^{-1} mol^{-1} = -62.682$
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
Gas absorption. The absorbed volume of gas is calculated from the initial and final volumes, both saturated with solvent vapor. The amount of solvent is determined from the weight	<ol> <li>Argon. Linde's Liquid Air Fac- tory. Contains 0.5% by volume nitrogen.</li> </ol>
of the displaced mercury (1).	freshly prepared quick lime.
of the displaced mercury (1).	

ORIGINAL MEASUREMENTS: 1. Argon; Ar; 7440-37-1 Boyer, F. L.; Bircher, L. J. 2. Ethanol; C<sub>2</sub>H<sub>5</sub>OH; 64-17-5 J. Phys. Chem. 1960, 64, 1330-1331.

VARIABLES:				PREPARED	BY:	_		
Т/	к: 29	8.15			1	И. Е		Derrick
P/kP	a: 10	1.325	(l atm)		•		•	

EXPERIMENTAL VALUES:

Т/К	$\frac{\text{Mol Fraction}}{X_1 \times 10^3}$	Bunsen Coefficient a	Ostwald Coefficient L
298.15	0.621	0.236	0.258 <u>+</u> 0.002

The Bunsen coefficient was calculated by the compiler.

The observed mole fraction solubility was taken from Boyer's dissertation (2).

The Dissertation gives the equation log  $X_1 = -3.381 + 0.573 \log C$  at

298.15 K where C is the number of carbon atoms in the alcohol. The mole fraction solubility given in the original paper was calculated from the 298.15 K equation.

#### AUXILIARY INFORMATION

METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Commercial Van Slyke blood gas	1. Argon. Ohio Surgical Co.
apparatus (E. H. Sargent Co.) was modified by the authors for their	99.6 per cent argon.
use.	2. Ethanol. Source not given.
	Treated by standard methods to
The total pressure of gas and solvent vapor in the solution chamber was	remove aldehydes and ketones, then dried and distilled.
adjusted to a pressure of one atm.	ulled and distilled.
The pressure was maintained at one	
atm during the solution process. The saturated solution was transferred to	
a bulb below the lower stopcock of	
the extraction vessel and sealed off.	ESTIMATED ERROR:
The gas and solvent vapor were then brought to volume over mercury. See	$\delta T/K = 0.01$
(1) for details of the extraction	$\delta L/cm^3 = 0.002$
procedure.	
	REFERENCES :
	1. Peters, J. P.; Van Slyke, D. D.
	"Quantitative Clinical Chemistry" Williams and Wilkins Co.,
	Baltimore, MD, 1932, Volume II.
	2. Boyer, F. L. Ph.D. Dissertation
	Vanderbilt U., 1959, Nashville, TN

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COMPONENTS:

# Argon Solubilities up to 200 kPa

		c Compounds			
COMPONENTS:			RIGINAL MEASUREMENTS:		
			Cargill, R. W.; Morrison, T. J.		
2. Ethanol; C <sub>2</sub> H <sub>6</sub> O; 64-17-5		J. <u>Chem. Soc.</u> <u>Faraday</u> <u>Trans</u> . <u>I</u> 1975, <u>71</u> , 618-634.			
VARIABLES:	······		REPARED BY:		
	288.65 - 332.7 101.325 (l atm		P. L. Long H. L. Clev		
EXPERIMENTAL VALU	ES:				
т/к	cm <sup>3</sup> (STP) Ar kg <sup>-1</sup> Ethanol	Mol Frac X <sub>1</sub> x 10 <sup>3</sup>		Ostwald efficient L	
288.65 293.05 298.25 303.05 308.15 312.95 328.05 332.75	312.6 309.7 309.7 304.8 303.4 299.2 297.9 297.2	0.6421 0.6362 0.6362 0.6261 0.6232 0.6146 0.6119 0.6105	0.2445 0.2431 0.2380 0.2356 0.2311 0.2263	0.262 0.262 0.265 0.264 0.266 0.265 0.265 0.272 0.273	
			olubilities were calcu		
See the argon			ΔS°/J M <sup>-1</sup> mol <sup>-1</sup> = -64 the recommended equati		
	<u></u>	AUXILIARY	NFORMATION	<u></u>	
METHOD/APPARATU	S /PROCEDURE .			LAT C .	
See Argon + Et	hanol + Water 11 and Morriso	data on.	OURCE AND PURITY OF MATER 1. Argon. British Oxy 99.9 per cent pure saturated brine.	gen Co. Gas	
			2. Ethanol. Source a Spectroscopic grad 0.002 mole fractio	le, contained	
			ESTIMATED ERROR:		

COMPONENTS :	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever Chemistry Department
2. 1-Propanol; C <sub>3</sub> H <sub>8</sub> O; 71-2	

#### CRITICAL EVALUATION:

The solubility of argon in 1-propanol was measured in three laboratories. Gjaldbaek and Nieman (1) report two solubility values near 298.15 and three values near 308.15 K. Boyer and Bircher (2,3) report solubility values at 298.15 and 308.15 K. Komarenko and Manzhelii (4) report nine values between 163.15 and 243.15 K.

The solubility values of Gjaldbaek and Niemann and of Boyer and Bircher were combined to obtain a set of recommended values for the room temperature region. Boyer and Bircher's solubility value at 308.15K appears to be high and was omitted in the final fit to Gibbs energy equation linear in temperature by the method of least squares.

The recommended changes in the thermodynamic parameters for the transfer of one mole of argon from the gas at 101.325 kPa to the hypothetical unit mole fraction solution are

 $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_{1} = -1,725.0 + 65.320 T$ Std. Dev.  $\Delta G^{\circ} = 10.0$ , Coef. Corr. = 0.9996  $\Delta H^{\circ}/J \text{ mol}^{-1} = 1,725.0$ ,  $\Delta S^{\circ}/J K^{-1} \text{ mol}^{-1} = -65.320$ .

The recommended solubility values and Gibbs energy as a function of temperature are in Table 1.

TABLE 1. Solubility of argon in 1-propanol. Recommended mole fraction solubility at 101.325 kPa and Gibbs energy change as a function of temperature.

T/K	Mol Fraction $X_1 \times 10^3$	∆G°/J mol <sup>-1</sup>
298.15	0.777	17,750
303.15	0.768	18,077
308.15	0.759	18,403

Komarenko and Manzhelii measured the solubility of argon in 1-propanol at a gas partial pressure of 26.664 kPa (200 mm Hg). The compiler calculated 101.325 kPa (1 atm) partial pressure mole fraction solubility values assuming Henry's law to be valid. The 101.325 kPa solubility values were fitted to a three constant equation by the method of least squares. The smoothed values of the mole fraction solubility and the thermodynamic changes for the transfer of one mole of argon from the gas at a pressure of 101.325 kPa to the hypothetical unit mole fraction solution are given on the data sheet at 10 degree intervals for the 173.15 to 243.15 K temperature range. The authors used an ultrapure alcohol sample that was probably very dry. Their solubility values should be reliable.

It is unusual to be able to give a tentative set of solubility values over an extended temperature range. By combining the low temperature solubility values of Komarenko and Manzhelii with the room temperature values used above in a three constant equation, tentative solubility values of argon in 1-propanol can be obtained over a 145 degree temperature range.

The equation,

 $\ln x_1 = -11.7972 + 7.83004/(T/100) + 1.83978 \ln (T/100)$ 

with a standard error about the regression line of  $1.82 \times 10^{-3}$ , was used to obtain the tentative values of solubility and thermodynamic changes for the transfer of one mole of argon from the gas phase at 101.325 kPa to the hypothetical unit mole fraction solution as a function of temperature. See Table 2.

		Organic Co	mpounds			18
COMPONENTS:				EVALUATO	DR:	
l. Argon; Ar; 7440-37-1 2. l-Propanol; C <sub>3</sub> H <sub>8</sub> O; 71-23-8			Chemis Emory	Clever stry Department University ta, Georgia 3032	22	
CRITICAL EVA	ALUATION:					
T/K Mol	bility at enthalpy, Fraction	entropy, and	and va heat	lues of capacity	Tentative mole f changes in Gibbs y as a function c AS°/J K <sup>-1</sup> mol <sup>-1</sup>	of temperature.
X	$x_1 \times 10^3$					mol-1
173.15 183.15 193.15 203.15 213.15 223.15 233.15 243.15 253.15 263.15 263.15 273.15 283.15 293.15 293.15 303.15 308.15	1.90 1.65 1.46 1.31 1.19 1.10 1.03 0.966 0.916 0.875 0.840 0.811 0.787 0.776 0.766 0.757	9.109 9.759 10.490 11.213 11.929 12.638 13.340 14.035 14.724 15.406 15.083 16.755 17.421 17.752 18.082 18.410	$\begin{array}{c} -3.8\\ -3.7\\ -3.5\\ -3.4\\ -3.2\\ -3.0\\ -2.9\\ -2.7\\ -2.6\\ -2.4\\ -2.3\\ -2.0\\ -1.9\\ -1.8\\ -1.7\end{array}$	09 56 03 50 97 44 91 38 532 79 76 49 73	$\begin{array}{c} -74.39 \\ -73.53 \\ -72.72 \\ -71.95 \\ -71.21 \\ -70.51 \\ -69.84 \\ -69.20 \\ -68.58 \\ -67.99 \\ -67.42 \\ -66.87 \\ -66.34 \\ -66.08 \\ -65.82 \\ -65.57 \end{array}$	15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30
<ul> <li>1. Gjaldbaek, J. C.; Niemann, H. Acta Chem. Scand. 1958, 12, 1015.</li> <li>2. Boyer, F. L.; Bircher, L. J. J. Phys. Chem. 1960, 64, 1330.</li> <li>3. Boyer, F. L. Ph.D. Dissertation, Vanderbilt University, 1959.</li> <li>4. Komarenko, V. G.; Manzhelii, V. G. Ukr. Fiz. Zh. (Uhr. Ed.) 1968, 13, 387.</li> <li>See page 284 for high pressure data on the system. The single high pressure value of Sisskind and Kasarnowsky (5) when reduced to 273.35 K and 101.325 kPa is 14 per cent lower than the value calculated from the tentative equation.</li> <li>5. Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. 1933, 214, 385.</li> </ul>						

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TD2 Algon Solubilitie	s up to 200 kFd
COMPONENTS:	ORIGINAL MEASUREMENTS:
	Gjaldbaek, J. C.; Niemann, H.
1. Argon, Ar; 7440-37-1	
2. 1-Propanol; C <sub>3</sub> H <sub>8</sub> O; 71-23-8	
	Acta Chem. Scand. 1958, 12, 1015-1023
VARIABLES: T/K: 298.15 - 308.15	PREPARED BY: J. Chr. Gjaldbaek
1/ 1. 200.10 500.10	
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
, c	Coefficient Coefficient
$x_1 \times 10^3$	α* <u>L</u>
298.15 0.776	0.2315 0.2527
298.16 0.774	0.2310 0.2521
308.21 0.755	0.2231 0.2517
308.13 0.762 308.15 0.761	0.2249 0.2537 0.2248 0.2536
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln$	-
	Coef. Corr. = 0.9997
$\Delta H^{\circ}/J \text{ mol}^{-1} = -1,562.1$	L, ΔS°/J K <sup>-1</sup> mol <sup>-1</sup> = -64.791
See Evaluation of Argon + 1-propanol f and solubility values.	for recommended Gibbs energy equation
I The Ostwald coefficient and mole tract	tion were calculated by the compiler.
	• •
Values at 1 atmosphere pressure assumi	
Values at 1 atmosphere pressure assumi	
Values at 1 atmosphere pressure assumi AUXILIARY	ing Henry's law is obeyed. INFORMATION
Values at 1 atmosphere pressure assumi AUXILIARY METHOD:	ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS:
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man-	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an	ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS:
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi-	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, < 0.05 % H <sub>2</sub> . 2. 1-Propanol. Dried and distilled,
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2. 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2. 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried,         &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled,         b.p. 97.1 - 97.4°C, n(D, 293.15K)</pre>
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Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR:</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE:	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, &lt; 0.05 % H2 . 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856.</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE: The absorbed volume of gas is cal-	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, &lt; 0.05 % H<sub>2</sub>. 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR:</pre>
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Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE: The absorbed volume of gas is cal- culated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent is	<pre>Ing Henry's law is obeyed. INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, &lt; 0.05 % H<sub>2</sub>. 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR:</pre>
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE: The absorbed volume of gas is cal- culated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent is determined by the weight of dis-	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, $< 0.05 \ \% \ H_2$ . 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR: $\delta T/K = 0.05$ $.\delta x_1/x_1 = 0.015$ REFERENCES:
Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE: The absorbed volume of gas is cal- culated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent is determined by the weight of dis- placed mercury. Details in ref. 1	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, $< 0.05 \ \ H_2$ . 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR: $\delta T/K = 0.05$ $.\delta X_1/X_1 = 0.015$ REFERENCES: 1. Lannung, A.
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Values at 1 atmosphere pressure assumi AUXILIARY METHOD: A calibrated all-galss combined man- ometer and bulb was enclosed in an air thermostat and shaken until equi- librium. Mercury was used for cali- bration and as confining liquid. The solvents were degassed in the appa- ratus. Details in ref. 1 and 2. APPARATUS/PROCEDURE: The absorbed volume of gas is cal- culated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent is determined by the weight of dis- placed mercury. Details in ref. 1	INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Argon. "L" air liquid. Dried, $< 0.05 \ \ H_2$ . 2. 1-Propanol. Dried and distilled, b.p. 97.1 - 97.4°C, n(D, 293.15K) = 1.3856. ESTIMATED ERROR: $\delta T/K = 0.05$ $.\delta X_1/X_1 = 0.015$ REFERENCES: 1. Lannung, A. <u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68.
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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.
2. 1-Propanol; C <sub>3</sub> H <sub>8</sub> O; 71-23-8	
	J. Phys. Chem. 1960, 64, 1330-1331.
VARIABLES:	PREPARED BY:
T/K: 298.15 - 308.15	M. E. Derrick
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
298.15 0.785 308.15 0.792	0.233 0.234 0.264 ± 0.001
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	-
$\Delta H^{\circ}/J \text{ mol}^{-1} = 699.63,$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -57.1$
The Bunsen Coefficient was calculated	by the compiler.
The 308.15 K values are from Boyer (2) at 298.15 K. The mole fraction solubit $\times 10^{-3}$ was calculated from the authors	lity in the original paper of 0.782
AUXILIARY	INFORMATION
AUXILIARY METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD: Gas extracted from solvent followed by measurement of gas and solvent	
METHOD: Gas extracted from solvent followed	SOURCE AND PURITY OF MATERIALS: 1. Argon. Ohio Surgical Co.
METHOD: Gas extracted from solvent followed by measurement of gas and solvent	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Ohio Surgical Co. 99.6 per cent.</li> <li>2. 1-Propanol. Removed aldehydes and ketones, dried, and distilled by standard methods.</li> </ul>
METHOD: Gas extracted from solvent followed by measurement of gas and solvent	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Ohio Surgical Co. 99.6 per cent.</li> <li>2. 1-Propanol. Removed aldehydes and ketones, dried, and distilled</li> </ul>
METHOD: Gas extracted from solvent followed by measurement of gas and solvent volumes (1). APPARATUS/PROCEDURE: Modified E. H. Sargent Co. manometric Van Slyke blood gas apparatus used.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Ohio Surgical Co. 99.6 per cent. 2. 1-Propanol. Removed aldehydes and ketones, dried, and distilled by standard methods.  ESTIMATED ERROR:</pre>
METHOD: Gas extracted from solvent followed by measurement of gas and solvent volumes (1). APPARATUS/PROCEDURE: Modified E. H. Sargent Co. manometric Van Slyke blood gas apparatus used. Total pressure of gas and vapor in	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Ohio Surgical Co. 99.6 per cent. 2. 1-Propanol. Removed aldehydes and ketones, dried, and distilled by standard methods.  ESTIMATED ERROR:</pre>
METHOD: Gas extracted from solvent followed by measurement of gas and solvent volumes (1). APPARATUS/PROCEDURE: Modified E. H. Sargent Co. manometric Van Slyke blood gas apparatus used.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Ohio Surgical Co. 99.6 per cent. 2. 1-Propanol. Removed aldehydes and ketones, dried, and distilled by standard methods.  ESTIMATED ERROR:</pre>

104			.3 up to 200		
COMPONENTS :			ORIGINAL M	EASUREMENTS:	
1. Argon; Ar; 7440-3	7-1		Komarenko	o, V.G.; Manzhe	elii, V.G.
2. 1-Propanol; C <sub>3</sub> H <sub>8</sub> O	; 71-23-8				
		i	Ukr.Fiz.	Zh. (Ukr.Ed.) 19 5. J. 1968, 13	968, <u>13</u> ,387-391. , 273-276.
VARIABLES:			PREPARED B	Y:	
T/K: 173.15 P/kPa: 26.664				T.D. Kittred	Te
	(200 hbing)			H.L. Clever	
EXPERIMENTAL VALUES:					
			tion Mol		
	P/mn		200 P/mr .3	-	
	X_]	x 10	<u> </u>	$1 \times 10^{3}$	
	173.15	0.496		1.88	
	183.15 193.15	0.431		1.640 1.48	
	203.15	0.34	5	1.31	
		0.318		1.210	
	233.15	0.294		1.119 1.03	
	243.15	0.243		0.923	
Smoothed Data: lnX <sub>l</sub>	= -6.96820 +	2.12	458/(T/10	0) - 0.987421	ln (T/100)
T/K Mol Fraction $X_1 \times 10^3$	∆G <sup>0</sup> /kJmol <sup>-1</sup>	ΔH <sup>O</sup>	/kJmol <sup>-1</sup>	ΔS <sup>O</sup> /JK <sup>-1</sup> mol <sup>-1</sup>	ΔCp/JK <sup>-1</sup> mol <sup>-1</sup>
173.15 1.87	9.046		-3.188	-70.65	-8.21
183.15 1.65	9.75		-3.271	-71.11	17 17
193.15 1.48 203.15 1.33	10.47 11.19		-3.352 -3.434	-71.55 -71.96	11
223.15 1.10	12.63	-	-3.598	-72.74	"
233.15 1.02 243.15 0.938	13.36 14.09		-3.681 -3.762	-73.10 -73.44	11
The mole fractio by Henry's law by th		at 10	01.325 kPa	a (760 mmHg) w	as calculated
	AUXI	LIARY	INFORMATIO	N	
METHOD / APPARATUS / PROC	EDURE :		SOURCE ANI	D PURITY OF MATER	IALS:
The solvent was d	eqassed by		1. Argo	on. Sourc	e not given.
vacuum. A thin laye	r of alcohol,				ographic method
cooled to 125-175 K, 20 hours in a vacuum			was	99.99 per cen	τ.
$10^{-3}$ mmHg.				ropanol. Puri	
The degassed liqu				lyzed in the A . Inst. for Si	
under vacuum in an a placed in the appara	mpoule which tus. The apr	was bara-	& H	igh-Purity Sub	stances. Purity
tus consisted of a m	anostat, a me	∍r-	99.	97 weight per	cent.
cury compensator, an					
cell divided by a me gas pressure of 200		л	DOTTI AMON	EBDOR	
temperature were est foil ends of the amp		ıe	ESTIMATED		05
pierced. The gas di		ne		$\delta T/K = 0$ $\delta P/mmHg = 0$	
liquid flowed throug	h a series of	E		$\delta x_1 / x_1 = 0$	
small cups. The amo solved was determine			REFERENCE		······
mercury level in the	compensator.	•			
Some measurements mmHg gas pressure.			1		
firmed that Henry's					
L					

COMPONENTS:	EVALUATOR:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>1-Butanol; C<sub>4</sub>H<sub>10</sub>O; 71-36-3</li> </ol>	H. L. Clever Chemistry Department Emory University Atlanta, Georgia 30322 U.S.A.

## CRITICAL EVALUATION:

The solubility of argon in 1-butanol was measured in three laboratories. Gjaldbaek and Niemann (1) report two values near 298.15 K and two values near 308.15 K. Boyer and Bircher (2,3) report solubility values at 298.15 K and 308.15 K. Komarenko and Manzhelii (4) report seven solubility values between 184.15 and 243.15 K.

Komarenko and Manzhelii measured the solubility of argon in 1-butanol at a gas partial pressure of 26.664 kPa (200 mmHg). The compiler calculated 101.325 kPa (1 atm) pressure mole fraction solubility values assuming Henry's law to be valid. The 101.325 kPa values were fitted to a three constant equation by the method of least squares. The smoothed values of the mole fraction solubility and the thermodynamics changes for the transfer of one mole of argon from the gas at a pressure of 101.325 kPa to the hypothetical unit mole fraction solution are given on the data sheet at 10 degree intervals for the 183.15 to 243.15 K temperature range. Komarenko and Manzhelii used an ultra high purity dry 1-butanol sample.

The room temperature region solubility values of Gjaldbaek and Niemann and of Boyer and Bircher are in conflict. They differ by 2.3 percent at 298.15 K and by 4.6 percent at 308.15 K with the Boyer and Bircher values being the higher at both temperatures.

The Boyer and Bircher solubilities increase with temperature. The Gjaldback and Niemann solubilities decrease with temperature. Both authors dried and distilled the alcohol. There is no evidence that the purity and dryness of the alcohol was an important factor. It is the judgment of the Evaluator that Gjaldbaek and Niemann used a more reliable method of solubility determination, and their solubility values are preferred. Smoothed data for the Gjaldback and Niemann appears on their data sheet.

The combination of the low temperature solubility values of Komarenko and Manzhelii with the 298.15 - 308.15 values of Gjaldbaek and Niemann gives a tentative set of solubility values for the 125 degree interval from 183.15 to 308.15 K.

The argon in 1-butanol mole fraction solubility at 101.325 kPa was fitted to the equation:

 $\ln X_1 = -11.1689 + 7.43153/(T/100) + 1.53183 \ln(T/100)$ 

by the method of least squares. The standard error about the regression line was 2.06 x 10-3.

Smoothed tentative mole fraction solubility values and values of the thermodynamic changes for the transfer of one mole fo argon from the gas at 101.325 kPa to the hypothetical unit mole fraction solution are given in Table I.

- Gjaldbaek, J. C.; Niemann, H. <u>Acta Chem. Scand.</u> 1958, <u>12</u>, 1015. Boyer, F. L.; Bircher, L. J. <u>J. Phys. Chem.</u> 1960, <u>64</u>, <u>1330</u>. Boyer, F. L. Ph.D. Thesis, Vanderbilt University, 1959. 1.
- 2. 3.
- Komarenko, V. G.; Manzhelii, V. G. <u>Ukr. Fiz. Zh</u>. (Ukr. Ed.) 1968, <u>13</u>, 4. 387.

COMPONENTS	:		EVALUATOR:		
-	n; Ar; 7440-3 tanol; C <sub>4</sub> H <sub>10</sub> 0		Emory Un	ever y Department iversity Georgia 30322	
	4 10	•	U.S.A.		
	September 1978				
CRITICAL EV	VALUATION:				· · · · · · · · · · · · · · · · · · ·
TABLE 1.	bility at 1	01.325 kPa ar	nd values of c	ntative mole fr hanges in Gibbs as a function o	energy,
т/к	Mol Fraction X <sub>1</sub> x 10 <sup>3</sup>	∆G°∕kJ mol-1	ΔH°/kJ mol-1	∆S°/JK <sup>-1</sup> mol <sup>-1</sup>	ΔC°/JK <sup>-1</sup> mol-1
183.15	2.06	9.417	-3.846	-72.42	12.74
193.15	1.81	10.138	-3.719 -3.591	-71.74	12.74
203.15 213.15	1.62 1.47	10.852 11.560	-3.464	-71.10 -70.49	12.74 12.74
223.15	1.35	12.262	-3.337	-69.90	12.74
233.15 243.15	1.25 1.17	12.958 13.649	-3.209 -3.082	-69.34 -68.81	12.74 12.74
253.15	1.10	14.335	-2.955	-68.30	12.74
263.15 273.15	1.05 0.999	15.015 15.691	-2.827 -2.700	-67.80 -67.33	12.74 12.74
283.15	0.959	16.362	-2.573	-66.87	12.74
293.15 298.15	0.924 0.909	17.028 17.360	-2.445 -2.382	-66.43 -66.21	12.74 12.74
303.15	0.895	17.690	-2.318	-66.00	12.74
308.15	0.882	18.020	-2.254	-65.79	12.74
See page	285 for high	pressure dat	a on the syst	em (5).	
solubili which is	ty of 0.880 x 3.2 per cent	10 <sup>-3</sup> at 298. lower than t	15 K and 101. the value calc	converts to a 325 kPa argon p ulated from the ek and Niemann'	ressure, tentative
5. Sissk	ind, B.; Kasa	rnowsky, I.	Z. Anorg. Che	<u>m</u> . 1933, <u>214</u> , 3	85.
	ov, G. A.; Sl <u>Tekhnol</u> . 197		Izv. Vyssh.	Uchebn. Zaved.,	Khim.

Organic Compounds	s Containing Oxygen 187
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Gjaldbaek, J. C.; Niemann, H.
2. 1-Butanol; C <sub>4</sub> H <sub>10</sub> O; 71-36-3	
	Acta Chem. Scand. 1958, 12, 1015-1023
VARIABLES:	PREPARED BY:
T/K: 298.15 - 308.15	J. Chr. Gjaldbaek
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
,	Coefficient Coefficient
$\qquad \qquad $	α* L
298.14 0.904	0.2206 0.2408
298.15 0.901 308.13 0.892	0.2198 0.2399 0.2156 0.2432
308.15 0.888	0.2146 0.2421
Smoothed Data: $\Delta G^\circ = -RT \ln X_1 = -1$	,066.4 + 61.863 T
-	
	Coef. Corr. = 0.9999
$\Delta H^{\circ}/J \text{ mol}^{-1} = 1,066.4$	, $\Delta S^{\circ}/J K^{-1} mol^{-1} = -61.863$
The Ostwald coefficients and mole fra	ctions were calculated by the compiler.
Values at 1 atmosphere pressure assum	ing Henry's law is obeyed.
T/K Mol Frac X <sub>1</sub> x 1	
293.15 0.909	17,068
293.15 0.909	17,377
303.15 0.896	17,687
308.15 0.890	17,996
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
A calibrated all-glass combined mano-	l. Argon. "L" air liquid. Dried.
meter and bulb was enclosed in an air	
thermostat and shaken until equili- brium. Mercury was used for calibra-	2. 1-Butanol. Distilled, b.p.
tion and as confining liquid. The	117.75 - 117.83°C. n(D, 293.15 K)
solvents were degassed in the appara-	= 1.3995.
tus. Details in ref. 1 and 2.	
	ESTIMATED ERROR:
APPARATUS/PROCEDURE:	LOTTINIED ENIOR.
The absorbed volume of gas is calcu-	$\delta T/K = 0.05$
lated from the initial and final amounts, both saturated with solvent	$\delta x_1 / x_1 = 0.015$
vapor. The amount of solvent is de-	REFERENCES :
termined by the weight of displaced mercury. Details in ref. 1 and 2.	1. Lannung, A.
	J. Am. Chem. Soc. 1930, 52, 68.
	2. Gjaldbaek, J. C.
4	Acta Chem. Scand. 1952, 6, 623.
	}

Argon Solubilitie	is up to 200 kPa
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 71-23-8	Boyer, F. L.; Bircher, L. J.
2. 1-Butanol; C <sub>4</sub> H <sub>10</sub> O; 71-36-3	
	J. Phys. Chem. 1960, 64, 1330-1331.
VARIABLES:	PREPARED BY:
	M. E. Derrick
T/K: 298.15 - 308.15	
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
	Coefficient Coefficient
298.15 0.931 308.15 0.922	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
The Bunsen Coefficient was calculated	by the compiler.
The 308.15 K values are from Boyer (2) 298.15 K is also from Boyer (2). The values $10^{-3}$ was calculated from the author	). The mole fraction solubility at alue in the original paper of 0.923 rs equation:
$\log x_1 = -3.381 + 0.5$	573 log C
K the equation is log X <sub>1</sub> = -3.392 + 0.5 AUXILIARY METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS;
Gas extracted from solvent followed by measurement of gas and solvent	1. Argon. Ohio Surgical Co. 99.6 per cent.
volumes (1).	-
	<ol> <li>1-Butanol. Removed aldehydes and ketones, dried, and distilled by standard methods.</li> </ol>
APPARATUS / PROCEDURE :	ESTIMATED ERROR:
Modified E. H. Sargent Co. manometric	$\delta T/K = 0.01$
Van Slyke blood gas apparatus used.	
· · · · · · · · · · · · · · ·	$\delta L/L = 0.002$
Total pressure of gas and vapor in	$\delta L/L = 0.002$ REFERENCES:
solution chamber adjusted to atmos- pheric pressure. Solvent trans-	$\delta L/L = 0.002$ REFERENCES: 1. Peters, J. P.; Van Slyke, D. D.
solution chamber adjusted to atmos- pheric pressure. Solvent trans- ferred to bulb below extraction ves-	δL/L = 0.002 REFERENCES: 1. Peters, J. P.; Van Slyke, D. D. "Qualitative Clinical Chemistry",
solution chamber adjusted to atmos- pheric pressure. Solvent trans- ferred to bulb below extraction ves- sel and sealed off. Gas and solvent	δL/L = 0.002 REFERENCES: 1. Peters, J. P.; Van Slyke, D. D. "Qualitative Clinical Chemistry",
solution chamber adjusted to atmos- pheric pressure. Solvent trans- ferred to bulb below extraction ves-	δL/L = 0.002 REFERENCES: <ol> <li>Peters, J. P.; Van Slyke, D. D.</li> <li>"Qualitative Clinical Chemistry", Williams and Wilkins Co., Balti- more, Md., 1932, Vol. II.</li> </ol>
solution chamber adjusted to atmos- pheric pressure. Solvent trans- ferred to bulb below extraction ves- sel and sealed off. Gas and solvent vapors brought to volume over mer-	<pre>&amp;L/L = 0.002 REFERENCES: 1. Peters, J. P.; Van Slyke, D. D.    "Qualitative Clinical Chemistry",    Williams and Wilkins Co., Balti-</pre>

COMPONENTS				MEASUREMENTS:	
1. Argo	n; Ar; 7440-3	/-1	Komaren	iko, V.G.; Manzhel	L11, V.G.
2. 1-Bu	tanol; C <sub>4</sub> H <sub>10</sub> O	; 71-36-3			
			Ukr.Fiz	.Zh. (Ukr.Ed.) 196	58, <u>13</u> ,387-391.
			Ukr. Ph	<u>iys. J. 1968, 13</u> ,	273-276.
VARIABLES	:		PREPARED	BY:	
	T/K: 184.15 kPa: 26.664			T.D. Kittredge	<b>a</b>
- / .	A24, 20,004	(200 mining)		I.D. AICLICUS	2
nubbation	SAT 1111 1170	<u> </u>			
EXPERIMENT	TAL VALUES:	T/K Mol Fra	ation Mo	l Fraction	
		P/mmHg		mmHg 760	
		X <sub>1</sub> x	10 <sup>3</sup>	$x_1 \times 10^3$	
		184.15     0.53       193.15     0.47		2.01 1.82	
		203.15 0.42	:5	1.62	
		213.15 0.39 223.15 0.36		1.49 1.37	
		233.15 0.33		1.26	
		243.15 0.29		1.13	
Smoothed	Data: lnX <sub>1</sub>	= -4.90674 - 0.0	908805/(1	2/100) - 2.05985/1	ln(T/100)
		0 // 1 //	<u>o</u> -1	0 /	
т/к 1		$\Delta G^{-}/kJmol - \Delta H$	['/kJmol -	ΔS <sup>O</sup> /JK <sup>-1</sup> mol <sup>-1</sup>	∆C <sup>-</sup> p/JK <sup>-</sup> mol <sup>-</sup>
	$x_{1} \times 10^{3}$				
183.15	2.02	9.446	-3.061	-68.29	-17.13
193.15	1.82		-3.232	-69.20	11
203.15 213.15	1.64 1.49	10.83 11.53	-3.404 -3.575	-70.06 -70.88	11
223.15	1.36	12.25	-3.746	-71.67	**
233.15 243.15	1.24 1.14	12.97 13.70	-3.917 -4.089	-72.42 -73.14	1
			101.325 k	Pa (760 mmHg) was	s calculated
by nenry	's law by the	compiter.			
	<u></u>	AUVII 1 A	RY INFORMAT		
·			I INFORMAL.		
METHOD /A	PPARATUS/PROC	EDURE:	SOURCE A	AND PURITY OF MATERIA	LS ;
		gassed by vacuur		on. Source not	
		ol, cooled to or 20 hours in a	Pur	rity by chromatog: 5 99.99 per cent.	raphic method
vacuum m	aintained at	$10^{-3}$ mmHg.	Ì		
	egassed liqui			Butanol. Purified the All-Union Sc:	
		poule which was us. The appara-		che All-Onion Sc. Single Crystals	
tus cons	isted of a ma	nostat, a mer-	Sub	ostances. Purity	
	pensator, and by a mercury	a solubility ce	11 per	cent.	
		and the tempera-			
ture wer	e established	. The foil ends	;	75 75505	
dissolve	mpoule were p d as the liqu	ierced. The gas id flowed throug		ED ERROR: $\delta T/K = 0.0$	5
a series	of small cup	s. The amount of		$\delta P/mmHg = 0.03$	1
		ermined by the in the compen-		$\delta X_{1} / X_{1} = 0.00$	05
sator.	mercury rever	TH the comben-	DIRE	000	
		were made at 400	REFERENC	CES :	
		he results con- aw was obeyed.			
		· · · · · · · · · · · · · · · · · · ·			
1					
ł					

COMPONENTS :	ORIGINAL MEASUREMENTS:
l. Argon; Ar; 7440-37-1	Krestov, G. A.; Slyusar, V. P.
2. Butanols	Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1978, 21, 1294 - 1297.
VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325 (760 mmHg)	H. L. Clever
EXPERIMENTAL VALUES:	
$cm^3 mol^{-1}$ $cm^3 Ar$	olubility (298.15 K, 760 mmHg) Ostwald/L tanol) <sup>-1</sup>
l-Butanol; C <sub>4</sub> H <sub>9</sub> OH; 71-	36-3
298.15 91.98 2	1.54 0.2342
2-Butanol or sec-Butan	
	2.66 0.2454
	Isobutanol; C <sub>4</sub> H <sub>9</sub> OH; 78-83-1
	2.94 0.2470
	t-Butanol; C <sub>4</sub> H <sub>9</sub> OH; 75-65-0 6.41 0.2782
	U.2/02
The compiler calculated the Ostwald co at 298.15 K and 760 mmHg (mol butanol 298.15 K. The argon Bunsen coefficient in 2-met 298.15, 303.15, 308.15 and 313.15 was paper from the same laboratory (1).	) <sup>-1</sup> by the butanol molar volume at hyl-2-propanol at temperatures of
AUXILIARY	INFORMATION
METHOD APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Ben-Naim and Baer (2). Modifications include a de- gassing vessel connected directly to the absorption cell, a bubbling ves- sel to presaturate the gas with solvent vapor, and means to maintain the gas supply at a constant pressure The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (3, 4).	
The solvent is degassed by boiling four hours under vacuum. Degassed solvent is admitted to the 639 ml absorption vessel. Gas,presaturated with solvent vapor,is admitted. After 30 minutes rapid stirring 98 % of the gas is dissolved. Slow stirring is continued for 2 hours to insure equilibrium. 3. Nedel'ko, B. E.;Krestov, G. A. <u>Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. 1969, 12, 998.</u> 4. Patsatsiya, K. M.; Krestov, G. A. <u>Zh. Fiz. Khim. 1970, 44, 1835.</u>	ESTIMATED ERROR: $\delta T/K = 0.005$ $\delta \gamma/\gamma = 0.01 \text{ (Compiler)}$ REFERENCES: 1. Krestov, G. A.; Nedel'ko, B. E.; Slyusar, V. P. <u>Izv. Vyssh. Uchebn. Zaved., Khim.</u> <u>Khim. Tekhnol.</u> 1976, <u>19</u> , 1629. 2. Ben-Naim, A.; Baer, S. Trans.Faraday Soc. 1963, <u>59</u> , 2735.

I

COMPONENTS :	ORIGINAL MEASUDEMENTS .
<pre>1. Argon; Ar; 7440-37-1 2. 2-Methyl-l-propanol or Isobutanol;</pre>	ORIGINAL MEASUREMENTS: Battino, R.; Evans, F. D.; Danforth, W. F.; Wilhelm, E.
C <sub>4</sub> H <sub>9</sub> OH; 78-83-1	<u>J. Chem</u> . <u>Thermodyn</u> . 1971, <u>3</u> , 743 - 751
VARIABLES:	PREPARED BY:
T/K: 274.07 - 327.95 P/kPa: 101.325 (1 atm)	H. L. Clever A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction x <sub>1</sub> × 10 <sup>3</sup> C	Bunsen Ostwald oefficient Coefficient α L
274.07 1.026 282.88 0.984 282.88 1.013	0.224 0.225 0.241 0.250 0.248 0.257
282.94 0.963	0.236 0.244 0.237 0.257
295.77 0.981 298.37 0.944	0.237 0.257 0.227 0.249
308.34 0.935	0.223 0.252 0.217 0.249
312.73 0.915 327.95 0.881	0.217 0.249 0.207 0.248
The Bunsen coefficients were calculate The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law. Smoothed Data: $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X$ Std. Dev. $\Delta G^{O} = 39.6$ ,	d by the compiler. an argon partial pressure of 1 = -1964.2 + 64.431 T Coef. Corr. = 0.9994
$\Delta H^{O}/J \text{ mol}^{-1} = -1964.2,$	$\Delta s^{0}/J K^{-1} mol^{-1} = -64.431$
T/K Mol Frac	tion $\Delta G^{O}/J \text{ mol}^{-1}$
$x_1 \times 1$	
273.15 1.02 278.15 1.00	
288.15 0.97	
298.15 0.95 308.15 0.92	
318.15 0.90	6 18,534 ments on the
328.15 0.88	5 19,179 system.
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on the design of Morrison and Billett (1)	1. Argon. Matheson Co. Inc. 99.995 per cent.
and the version used is described by Battino, Evans, and Danforth (2).	<ol> <li>2. 2-Methyl-1-propanol. Fisher Co. Certified grade (99 mole per cent).</li> </ol>
The degassing apparatus is that	ESTIMATED ERROR:
described by Battino, Banzhof, Bogan, and Wilhelm (3).	$\delta T/K = 0.03$
Degassing. Up to 500 cm <sup>3</sup> of solvent	$\delta P/mmHg = 0.5$
is placed in a flask of such size	$\delta x_{1} / x_{1} = 0.005$
that the liquid is about 4 cm deep. The liquid is rapidly stirred, and	REFERENCES:
vacuum is intermittently applied	1. Morrison, T. J.; Billett, F.
through a liquid N <sub>2</sub> trap until the permanent gas residual pressure drops	J. <u>Chem</u> . <u>Soc</u> . 1948, 2033.
to 5 microns.	2. Battino, R.; Evans, F. D.; Danforth, W. F.
Solubility Determination. The de-	J. Am. Oil Chem. Soc. 1968,
gassed solvent is passed in a thin	$\frac{45}{830}$ , 830.
film down a glass helical tube con- taining solute gas plus the solvent	3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E.
vapor at a total pressure of one atm.	Anal. Chem. 1971, <u>43</u> , 806.
The volume of gas absorbed is found by difference between the initial	
l and final volumes in the buret system	
The solvent is collected in a tared flask and weighed.	
	L

COMPONENTS :		
		ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; '</pre>	7440-37-1	Gjaldbaek, J. C.; Niemann, H.
2. 1-Pentanol;	C <sub>5</sub> H <sub>11</sub> OH; 71-41-0	<u>Acta Chem</u> . <u>Scand</u> . 1958, <u>12</u> , 1015-1023.
	298.12 - 308.18 101.325 (1 atm)	PREPARED BY: J. Chr. Gjaldbaek
EXPERIMENTAL VALUE	S:	
	$x_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient $\alpha$ L
	298.12         0.995           298.15         0.992           308.18         0.990           308.16         0.972	0.2055 0.2243 0.2049 0.2237 0.2025 0.2285 0.1993 0.2248
- Smoothed Data:	$\Delta G^{\circ}/J \mod^{-1} = -RT \ln$ Std. Dev. $\Delta G^{\circ} = 19.5$ ,	X <sub>1</sub> = -965.83 + 60.73 T Coef. Corr. = 0.9985
	$\Delta H^{\circ}/J \text{ mol}^{-1} = -965.83,$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -60.73$
	T/K Mol Frac X <sub>l</sub> x l	
	293.15         1.000           298.15         0.993           303.15         0.987           308.15         0.981           313.15         0.975	3 17,140 7 17,444 17,447
The solubility is obeyed.	values are at 101.325 }	Pa (l atm) assuming that Henry's law
L	AUXILIARY	INFORMATION
METHOD:	AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD:	AUXILIARY	
METHOD:	AUXILIARY	SOURCE AND PURITY OF MATERIALS:
		<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. "L'air liquid. Dried.   &lt; 0.05 % water. 2. 1-Pentanol. Fractionated at about     115 mmHg. Boiling point 137.83 -     137.90 °C at 760 mmHg. Refractive</pre>
APPARATUS/PROCEDU glass combined enclosed in an shaken until ec used for calib	RE: A calibrated, all- manometer and bulb was air thermostat and guilibrium. Mercury wa ration and as confining	SOURCE AND PURITY OF MATERIALS: 1. Argon. "L'air liquid. Dried. < 0.05  water. 2. 1-Pentanol. Fractionated at about 115 mmHg. Boiling point 137.83 - 137.90 °C at 760 mmHg. Refractive index (Na D, 293.15 K) = 1.412. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta X_1/X_1 = 0.015$
APPARATUS/PROCEDU glass combined enclosed in an shaken until ec used for calibu	RE: A calibrated, all- manometer and bulb was air thermostat and guilibrium. Mercury wa ration and as confining plvents were degassed i	SOURCE AND PURITY OF MATERIALS: 1. Argon. "L'air liquid. Dried. < 0.05  water. 2. 1-Pentanol. Fractionated at about 115 mmHg. Boiling point 137.83 - 137.90 °C at 760 mmHg. Refractive index (Na D, 293.15 K) = 1.412. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta X_1/X_1 = 0.015$

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.
2. 1-Pentanol, C <sub>5</sub> H <sub>11</sub> OH; 71-41-0	J. Phys. Chem. 1960, 64, 1330-1331.
VARIABLES: T/K: 298.15, 308.15	PREPARED BY:
P/kPa: 101.325 (1 atm)	M. E. Derrick
EXPERIMENTAL VALUES:	
T/K Mol Fraction Bunsen Ostwald	
	$\begin{array}{c} \text{Defficient} \\ \alpha \\ \underline{\alpha} \\ L \\ \end{array}$
298.15 1.04	0.210 0.229 + 0.008
308.15 1.05	$0.216$ $0.244 \pm 0.003$
The Bunsen coefficients were calculat	ed by the compiler.
	-
The observed mole fraction solubilitie dissertation (2).	es were caren from boyer s
The Dissertation gives the equations	log X <sub>1</sub> = -3.381 + 0.573 log C at
298.15 K and log $X_1 = -3.392 + 0.599$	log C at 308.15 K where C is the
number of carbon atoms in the alcohol in the original paper was calculated	
Smoothed Data: $\Delta G^0 = -RT \ln X_1 = -34$	0.5 + 58.25 T
The equation is tenta	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Commercial Van Slyke blood gas apparatus (E. H. Sargent Co.) was	<ol> <li>Argon. Ohio Surgical Co.</li> <li>99.6 per cent argon.</li> </ol>
modified by the authors for their use.	2. 1-Pentanol. Source not given.
The total pressure of gas and solvent	Treated by standard methods to
vapor in the solution chamber was	remove aldehydes and ketones, then dried and distilled.
adjusted to a pressure of one atm. The pressure was maintained at one	
atm during the solution process. The saturated solution was transferred to	
a bulb below the lower stopcock of	
the extraction vessel and sealed off. The gas and solvent vapor were then	ESTIMATED ERROR:
brought to volume over mercury. See	$\delta T/K = 0.01$
(1) for details of the extraction procedure.	$\delta L/cm^3 = 0.008$
	REFERENCES: 1. Peters, J. P.; Van Slyke, D. D.
	"Quantitative Clinical Chemistry" Williams and Wilkins Co.,
	Baltimore, MD, 1932, Volume II.
	2. Boyer, F. L. Ph.D. Dissertation
	Vanderbilt U., 1959, Nashville, TN

194 Argon Solubilitie	es up to 200 kPa	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.	
2. 1-Hexanol; C <sub>6</sub> H <sub>13</sub> OH; 111-27-3	<u>J. Phys</u> . <u>Chem</u> . 1960, <u>64</u> , 1330-1331.	
VARIABLES: T/K: 298.15	PREPARED BY:	
T/K: 298.15 P/kPa: 101.325 (1 atm)	M. E. Derrick	
EXPERIMENTAL VALUES:		
T/K Mol Fraction $x_1 \times 10^3$ C	Bunsen Ostwald oefficient Coefficient α L	
298.15 1.14	0.205 0.224 ± 0.001	
The Bunsen coefficient was calculated	-	
The observed mole fraction solubility dissertation (2).	was taken from Boyer's	
The Dissertation gives the equation 1	+	
298.15 K where C is the number of car fraction solubility given in the orig 298.15 K equation.		
AUXILIARY INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Commercial Van Slyke blood gas apparatus (E. H. Sargent Co.) was modified by the authors for their	<ol> <li>Argon. Ohio Surgical Co. 99.6 per cent argon.</li> <li>1-Hexanol. Source not given.</li> </ol>	
use. The total pressure of gas and solvent vapor in the solution chamber was adjusted to a pressure of one atm. The pressure was maintained at one atm during the solution process. The saturated solution was transferred to a bulb below the lower stopcock of the extraction vessel and sealed off. The gas and solvent vapor were then brought to volume over mercury. See (1) for details of the extraction procedure.	Treated by standard methods to remove aldehydes and ketones, then dried and distilled.	
	ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta L/cm^3 = 0.001$	
	REFERENCES: 1. Peters, J. P.; Van Slyke, D. D. "Quantitative Clinical Chemistry" Williams and Wilkins Co., Baltimore, MD, 1932, Volume II.	
	<ol> <li>Boyer, F. L. Ph.D. Dissertation Vanderbilt U., 1959, Nashville, TN</li> </ol>	

Organic Compounds	Containing Oxygen	195
COMPONENTS :	ORIGINAL MEASUREMENTS:	٦
l. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.	
2. 1-Heptanol; C <sub>7</sub> H <sub>15</sub> OH; 111-70-6	J. Phys. Chem. 1960, 64, 1330-1331.	
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: M. E. Derrick	
EXPERIMENTAL VALUES:		
T/K Mol Fraction X <sub>1</sub> × 10 <sup>3</sup> C	Bunsen Ostwald oefficient Coefficient $\alpha$ L	
298.15 1.25	0.200 0.218 + 0.003	
The Bunsen coefficient was calculated by the compiler.		
The observed mole fraction solubility dissertation (2).	was caten from boyer s	
The Dissertation gives the equation la	og X <sub>1</sub> = -3.381 + 0.573 log C at	
298.15 K where C is the number of carbon atoms in the alcohol. The mole fraction solubility given in the original paper was calculated from the 298.15 K equation.		
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;	
Commerical Van Slyke blood gas apparatus (E. H. Sargent Co.) was modified by the authors for their use. The total pressure of gas and solvent vapor in the solution chamber was adjusted to a pressure of one atm. The pressure was maintained at one atm during the solution process. The saturated solution was transferred to	<ol> <li>Argon. Ohio Surgical Co. 99.6 per cent argon.</li> <li>1-Heptanol. Source not given. Treated by standard methods to remove aldehydes and ketones, then dried and distilled.</li> </ol>	
a bulb below the lower stopcock of the extraction vessel and sealed off. The gas and solvent vapor were then brought to volume over mercury. See (1) for details of the extraction procedure.		
	REFERENCES :	

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Boyer, F. L.; Bircher, L. J.
2. 1-Octanol; C <sub>8</sub> H <sub>17</sub> OH; 111-87-5	J. Phys. Chem. 1960, <u>64</u> , 1330-1331.
0 1/	
VARIABLES:	PREPARED BY:
T/K: 298.15, 308.15	M. E. Derrick
P/kPa: 101.325 (1 atm)	M. E. Dellick
EXPERIMENTAL VALUES:	Den en la
T/K Mol Fraction	Bunsen Ostwald oefficient Coefficient
	<u>α L</u>
298.15 1.38	0.195 0.213 + 0.005
308.15 1.40	$0.192$ $0.217 \pm 0.008$
The Bunsen coefficients were calculat	ed by the compiler.
The observed mole fraction solubiliti	es were taken from Boyer's
dissertation (2).	-
The Dissertation gives the equations	$\log X_{1} = -3.381 + 0.573 \log C$ at
	-
298.15 K and log $X_1 = -3.392 + 0.599$	
number of carbon atoms in the alcohol in the original paper was calculated	
Smoothed Data: $\Delta G^{0}/J \mod^{-1} = - RT \ln$	$X_1 = 1089.5 + 51.1 T$
The equation is tenta	tive.
See pages 169 - 170 for Evaluator's c	omments
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	COURCE AND DUDITY OF MATERIALS.
Commercial Van Slyke blood gas	SOURCE AND PURITY OF MATERIALS:
apparatus (E. H. Sargent Co.) was	99.6 per cent argon.
modified by the authors for their	2. 1-Octanol. Source not given.
use.	Treated by standard methods to
The total pressure of gas and solvent	remove aldehydes and ketones, then dried and distilled.
vapor in the solution chamber was adjusted to a pressure of one atm.	
The pressure was maintained at one	
atm during the solution process. The	
saturated solution was transferred to a bulb below the lower stopcock of	
the extraction vessel and sealed off.	ESTIMATED ERROR:
The gas and solvent vapor were then brought to volume over mercury. See	$\delta T/K = 0.01$
(1) for details of the extraction	$\delta L/cm^3 = 0.008$
procedure.	
	REFERENCES :
	1. Peters, J. P.; Van Slyke, D. D.
	"Quantitative Clinical Chemistry"
1	Williams and Wilkins Co
	Williams and Wilkins Co., Baltimore, MD, 1932, Volume II.
	Baltimore, MD, 1932, Volume II.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; 7440-37-1 2. 1-Octanol; C<sub>8</sub>H<sub>17</sub>OH; 111-87-5</pre>	<pre>Wilcock, R. J.; Battino, R.; Danforth, W. F.; Wilhelm, E. <u>J. Chem. Thermodyn</u>. 1978, <u>10</u>, <u>817-822.</u></pre>
VARIABLES: T/K: 283.28 - 313.57 P/kPa: 101.325	PREPARED BY: A. L. Cramer H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient αL
283.28 1.271 298.10 1.273 313.57 1.237	0.1822 0.1890 0.1818 0.1968 0.1728 0.1984
The Bunsen coefficients were calculated	d by the compiler.
The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law.	
Smoothed Data: $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X$	1 = -679.6 + 57.793 T
Std. Dev. $\Delta G^{\circ} = 7.7$ , Co	oef. Corr. = 0.9999
$\Delta H^{O}/J \text{ mol}^{-1} = -679.6$	$\Delta s^{\circ}/J K^{-1} mol^{-1} = -57.793$
	tion $\Delta G^{O}/J \text{ mol}^{-1}$
X <sub>1</sub> × 1	03
278.15 1.28 288.15 1.27 298.15 1.26 308.15 1.25 318.15 1.24	15,973 16,551 17,129 17,707
See pages 169 - 170 for Evaluator's co	omments.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described	1. Argon. Matheson Co., Inc. 99.995 per cent.
by Battino, Evans, and Danforth (2). The degassing apparatus is that	2. 1-octanol. Eastman Organic Chemicals. Distilled, density
described by Battino, Banzhof, Bogan, and Wilhelm (3).	$\rho_{298.15} = 0.8247 \text{ g cm}^{-3}$
Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that	ESTIMATED ERROR:
the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid $N_2$ trap until the permanent gas residual pressure drops to	$\begin{array}{rcl} & \delta T/K &= & 0.03 \\ & \delta P/mmHg &= & 0.5 \\ & \delta X_{1}/X_{1} &= & 0.01 \end{array}$
5 microns.	RIFERENCES:
Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system.	<ol> <li>Morrison, T. J.; Billett, F. <u>J. Chem. Soc</u>. 1948, 2033.</li> <li>Battino, R.; Evans, F. D.; Danforth, W. F. <u>J. Am. Oil Chem. Soc</u>. 1968, <u>45</u>, 830.</li> <li>Battino, R.; Banzhof, M.; Battino, R.; Banzhof, M.;</li> </ol>
The solvent is collected in a tared flask and weighed.	Bogan, M.; Wilhelm, E. <u>Anal. Chem</u> . 1971, <u>43</u> , 806.

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198 Argon Solubilitie	5 up to 200 kFa
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Wilcock, R. J.; Battino, R. Danforth, W. F.; Wilhelm, E.
2. 1-Decanol; C <sub>10</sub> H <sub>21</sub> OH; 112-30-1	<u>J. Chem. Thermodyn</u> . 1978, <u>10</u> , 817-822.
VARIABLES:	PREPARED BY:
T/K: 282.60 - 313.54 P/kPa: 101.325 (1 atm)	A. L. Cramer H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $x_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L
282.60 1.474 298.10 1.494 313.54 1.441	0.1748 0.1808 0.1750 0.1910 0.1666 0.1912
The Bunsen coefficients were calculate	d by the compiler.
The Bunsen coefficients were calculated by the compiler. The solubility values were adjusted to an argon partial pressure of 101.325 kPa (1 atm) by Henry's law.	
Smoothed Data: $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X$	-
Std. Dev. $\Delta G^{\circ} = 12.1$ ,	Coef. Corr. = 0.9998
$\Delta H^{O}/J \text{ mol}^{-1} = -557.4,$	$\Delta S^{O}/J K^{-1} mol^{-1} = -56.106$
T/K Mol Frac	tion $\Delta G^{O}/J \text{ mol}^{-1}$
x, × 1	
$\frac{1}{278.15}$ 1.49 15,048	
288.15 1.48 298.15 1.47	
308.15 1.46	16,732
318.15 1.45	17,293
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on the design of Morrison and Billett	<ol> <li>Argon. Matheson Co., Inc. 99.995 per cent Ar.</li> </ol>
(1) and the version used is described by Battino, Evans, and Danforth (2).	2. 1-Decanol. Eastman Organic Chemicals. Distilled, density
The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3).	$\rho_{298.15} = 0.8206 \text{ g cm}^{-3}$ .
Degassing. Up to 500 cm <sup>3</sup> of solvent	ESTIMATED ERROR:
is placed in a flask of such size that	$\delta T/K = 0.02$ $\delta P/mmHg = 0.5$
the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum	$\delta P / mmHg = 0.5$ $\delta X_1 / X_1 = 0.01$
is intermittently applied through a liquid N <sub>2</sub> trap until the permanent	REFERENCES :
gas residual pressure drops to	1. Morrison, T. J.; Billett, F.
5 microns.	J. Chem. Soc. 1948, 2033.
Solubility Determination. The de- gassed solvent is passed in a thin	2. Battino, R.; Evans, F. D.; Danforth, W. F.
film down a glass helical tube con- taining solute gas plus the solvent	J. Am. Oil Chem. Soc. 1968, 45, 830.
vapor at a total pressure of one atm. The volume of gas absorbed is found	3. Battino, R.; Banzhof, M.;
by difference between the initial and	Bogan, M.; Wilhelm, E.
final volumes in the buret system. The solvent is collected in a tared flask and weighed.	<u>Anal</u> . <u>Chem</u> . 1971, <u>43</u> , 806.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Gjaldbaek, J. C.; Niemann, H.
<pre>2. 1,2-Ethanediol or Ethylene glycol; (CH<sub>2</sub>OH)<sub>2</sub>; 107-21-1</pre>	<u>Acta Chem</u> . <u>Scand</u> . 1958, <u>12</u> , 1015-1023.
VARIABLES:	
T/K: 298.14 - 308.15 P/kPa: 101.325 (1 atm)	PREPARED BY: J. Chr. Gjaldbaek
EXPERIMENTAL VALUES:	
T/K Mol Fraction X <sub>1</sub> x 10 <sup>3</sup>	Bunsen Ostwald Coefficient Coefficient L
298.14 0.0798 298.14 0.0783 308.15 0.0815	0.0320 0.0314 0.0343 0.0325 0.0367
308.15 0.0791	0.0315 0.0355
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln x_1$	
Std. dev. ∆G° = 36.7, C	
$\Delta H^{0}/J \text{ mol}^{-1} = 1192.1, \Delta$	$S^{0}/J K^{-1} mol^{-1} = -74.845$
	ction $\Delta G^{\circ}/J \text{ mol}^{-1}$
X <sub>1</sub> x	
293.15 0.078	
298.15 0.079 303.15 0.079	
308.15 0.080	3 24,160
The Ostwald and mole fraction solubility values were calculated by the compiler.	
The Editor and his staff added the s	moothed data.
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
	1. Argon. "L'air Liquid". Dried, less than 0.05 per cent water.
	2. 1,2-Ethanediol. Fractionated in a column at about 53 mmHg. Boiling point 197.30-197.42 $^{O}C$ at 760 mmHg, refractive index $n_{D} = 1.4320$ at 20 $^{O}C$ .
APPARATUS/PROCEDURE: A calibrated all- glass combined manometer and bulb was enclosed in an air thermostat and shaken until equilibrium. Mercury was	ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta X_1/X_1 = 0.015$
used for calibration and as the con- fining liquid. The solvents were degassed in the apparatus. Details are in references 1 and 2.	REFERENCES: 1. Lannung, A. <u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68.
The absorbed volume of gas is calcula- ted from the initial and final amounts both saturated with solvent vapor. The amount of solvent is determined by the	Acta Chem. Scand. 1952, <u>6</u> , 623.

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200 Argon Solubilities up to 200 kPa				
COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-	37-1	Ben-Naim, A.		
2. 1,2-Ethanediol o C <sub>2</sub> H <sub>6</sub> O <sub>2</sub> ; 107-21-1	r Ethylene Glycol;			
VARIABLES: T/K: 288.15 - 307.15 P/kPa: 101.325 (1 atm)		PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES: T/K	X. v 10 <sup>3</sup> Coef	nsen Ostwald ficient Coefficient a L		
288.15 293.15 298.15 301.15 304.15 307.15	0.0845         0.           0.0846         0.           0.0848         0.           0.0847         0.           0.0849         0.	0341         0.0360           0340         0.0365           0340         0.0371           0339         0.0374           0339         0.0377           0336         0.0378		
	he mole fraction s	rom a graph in the original paper olubility and the Bunsen coefficient er.		
1		Х <sub>1</sub> = 20.3 + 77.898 Т Coef. Corr. = 0.9999		
∆нУ	$J mol^{-1} = 20.3, \Delta S$	$^{\circ}/J K^{-1} mol^{-1} = - 77.898$		
T/K Mol Frac X <sub>1</sub> x 1		tion $\Delta G^{0}/J \text{ mol}^{-1}$		
	288.15 0.0846 298.15 0.0846 308.15 0.0846	23,246		
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDU A calibrated d contains degassed e introduced wet from buret system. Stirr. forces it up to sid the top of the flas returns via a centr. amount of gas disso by the gas burets. ' apparatus is thermo bath. 97 % of the g. 30 min., the remain slow stirring (1).	issolution vessel thanediol. Gas is a calibrated gas ing the liquid earms attached to k and the liquid al tube. The lved is determined The entire stated in a water as dissolves in	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. No information given. 2. 1,2-Ethanediol. Fluka's Pure Grade or Analar Grade. The first was used in most of the measure- ments.  ESTIMATED ERROR:</pre>		
		<u> </u>		

Organic Compounds Containing Oxyg	aen
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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. Cyclohexanol; C <sub>6</sub> H <sub>11</sub> OH; 108-93-0	<u>J. Am. Chem. Soc</u> . 1930, <u>52</u> , 68 - 80.
	· · · · · · · · · · · · · · · · · · · ·
VARIABLES: T/K: 298.15 - 318.15 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$ Co	Bunsen Ostwald pefficient Coefficient α L
298.15 0.534 298.15 0.529 298.15 0.529	0.113 0.123 0.112 0.122 0.112 0.122
310.15 0.549 310.15 0.544 310.15 0.539	0.115 0.131 0.114 0.129 0.113 0.128
318.15 0.562 318.15 0.557 318.15 0.548	0.117 0.136 0.116 0.135 0.114 0.133
The mole fraction solubility and Ostward by the compiler.	ald coefficent values were calculated
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X$	<u>1</u> = 1798.2 + 56.678 Т
Std. Dev. $\Delta G^0 = 22.2$ , Co	oef. corr. = 0.9989
$\Delta H^0 / J mol^{-1} = 1798.2$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -56.678$
	raction $\Delta G^{\circ}/J \text{ mol}^{-1} \times 10^3$
	530 18,697 543 19,264
	555 19,830
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus is a modification of that of von Antropoff (1). A calibra- ted, combined all glass manometer and absorption bulb is enclosed in an air thermostat. Mercury is used as the calibration and confining liquid. The solvent is degassed in the apparatus.	by volume nitrogen. 2. Cyclohexanol. Poulenc Frères "pur" Fractionated twice in vacuo,
The solvent and gas (presaturated with solvent vapor) are shaken together until equilibrium is estab- lished.	ōc.
EVALUATOR'S NOTE:	ESTIMATED ERROR: $E = 0.02$
Cauquil (2) reported an Ostwald	$\delta T/K = 0.03$
coefficient of 0.173 at 299.15 K and a total pressure of 755 mmHg. The	REFERENCES :
value is rejected as probably high.	1. von Antropoff, A. <u>Z. Electrochem</u> . 1919, <u>25</u> , 269.
	2. Cauquil, G. J. Chim. Phys. 1927, <u>68</u> , 53.
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202 Argon Solubilities up to 200 kPa				
COMPONENTS :	01	RIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	E	Ben-Naim, A.; Moran, G.		
2. 1,4-Dioxane; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; 123-91-1		<u>Trans</u> . <u>Faraday</u> <u>Soc</u> . 1965, <u>61</u> , 821 - 825.		
VARIABLES:	Р	REPARED BY:		
T/K: 288.15 - 298.15 P/kPa: 101.325 (1 atm)		H. L. Clever		
EXPERIMENTAL VALUES:				
T/K Mol Fraction	<u>ມ</u> Bເ	insen Ostwald		
$x_1 \times 10^3$	Coef 	fficient Coefficient $\alpha$ L		
288.15 0.583 293.15 0.593 298.15 0.604	Ο.	.154       0.162         .156       0.167         .158       0.172		
compiler. The Bunsen coefficient were calculated by the compiler a	and th for an	a graph in the original paper by the ne mole fraction solubility values argon partial pressure of 101.325 icient to be independent of pressure.		
Smoothed Data: $\Delta G^0/J \mod^{-1} = -1$	RT ln }	K <sub>1</sub> = 2513.1 + 53.200 T		
$\Delta H^{\circ}/J \text{ mol}^{-1} = 253$	3.1,	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -53.200$		
T/K Mol Fr X <sub>1</sub> x		ction $\Delta G^{0}/J \text{ mol}^{-1}$		
288.15 0.5				
288.15 0.5		4 18,375		
IXUA	LIARY II	NFORMATION		
METHOD /APPARATUS / PROCEDURE :	Is	OURCE AND PURITY OF MATERIALS:		
A calibrated dissolution ve	1	1. Argon. No information.		
contains degassed dioxane. Gas is introduced wet from a calibrated gas buret system. Stirring the liquid forces it up through sidearms attached to the top of the flask and the liquid returns via a central tube The amount of gas dissolved is determined in the gas burets. The entire apparatus is thermostated in a water bath. 97 per cent of the gas dissolves in the first 30 minutes, the remainder in four hours of slow stirring (1).		2. 1,4-Dioxane. Source not given. Refluxed over KOH + Ag <sub>2</sub> O for 48 hours, distilled.		
		STIMATED ERROR:		
		$\delta L/L = 0.002$ for the overall measurement. Reading the value from a graph adds uncertainty.		
1		REFERENCES :		
		<ol> <li>Ben-Naim, A.; Baer, S. <u>Trans. Faraday Soc</u>. 1963, <u>59</u>, 2735.</li> </ol>		

	s Containing Oxygen 203
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Lannung, A.
2. 2-Propanone or Acetone; C <sub>3</sub> H <sub>6</sub> O; 67-64-1	J. <u>Am</u> . <u>Chem</u> . <u>Soc</u> . 1930, <u>52</u> , 68 - 80.
VARIABLES:	PREPARED BY:
T/K: 278.15 - 313.15 P/kPa: 101.325 (1 atm)	P. L. Long A. L. Cramer
EXPERIMENTAL VALUES:	
T/K Mol Fraction	$K_{1} = 1903.7 + 51.872 T$ Coef. Corr. = 0.9999 $\Delta S^{\circ}/J K^{-1} mol^{-1} = -51.872$ tion $\Delta G^{\circ}/J mol^{-1}$ 16,332 16,851 17,369
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
Gas absorption. The gas is presatu- rated with solvent vapor. The gas volume absorbed is the difference between initial and final gas vol- umes. The amount of solvent is de- termined by the weight of mercury displaced.	<ol> <li>Argon. Linde's Liquid Air Factory. Contained 0.5 percent by volume nitrogen.</li> <li>2-Propanone. Kahlbaum's "zur Analyse". Used after tests showed absence of water, acid and aldehyde.</li> </ol>
APPARATUS/PROCEDURE: The apparatus is a modification of that of von Antropoff (1). A calibrated, combined all glass manometer and bulb is enclosed in an air thermostat. Mercury is used as the calibration and confining liquid. The solvent is degassed in the appa- ratus. The solvent and the gas are shaken together until equilibrium is established.	ESTIMATED ERROR: δT/K = 0.03 REFERENCES: 1. v. Antropoff, A. <u>Z. Electrochem</u> . 1919, <u>25</u> , 269.

COMPONENTS:	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Krestov, G. A.; Nedel'ko, B. E.			
2. Acetic Acid; CH <sub>3</sub> COOH; 64-19-7	<u>Izv. Vyssh. Uchebn</u> . <u>Zaved., Khim</u> . <u>Khim. Tekhnol</u> . 1975, <u>18</u> , 1893 - 1896.			
VARIABLES:	PREPARED BY:			
T/K: 288.15 - 323.15 P/kPa: 101.325 (1 atm)	H. L. Clever			
EXPERIMENTAL VALUES:				
T/K Mol Fraction $X_1 \times 10^3$ Co	BunsenOstwaldDefficientCoefficient $\alpha$ L			
288.15 0.440	0.1727 0.1822			
298.15 0.418 308.15 0.396	0.1630 0.1779 0.1527 0.1724			
323.15 0.357	0.1355 0.1604			
Solubility values were adjusted to a kPa by Henry's law.	an argon partial pressure of 101.325			
The mole fraction solubities were ca	alculated by the compiler.			
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT$ in	$x_1 = -4655.9 + 80.342 \text{ T}$			
Std. Dev. $\Delta G^0 = 7.4$ ,	-			
	$\Delta S^{0}/J K^{-1} mol^{-1} = -80.342$			
T/K Mol Frad	ction $\Delta G^{0}/J \text{ mol}^{-1}$			
X <sub>1</sub> x 2	10 <sup>3</sup>			
288.15 0.444	4 18,495			
298.15 0.410	5 19,298			
308.15 0.39 318.15 0.37	•			
328.15 0.350				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Ben-Naim and Baer (1). Modifications include a degassing vessel connected directly to the absorption cell, a bubbling vessel to presaturate the gas with solvent vapor, and means to maintain the gas supply at a constant pressure. The entire apparatus is immersed in a 400 liter water bath controlled to within 0.005 K (2, 3).	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Specially pure grade designated MRTU-6-02-377-66. Contained not more than 0.004 % N<sub>2</sub> and 0.001 % O<sub>2</sub>.</li> <li>2. Water. Doubly distilled.</li> <li>3. Acetic acid.</li> </ul>			
The solvent is degassed by boiling four hours under vacuum. Degassed solvent is admitted to the 639 ml ab- sorption cell. Gas, presaturated with solvent vapor, is admitted. After 30 minutes rapid stirring 98 % of the gas is dissolved. Slow stirring is contin- ued for 2 hours to insure equilibrium.	ESTIMATED ERROR: $\delta T/K = 0.005$ $\delta X_1/X_1 = 0.01$ REFERENCES: 1. Ben-Naim, A.; Baer, S. Trans. Faraday Soc. 1963, 59, 2735.			
	<ol> <li>Nedel'ko, B. E.; Krestov, G. A. <u>Izv. Vyssh. Uchebn. Zaved., Khim.</u> <u>Khim. Tekhnol</u>. 1969, <u>12</u>, 998.</li> <li>Patsatsiya, K. M.; Krestov, G. A. <u>Zh. Fiz. Khim. 1970, 44, 1835.</u></li> </ol>			

Organic	Compounds	Containing	Ovvden
Organic	Compounds	Containing	OXYYEII

Organic Compounds Containing Oxygen			205			
COMPONENTS :			ORIGIN	L MEASUREMEN	TS:	
l. Argon; Ar; 7740-37-1		Zhele	znyak, N.	I.; Krestov, G.	Α.	
2. Butanoic Aci	.d; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; 107	-92-6			<u>m</u> . 1978, <u>19</u> , 818 . 1978, <u>19</u> , 704	
VARIABLES: T/K: 288.15 - 323.15 P/kPa: 101.325 (l atm)		PREPAR		L. Clever		
EVDEDINENTAL VALUES	•					
EXPERIMENTAL VALUES	Mol Fraction	Bunsen		Ostwald	Solvomolality	Ŧ
	$\frac{X_1 \times 10^3}{1000}$			Coefficient L		
288.15	0.8838	0.217		0.229	49.06	-
298.15 308.15	0.8843 0.8721	0.214		0.234	49.09	
323.15	0.8559	0.209		0.236 0.239	48.41 47.57	
*(mol A	r at 760 mmHg)	(55.51 m	ol but	anoic acid		-
The mole fraction values were calo	on solubility, culated by the	Bunsen c compiler	oeffic	cient and C	stwald coefficio	ent
Smoothed Data:	$\Delta G^{O}/J \text{ mol}^{-1} =$	-RT ln X	: <sub>1</sub> = -7	765.1 + 61.	073 т	
	Std. Dev. $\Delta G^{O}$	= 4.8, 0	coef. (	Corr. = 0.9	999	
	$\Delta H^{O}/J \text{ mol}^{-1} =$	-765.1,	∆s <sup>o</sup> /J	$\kappa^{-1}$ mol <sup>-1</sup>	= -61.073	
	т/к	Mol Frac	tion	∆G <sup>O</sup> /J mol <sup>-</sup>	ī	
		X <sub>1</sub> × 1	.0 <sup>3</sup>			
	288.15	0.88		16,833		
	298.15 308.15	0.87 0.87		17,444 18,054		
	318.15	0.86	21	18,665		
	328.15	0.85	45	19,276		
		AUXILIARY	INFORM	ATION	<u></u>	
METHOD / APPARATUS / PI	ROCEDURE :	·····	SOURCE	AND PURITY	OF MATERIALS:	<u></u>
The apparatus is		on of the				2
apparatus of Ber Modifications ir	n-Naim and Baer	: (1).	de	esignated M	RTU-6-02-377-66	•
vessel connected				, and 0.001	t more than 0.00 % O <sub>2</sub> .	048
absorption cell,			· ·	•	2	
presaturate the vapor, and means			2. BU	tanoic Aci	a.	
supply at a cons entire apparatus						
liter water bath 0.005 K (2,3).						
The solvent is d					·	
four hours under vacuum. Degassed solvent is admitted to the 639 ml		ESTIM	ATED ERROR:	T/K = 0.005		
absorption cell. Gas, presaturated				$\gamma/\gamma = 0.002 - 0$	.004	
with solvent vap After 30 minutes						
of the gas is di	ssolved. Slow	້	REFER	ENCES :		
stirring is cont insure equilibri			1. Be	en-Naim, A.		) <u>)</u>
is prepared by w	eight. The co	mposi-	1 ++	del'ko, B.	<u>ay Soc. 1963, 59</u> E.; Krestov, G	-, 2/35 . A.
tion is checked after the solution process by density and refractive			<u>1</u> 2	v. Vyssh.	Uchebn. Zaved., 1. 1969, 12, 998	Khim.
index measurements.		3. Pa	tsatsiya,	K. M.; Krestov,	G. A.	
		Zh	<u>. Fiz. Khi</u>	<u>m</u> . 1970, <u>44</u> , 18:	35.	

COMPONENTS:       ORIGINAL MEA         1. Argon; Ar; 7440-37-1       Gjaldbaek         2. Hexadecafluoroheptane or Perfluoroheptane; $C_7F_{16}$ ; 335-57-9       Acta Chem         VARIABLES:       PREPARED BY         VARIABLES:       P/kPa: 101.325 (1 atm)         EXPERIMENTAL VALUES:       T/K Mol Fraction Bunsen         298.15       5.27         0.5286       0.5275         The Ostwald and mole fraction solubility values compiler at 101.325 kPa (1 atm) argon pressure a obeyed.	ASUREMENTS: ., J. C.; Niemann, H.
2. Hexadecafluoroheptane or Perfluoroheptane; $C_7F_{16}$ ; 335-57-9 VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Coefficient 298.15 5.27 0.5286 298.15 5.26 0.5275 The Ostwald and mole fraction solubility values compiler at 101.325 kPa (1 atm) argon pressure a	, J. C.; Niemann, H.
heptane; $C_7F_{16}$ ; 335-57-9 VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Coefficient 298.15 5.27 0.5286 298.15 5.26 0.5275 The Ostwald and mole fraction solubility values compiler at 101.325 kPa (1 atm) argon pressure a	
T/K: 298.15 P/kPa: 101.325 (1 atm) EXPERIMENTAL VALUES:	<u>1</u> . <u>Scand</u> . 1958, <u>12</u> , 611 - 614.
T/K Mol Fraction Bunsen $X_1 \times 10^3$ Coefficient 298.15 5.27 0.5286 298.15 5.26 0.5275 The Ostwald and mole fraction solubility values compiler at 101.325 kPa (1 atm) argon pressure a	: J. Chr. Gjaldbaek
$\begin{array}{c} \begin{array}{c} X_{1} \times 10^{3} \\ 298.15 \\ 298.15 \\ 5.26 \\ \end{array} \begin{array}{c} \begin{array}{c} \text{Coefficient} \\ \alpha \\ \hline \end{array} \end{array}$	
298.15 5.26 0.5275 The Ostwald and mole fraction solubility values compiler at 101.325 kPa (1 atm) argon pressure a	Ostwald Coefficient L
compiler at 101.325 kPa (1 atm) argon pressure a	0.5770 0.5758
	were calculated by the issuming Henry's law is
AUXILIARY INFORMATION	
METHOD / APPARATUS / PROCEDURE: SOURCE AND	PURITY OF MATERIALS:
ometer and bulb was enclosed in an air thermostat and shaken until equilibrium.than 0 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 references 1 and 2.2. Hexade ated, method Boilin mmHg, at 216The absorped volume of gas is calculated from the initial and final amounts, both saturated with solvent vapor. The amount of solvent is deter- mined by the weight of displacedESTIMATED E	ERROR:
mercury.	$\delta T/K = 0.05$ $\delta X_1/X_1 = 0.015$
2. Gjaldb	

COMPONENTS:	EVALUATOR:		
1. Argon; Ar; 7440-37-1	H. L. Clever		
	Department of Chemistry		
2. Undecafluoro(trifluoromethyl)- cyclohexane or Perfluoromethyl-	Emory University		
cyclohexane; $C_7F_{14}$ ; 355-02-2	Atlanta, GA 30322 USA		
	June 1979		
CRITICAL EVALUATION:			
Reeves and Hildebrand (1) reported 10	solubility values at one atmosphere		
pressure and temperatures between 278	.09 and 307.86 K. Clever, Battino,		
Saylor and Gross (2) reported three v Graham and Weale (3) measured the sol	alues between 289.15 K and 316.25 K.		
323.15 K. They extrapolated a mole f	raction solubility of $4.7 \times 10^{-3}$ at		
atmospheric pressure from their measu	rements at pressures between 76 and		
329 atmospheres.			
The Reeves and Hildebrand smoothed da	ta range from 2.7 percent higher at		
288 K to 3.3 percent higher at 318 K	than the data of Clever et al.		
The single value of Graham and Weale			
than the value extrapolated from Reev	es and Hildebrands data.		
The Reeves and Hildebrand data appear	to be of exceptional accuracy. Thus		
their data are recommended over the o			
used for the recommended thermodynami	c values and smoothed data below.		
The recommended thermodynamic values	for the transfer of one mole of argon		
from the gas at 101.325 kPa (1 atm) t	o the hypothetical unit mole fraction		
solution are			
$\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln x_1 = -1909.0 + 51.139 T$			
-			
Std. Dev. $\Delta G^{O} = 1.55$ , Coeff. Corr. = 0.9999			
$\Delta H^{\circ}/J \text{ mol}^{-1} = -1909.0, \Delta S^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1} = -51.139$			
Table 1Solubility of argon in perfluoromethylcyclohexane at an argon pressure of 101.325 kPa. Recommended mole fraction solubility and Cibbs energy of solution as a function of temperature			
and Gibbs energy of solution as a function of temperature.			
T/K Mol Fra	$\Delta G^{O}/J \text{ mol}^{-1}$		
x <sub>1</sub> x			
278.15 4.8	67 12,315		
283.15 4.7			
288.15 4.7 293.15 4.6	29 12,827 65 13,083		
298.15 4.6			
303.15 4.5	•		
308.15 4.4 313.15 4.4			
318.15 4.3			
1. Reeves, L. W.; Hildebrand, J. H. J. Am. Chem. Soc. 1957, 79, 1313.			
<ol> <li>Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, G. M. J. Phys. Chem. 1957, 61, 1078.</li> </ol>			
3. Graham, E. B.; Weale, K. E. Prog. Internat. Res. Thermodynamic and Transport Properties, Symposium on Thermophysical Properties, 2nd, Princeton, 1962, page 153.			
Jolley and Hildebrand (4) report the partial molal volume of argon dissolved in perfluoromethylcyclohexane to be $(51 \pm 1) \text{ cm}^3 \text{ mol}^{-1}$ at 298.15 K by a dilatometer measurement.			
4. Jolley, J. E.; Hildebrand, J. H. J. Am. Chem. Soc. 1958, 80, 1050.			

COMPONENTS: ORIGINAL MEASUREMENTS: Reeves, L. W.; Hildebrand, J. H. 1. Argon; Ar; 7440-37-1 2. Undecafluoro(trifluoromethyl) -J. Am. Chem. Soc. 1957, 79, 1313-1314 cyclohexane or Perfluoromethylcyclohexane; C<sub>7</sub>F<sub>14</sub>; 355-02-2 VARIABLES: PREPARED BY: T/K: 278.09 - 307.86 P/kPa: 101.325 (1 atm) T. D. Kittredge EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald Coefficient Coefficient  $X_1 \times 10^3$ Τ. α, 278.09 4.8709 0.574 0.584 4.7999 283.06 0.562 0.582 0.582 283.10 4.7965 0.561 288.36 4.7234 0.548 0.579 293.08 4.6625 0.537 0.577 293.17 4.6634 0.537 0.577 293.19 4.6689 0.538 0.578 298.48 4.5962 0.526 0.574 303.16 4.5470 0.517 0.573 307.86 4.4978 0.507 0.572 The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data:  $\Delta G^{\circ}/J \text{ mol}^{-1} = -RT \ln X_1 = -1910.47 + 51.145 T$ Std. dev.  $\Delta G^0 = 1.66$ , Coef. corr. = 0.9999  $\Delta H^{0}/J \text{ mol}^{-1} = -1910.47, \Delta S^{0}/J K^{-1} \text{ mol}^{-1} = -51.145$ This is the recommended equation for the argon + undecafluoro(trifluoromethyl)cyclohexane system. See the evaluation sheet for the system for the recommended values calculated from the equation. AUXILIARY INFORMATION METHOD: SOURCE AND PURITY OF MATERIALS: 1. Argon. Linde Co. Standard grade, 99.9 per cent pure by spectroscopic analysis. 2. Undecafluoro(trifluoromethyl)cyclohexane. Purified by Glew and Reeves (2), distilled through vacuum jacketed column at a reflux ratio of 15:1. Normal boiling point 76.14 °C., density 1.7878 g cm<sup>-3</sup> at 298.15 K. ESTIMATED ERROR: APPARATUS / PROCEDURE :  $\delta T/K = 0.001$  $\delta X_1 / X_1 = 0.001$ The apparatus is a modified version of the apparatus of Cook and Hanson (1). The gas is measured and admitted to the degassed solvent. The appara-**REFERENCES**: tus is shaken for five minutes. The 1. Cook, M. W.; Hanson, D. N. residual gas is measured. The proced-Rev. Sci. Instr. 1957, 28, 370. ure is repeated until the residual gas volume does not change. 2. Glew, D. N.; Reeves, L. W. J. Am. Chem. Soc. 1956, 60, 615.

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Argon Solubilities up to 200 kPa

COMPONENTS:	
3 3	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Clever, H.L.; Saylor, J.H.;
2. Undecafluoro(trifluoromethyl)-	Gross, P.M.
cyclohexane (Perfluoromethyl-	
cyclohexane); $C_7F_{14}$ ; 355-02-2	
7 14, 555 52 2	J. Phys. Chem. 1958, 62, 89-91.
VARIABLES:	PREPARED BY:
T/K: 289.15 - 316.25	
Total P/kPa: 101.325 (1 atm)	P.L. Long
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
	Coefficient Coefficient
$x_{1} \times 10^{3}$	α` L
289.15 4.62	0.538 0.570
303.15 4.34	0.496 0.550
316.25 4.27	0.478 0.553
Smoothed Data: $\Delta G^{O}/J \mod^{-1} = - RT \ln$	Х <sub>1</sub> = -2205.8 + 52.394 т
-	
Std. Dev. $\Delta G^{O} = 29.2$ ,	
$\Delta H^{O}/J \text{ mol}^{-1} = -2205.8$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -52.394$
T/K Mol Fra	action $\Delta G^{O}/J \text{ mol}^{-1}$
x <sub>1</sub> ×	10 <sup>3</sup>
<u></u>	
288.15 4.	60 12,891
293.15 4.	53 13,153
298.15 4.	46 13,415
	40 13,677
308.15 4.1	
318.15 4.	22 14,463
The solubility values were adjusted to	o a partial pressure of argon of
101.325 kPa (1 atm) by Henry's law.	o a parciar probbaro or argon or
	d by the compiler
The Bunsen coefficients were calculate	ed by the compiler.
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
METHOD: Volumeteric. The apparatus (1) is	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both
METHOD: Volumeteric. The apparatus (1) is a modification of that used by	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica-	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades were used.
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man-	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane.</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres-	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with con-</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres-	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled.</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>O</sup> at 753 mm.,</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled.</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>o</sup> at 753 mm.,</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases.	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>o</sup> at 753 mm.,</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>O</sup> at 753 mm., lit. b.p. 76.14 at 760 mm.</li> <li>ESTIMATED ERROR: δT/K = 0.05</li> </ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>O</sup> at 753 mm., lit. b.p. 76.14 at 760 mm.</li> <li>ESTIMATED ERROR:</li></ul>
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent is shaken and evacuated while at-	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., Inc. Both standard and research grades were used.</li> <li>2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with concentrated H<sub>2</sub>SO<sub>4</sub>, washed, dried over Drierite and distilled. b.p. 75.95 to 76.05<sup>O</sup> at 753 mm., lit. b.p. 76.14 at 760 mm.</li> <li>ESTIMATED ERROR: δT/K = 0.05</li> </ul>
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METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent is shaken and evacuated while at- tached to a cold trap, until no bub- bles are seen; solvent is then trans-	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades were used. 2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with con- centrated $H_2SO_4$ , washed, dried over Drierite and distilled. b.p. 75.95 to 76.05° at 753 mm., lit. b.p. 76.14 at 760 mm. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$
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METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent is shaken and evacuated while at- tached to a cold trap, until no bub- bles are seen; solvent is then trans- ferred through a 1 mm capillary tubing, released as a fine mist into a continuously evacuated flask. (b) Solvent is saturated with gas as it flows through 8 mm x 180 cm of tubing	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades were used. 2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with con- centrated $H_2SO_4$ , washed, dried over Drierite and distilled. b.p. 75.95 to 76.05° at 753 mm., lit. b.p. 76.14 at 760 mm. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M. <u>J. Phys. Chem.</u> 1957, <u>61</u> , 1078. 2. Morrison, T.J.; Billett, F.
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent is shaken and evacuated while at- tached to a cold trap, until no bub- bles are seen; solvent is then trans- ferred through a 1 mm capillary tubing, released as a fine mist into a continuously evacuated flask. (b) Solvent is saturated with gas as it flows through 8 mm x 180 cm of tubing attached to a gas buret. Pressure is	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades were used. 2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with con- centrated $H_2SO_4$ , washed, dried over Drierite and distilled. b.p. 75.95 to 76.05° at 753 mm., lit. b.p. 76.14 at 760 mm. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M. J. Phys. Chem. 1957, 61, 1078. 2. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033;
METHOD: Volumeteric. The apparatus (1) is a modification of that used by Morrison and Billett (2). Modifica- tions include the addition of a spiral solvent storage tubing, a man- ometer for constant reference pres- sure, and an extra gas buret for highly soluble gases. APPARATUS/PROCEDURE: (a) Degassing. 700 ml of solvent is shaken and evacuated while at- tached to a cold trap, until no bub- bles are seen; solvent is then trans- ferred through a 1 mm capillary tubing, released as a fine mist into a continuously evacuated flask. (b) Solvent is saturated with gas as it flows through 8 mm x 180 cm of tubing	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc. Both standard and research grades were used. 2. Perfluoromethylcyclohexane. du Pont FCS-326, shaken with con- centrated $H_2SO_4$ , washed, dried over Drierite and distilled. b.p. 75.95 to 76.05° at 753 mm., lit. b.p. 76.14 at 760 mm. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M. <u>J. Phys. Chem.</u> 1957, <u>61</u> , 1078. 2. Morrison, T.J.; Billett, F.

210	Aig	on Solubline	es up to 200 kPa
COMPONENTS:			ORIGINAL MEASUREMENTS:
l. Argon; Ar;	7440-37-1		Hiraoka, H.; Hildebrand, J. H.
2. 1,1,2-Trich ethane or F 76-13-1	loro-1,2,2-tri reon 113; CCl <sub>2</sub>	fluoro- F·CCl <sub>2</sub> F;	<u>J</u> . <u>Phys</u> . <u>Chem</u> . 1964, <u>68</u> , 213-214.
VARIABLES:			PREPARED BY:
Т/К:	273.25 - 298.0 101.325 (1 atm		M. E. Derrick A. L. Cramer
EXPERIMENTAL VALUE	:S:		
-	T/K Mol F	raction	Bunsen Ostwald
			Coefficient Coefficient
		. 34	0.649 0.649
	277.36 3	.28	0.634 0.644
		.185 .14	0.606 0.639 0.593 0.636
		.095	0.580 0.633
- Smoothed Data:	∆G°/J mol <sup>-1</sup> =	- RT ln	$x_1 = -2014.6 + 54.797 T$
	Std. Dev. ∆G°	= 4.2,	Coef. Corr. = 0.9999
	$\Delta H^{o}/J \text{ mol}^{-1} =$	-2014.6,	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -54.797$
	т/к	Mol Frac X <sub>l</sub> x l	$\Delta G^{\circ}/J \text{ mol}^{-1}$
	273.15 278.15 283.15 288.15	3.33 3.28 3.23 3.18	13,227 13,501 13,775
	293.15 298.15	3.14 3.09	14,049 14,323
	<u></u>	AUXILIARY	INFORMATION
METHOD: Saturati with gas near 1 absorbed by lic measurements in	l atm. Volume quid determined	of gas 1 by P-V	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co., passed through cold trap.</li> <li>2. 1,1,2-Trichloro-1,2,2-trifluoro- ethane. Union Carbide Co. Dis-</li> </ul>
			tilled, purity checked by ultra- violet absorbance.
			ESTIMATED ERROR:
APPARATUS/PROCEDU buret and pipe solvent reserve contains a mage confined in pip	t for solution bir used. The netic stirrer.	and pipet Liquid	$\delta T/K = 0.02$ $\delta X_1/X_1 = 0.003$
confined in pi volume is the d volume of pipe cury. The com buret and pipe solvent vapor	difference betw t and volume of nection between t prevents gas	ween f mer- n the	REFERENCES: 1. Kobatake, Y.; Hildebrand, J. H. J. Phys. Chem. 1961, <u>65</u> , 331.

Organic	Compounds	Containing	Halogen

	Or	ganic Compounds	Containing Halogen	ı 211
COMPONENTS :			ORIGINAL MEASUREM	ENTS:
1. Argon; Ar; 7440	-37-1		Linford, R. G.	; Hildebrand, J. H.
2. Benzene; C <sub>6</sub> H <sub>6</sub> ;	71-43-2		J. Phys. Chem.	. 1969, <u>73</u> , 4410 - 4411.
3. 1,1,2-Trichloro ethane or Freon 76-13-1				
VARIABLES:	<u></u>		PREPARED BY:	
T/K: 29 P/kPa: 10 $C_6H_6/X_2$ : 0.	1.325 ()	L atm) 550	т. 1	D. Kittredge
EXPERIMENTAL VALUES:				
	т/к	Benzene Mol Fraction X <sub>2</sub>	Argon Mol Fraction X <sub>1</sub> x 10 <sup>3</sup>	
	298.15	0.0 0.348 0.650 1.000	3.05 <sup>a</sup> 2.22 1.60 0.877 <sup>b</sup>	
a.		a, H.; Hildebr 5. <u>Chem</u> . 1964,		-
b.	Clever		no, R.; Saylor,	, J. H.; Gross, P. M.
		AUXILIARY	INFORMATION	
METHOD:	·		SOURCE AND PURITY	OF MATERIALS.
Saturation of the partial pressure of			1. Argon. Stat	ted to be highest purity by obtainable.
				atheson, Coleman and troquality". Used as
			ethane. Mat	loro-1,2,2-trifluoro- cheson, Coleman and Bell ality", used as received.
			ESTIMATED ERROR:	······································
APPARATUS/PROCEDURE:			$\delta X_1/X_1$	= 0.005
The Dymond-Hildebu which uses an all	-glass p	pumping	T 1	L
system to spray sisolvent into the content of the system o	gas. The	e amount of	REFERENCES :	
gas dissolved is a initial and final	calculat	ed from the	1. Dymond, J.	H.; Hildebrand, J. H. <u>Fundam</u> . 1967, <u>6</u> , 130.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Körösy, F.
2. Trichloromethane or Chloroform; CHCl <sub>3</sub> ; 67-66-3	<u>Trans</u> . <u>Faraday</u> <u>Soc</u> . 1937, <u>33</u> , 416-425.
VARIABLES:	PREPARED BY:
T/K: 295.15	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction $X_1 \times 10^3$	Coefficient Coefficient
295.15 0.592	0.165 0.178
by the compiler.	lubility values were calculated
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
The apparatus and method of Winkler (1 were used. However, the apparatus was usually not thermostated, and degassin was by evacuating and shaking the solvent, not evacuating and boiling th solvent as was done by Winkler.	2. Trichloromethane. No information.
APPARATUS/PROCEDURE:	ESTIMATED ERROR:
	$\delta x_1 / x_1 = 0.05$
	REFERENCES:
	l. Winkler, L. W. Ber. 1891, <u>24</u> , 89.

Organic Compounds	S Containing Halogen 213
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Reeves, L. W.; Hildebrand, J. H.
2. Tetrachloromethane or Carbon tetrachloride; CCl <sub>4</sub> ; 56-23-5	<u>J</u> . <u>Am</u> . <u>Chem</u> . <u>Soc</u> . 1957, <u>79</u> , 1313-1314.
VARIABLES: T/K: 252.98 - 284.29 P/kPa: 101.325 (1 atm)	PREPARED BY: T. D. Kittredge
EXPERIMENTAL VALUES: T/K Mol Fraction X1 x 10 <sup>3</sup>	Bunsen Ostwald Coefficient Coefficient $\alpha$ L
252.98 1.3976 264.18 1.3809 269.83 1.3736 272.65 1.3697 284.29 1.3669	0.341 0.316 0.332 0.321 0.329 0.325 0.326 0.325 0.321 0.334
The Bunsen and Ostwald coefficients we	ere calculated by the compiler.
1	$\Delta S^{0}/J \ K^{-1} \ mol^{-1} = -56.374$ $\frac{13,558}{13,840}$ $14,122$ $14,404$ $14,686$ $14,968$ $15,250$
AUXILIARY	INFORMATION
EVALUATORS NOTE: The data of Reeves and Hildebrand on this sheet are pre- ferred over the data of Graham and Weale on the next page. The Graham and Weale data were not directly measured but extrapolated from high pressure data. Jolley and Hildebrand (2) report the partial molal volume of argon dissol- ved in tetrachloromethane to be (44 ± 1) cm <sup>3</sup> mol <sup>-1</sup> at 298.15 K by a dila- tometer measurement.	2. Tetrachloromethane. Reagent grade. Dried over P <sub>2</sub> O <sub>5</sub> , shaken with Hg, distilled through a vacuum jacketed column at a reflux ratio of 15:1. Nornmal boiling point 76.52 ± 0.05 <sup>O</sup> C., density 1.5845 g cm <sup>-3</sup> at 298.15 K.
APPARATUS/PROCEDURE:	ESTIMATED ERROR: $\delta T/K = 0.001$
The apparatus is a modified version of the apparatus of Cook and Hanson (1). The gas is measured and admitted to the degassed solvent. The apparatus is shaken for five minutes. The residual gas is measured. The procedus is repeated until the residual gas volume does not change.	$\delta X_1 / X_1 = 0.001$

COMPONENTS: ORIGINAL MEASUREMENTS: 1. Argon; Ar; 7440-37-1 Graham, E. B.; Weale, K. E. Progr. Internat. Res. Thermodynamic 2. Tetrachloromethane or Carbon and Transport Properties, Symposium on Thermophysical Properties, 2nd., Princeton, 1962, 153 - 158. Chem. Abstr. 1962, 57, 1616i. tetrachloride; CCl<sub>4</sub>; 56-23-5 VARIABLES: PREPARED BY: T/K: 323.15 - 373.15 P/kPa: 101.325 (1 atm) A. L. Cramer EXPERIMENTAL VALUES: T/K Mol Fraction Bunsen Ostwald  $X_1 \times 10^3$ Coefficient Coefficient L α 323+15 0.31<sub>5</sub> 0.293 1.4 0.37 348.15 1.35 0.373 373.15 1.35 0.284 0.388 The authors measured the solubility at high pressure of 50 to 305 bars. They fitted the solubility to the equation  $S = aP + bP^2$ . The solubility values above were estimated from the equation at a pressure of 1 atm. See page 309 for the high pressure solubility values for the system. The compiler calculated the Bunsen and Ostwald coefficients. Smoothed Data: The combined data of Reeves and Hildebrand (preceding page) and Graham and Weale, except for the 323.15 K value, in a linear regression of Gibbs energy of solution linear in temperature gave the tentative equation for the mole fraction solubility of argon in tetrachloromethane between 248.15 and 373.15 K.  $\Delta G^{0}/J \text{ mol}^{-1} = - RT \ln X_{1} = -183.63 + 55.452 T$ Std. dev.  $\Delta G^0 = 10.6$ , Coef. corr. = 0.9999 The equation based on the Reeves and Hildebrand data alone is preferred. (See preceding page.) AUXILIARY INFORMATION METHOD: SOURCE AND PURITY OF MATERIALS: See the high pressure argon + tetrachloromethane data sheet for details. See page 213 for the Evaluator's note, and a value of the argon partial molal volume in tetrachloromethane. **ESTIMATED ERROR:** APPARATUS / PROCEDURE : **REFERENCES**:

Argon Solubilities up to 200 kPa

Organic Compounds	Containing Halogen 215
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Saylor, J. H.; Battino, R.
2. Fluorobenzene; C <sub>6</sub> H <sub>5</sub> F; 462-06-6	<u>J. Phys</u> . <u>Chem</u> . 1958, <u>62</u> , 1334-1337.
VARIABLES:	PREPARED BY:
T/K: 288.15 - 328.15 P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
x <sub>1</sub> x 10 <sup>3</sup>	Coefficient Coefficient α L
288.15       1.15         298.15       1.15         313.15       1.16         328.15       1.14	0.276 0.291 0.273 0.298 0.270 0.310 0.261 0.313
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	$X_1 = -121.76 + 56.67 \text{ T}$
	Coef. Corr. = 0.9998
$\Delta H^{\circ}/J \text{ mol}^{-1} = -121.76$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -56.67$
T/K Mol Fract	ion AG°/J mol <sup>-1</sup>
$\frac{X_1 \times 10}{2}$	
288.15 1.15 293.15 1.15	16,207 16,490
298.15 1.15	16,774
303.15 1.15 308.15 1.15	17,057 17,340
313.15 1.15	17,624
318.15 1.15	17,907
323.15 1.15 328.15 1.15	18,190 18,474
The solubility values were adjusted t 101.325 kPa (1 atm) by Henry's law.	
The Bunsen coefficients were calculat	ed by the compiler.
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was based on the design by Morrison and Billett (1), and the version used was described by Clever,	grade.
Battino, Saylor, and Gross (2).	2. Fluorobenzene. Eastman White label. Dried over P <sub>4</sub> 0 <sub>10</sub> , dis-
The degassed solvent was passed through a helical glass tube contain- ing the gas. The gas dissolves ra- pidly and the saturated liquid flows into a buret system. The volume of gas dissolved was determined by the	+1110d, b p. 84.28-84.68°C.
increase in the liquid level in the buret system at constant pressure.	ESTIMATED ERROR:
The volume of the solvent was deter- mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$ $\delta X/X = 0.02$
	REFERENCES :
	1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.
	<ol> <li>Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, 61, 1078.</li> </ol>
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216 Argon Solubilitie	5 up to 200 ki u
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Evans, D. F.; Battino, R.
2. Hexafluorobenzene; C <sub>6</sub> F <sub>6</sub> ; 392-56-3	<u>J</u> . <u>Chem</u> . <u>Thermodyn</u> . 1971, <u>3</u> , 753-760.
VARIABLES: T/K: 282.95 - 297.85 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever
EXPERIMENTAL VALUES:	
$\frac{T/K}{x_1 \times 10^3}$	Bunsen Ostwald Coefficient Coefficient α L
282.95 2.465 282.96 2.472	0.488 0.506 0.490 0.508
297.68         2.397           297.75         2.402           297.85         2.401	0.465 0.507 0.466 0.508 0.466 0.508
The Bunsen coefficients were calcula The solubility values were adjusted 101.325 kPa (1 atm) by Henry's law.	to an argon partial pressure of
Std. Dev. $\Delta G^{\circ} = 3.2$ , $\Delta H^{\circ}/J \mod^{-1} = -1331$ . T/K Mol Fr. $\frac{X_1 \times X_2}{278.15}$ 283.15 2. 288.15 2.	49         13,862           47         14,136           44         14,409
298.15 2.	•
<pre>METHOD /APPARATUS/PROCEDURE: The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is de- scribed by Battino, Evans, and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm<sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The liquid is rapidly stirred, and vacuum is intermittently applied through a liquid N, trap until the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is col- lected in a tared flask and weighed.</pre>	<pre>99.995 per cent. 2. Hexafluorobenzene. Imperiel Smelting Co., Avnomouth, U.K. GC purity 99.7%, density,  <sup>ρ</sup>298.15 = 1.60596 g cm<sup>-3</sup> Purification described <u>Anal</u>.</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Saylor, J. H.; Battino, R.
2. Chlorobenzene; C <sub>6</sub> H <sub>5</sub> Cl; 108-90-7	J. Phys. Chem. 1958, 62, 1334-1337.
- -	
11-D7-D7-D2-	
VARIABLES:	PREPARED BY:
T/K: 288.15 - 328.15	H. L. Clever
P/kPa: 101.325 (1 atm)	
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald
$x_1 \times 10^3$	Coefficient α L
$\frac{11}{288.15}$ $\frac{11}{0.864}$	0.191 0.202
298.15 0.852	0.187 0.204
313.15 0.864 328.15 0.882	0.187 0.214 0.187 0.225
Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = -RT \ln I$	
	Coef. Corr. = $0.9997$
	$\frac{\Delta S^{\circ}/J K^{-1} mol^{-1}}{\Delta G^{\circ}/J mol^{-1}} = -57.0$
T/K Mol Frac X <sub>1</sub> × 1	03 03
288.15 0.855	16,925
293.15 0.858	17,210
298.15 0.861 303.15 0.864	17,495 17,780
303.15 0.864 308.15 0.867	18,065
313.15 0.869	18,350
318.15 0.87 <sub>2</sub> 323.15 0.874	18,635 18,920
328.15 0.877	19,205
The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law. The Bunsen coefficients were calculate	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was based on the design by Morrison and Billett(1), and the	<ol> <li>Argon. Matheson Co., Research grade.</li> </ol>
version used was described by Clever,	
Battino, Saylor, and Gross (2).	2. Chlorobenzene. Eastman white label. Dried over P <sub>4</sub> O <sub>10</sub> , dis-
The degassed solvent was passed through a helical glass tube contain- ing the gas. The gas dissolves ra-	tilled, b.p. 131.67 - 131.71 °C.
pidly and the saturated liquid flows into a buret system. The volume of gas dissolved was determined by the	
increase in the liquid level in the buret system at constant pressure.	ESTIMATED ERROR:
The volume of the solvent was deter-	
mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$ $\delta X/X = 0.02$
	REFERENCES :
	1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.
	<ol> <li>Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.</li> </ol>
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	ilities up to 200 kPa	
COMPONENTS: 1. Argon; Ar; 7440-37-1 2. 1,4-Dimethylbenzene ( <u>p</u> -Xylene) C <sub>8</sub> H <sub>10</sub> ; 106-42-3	ORIGINAL MEASUREN Clever, H.L.	ENTS :
<pre>3. 1,4-Dichlorobenzene; C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub>; 106-46-7</pre>	J. Phys. Chem	. 1957, <u>61</u> , 1082-1083.
VARIABLES: T/K: 303.15 P/kPa: 101.325 (1 atm) 1,4-Dichlorobenzene/X <sub>3</sub> : 0-0.455		. Edelman . Cramer
EXPERIMENTAL VALUES:	······	
benzene	caction Bunsen Coeffici α 10 <sup>3</sup> α	Ostwald ent Coefficient L
303.150.1701303.150.3101	25         0.225           17         0.213           09         0.202           02         0.191	0.236 0.224
The mole fraction solubility of ar with the mole fraction of 1,4-dich	on correlates w probenzene in the	ell in a linear function mixed solvent.
$X_1 \times 10^3 = 1.25$	0.511 $X_3$ (r =	0.9992)
The Bunsen coefficients were calcu	ated by the compi	ler.
The Bunsen coefficients were calcu	ated by the compi	ler.
	ated by the compi	ler.
	RY INFORMATION SOURCE AND PURIT 1. Argon. M 2. 1,4-Dimet Kodak whi 3. 1,4-Dichl Kodak whi	

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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Saylor, J. H.; Battino, R.
2. Bromobenzene; C <sub>6</sub> H <sub>5</sub> Br; 108-86-1	J. Phys. Chem. 1958, 62, 1334-1337.
VARIABLES:	PREPARED BY:
T/K: 288.15 - 328.15	H. L. Clever
P/kPa: 101.325 (1 atm)	
EXPERIMENTAL VALUES:	
T/K Mol Fraction	Bunsen Ostwald Coefficient Coefficient
$x_1 \times 10^3$	
288.15 0.675	0.145 0.153
298.15 0.676	0.144 0.157
313.15 0.687	0.144 0.165
328.15 0.710	0.147 0.176
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT$ in	$X_1 = 1,017.2 + 57.2 T$
	Coef. Corr. = 0.9998
$\wedge H^{\circ}/J \mod^{-1} = 1.017.$	2, $\Delta S^{\circ}/J K^{-1} mol^{-1} = -57.2$
T/K Mol Fra	action AG°/J mol <sup>-1</sup>
x <sub>1</sub> x	105
288.15 0.6	
293.15 0.6	
298.15 0.6 303.15 0.6	
308.15 0.6	
313.15 0.6	
318.15 0.69	
323.15 0.7	
328.15 0.70	05 19,798.5
The solubility values were adjusted solubility values were adjusted solution in the solution of the solution o	to a partial pressure of argon gas of
	,
The Bunsen coefficients were calculation	ted by the compiler.
AUXILIA	RY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	L Argen Wetheren Co. Percerah
The apparatus was based on the design by Morrsion and Billett (1), and the	
version used was described by Clever	,
Battino, Saylor, and Gross (2).	2. Bromobenzene. Eastman, white
	label. Dried over P <sub>4</sub> O <sub>10</sub> , dis-
The degassed solvent was passed through a helical glass tube contain-	tilled, b.p. 155.86 - 155.90°C
ing the gas. The gas dissolves ra-	
pidly and the saturated liquid flows	
into a buret system. The volume of	
gas dissolved was determined by the increase in the liquid level in the	
buret system at constant pressure.	ESTIMATED ERROR:
The volume of the solvent was deter-	bm/r = 0.02
mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$
	$\delta X/X = 0.02$
1	REFERENCES :
1	
	1. Morrison, T. J.; Billett, F. J. <u>Chem</u> . <u>Soc</u> . 1948, 2033.
	2. Clever, H. L.; Battino, R.;
	Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u> , 1078.
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<b>L</b>	

COMPONENTS:	
	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; 7440-37-1 2. 1,4-Dimethylbenzene (p-Xylene);</pre>	Clever, H.L.
<pre>2. 1,4-Dimethylbenzene (p-Xylene);         C<sub>8</sub>H<sub>10</sub>; 106-42-3</pre>	T. Dhua, Cham, 1057, 61, 1000, 1000
3. 1,4-Dibromobenzene; C <sub>6</sub> H <sub>4</sub> Br <sub>2</sub> ; 106-37-6	<u>J</u> . <u>Phys</u> . <u>Chem</u> . 1957, <u>61</u> , 1082-1083.
VARIABLES:	PREPARED BY:
T/K: 303.15 P/kPa: 101.325 (1 atm) 1,4-Dibromobenzene/X3: 0 - 0.255	C.E. Edelman A.L. Cramer
EXPERIMENTAL VALUES:	
T/K 1,4-Dibromo- Mol Frac benzene Mol Fraction X <sub>1</sub> X J X <sub>3</sub>	Coefficient Coefficient
303.15 0.0 0.130 0.255 1.01	0.225 0.250 0.203 0.225 0.184 0.204
with the mole fraction of 1,4-dibromob	
$X_1 \times 10^3 = 1.25 - 0.$	942 $X_3$ (r = 0.9993)
The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law.	a partial pressure of argon of
The Bunsen coefficients were calculate	d by the compiler
AUXILIARY	
	INFORMATION
METHOD:	INFORMATION SOURCE AND PURITY OF MATERIALS;
Volumetric. The solvent is satu-	
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of	<ul> <li>SOURCE AND PURITY OF MATERIALS;</li> <li>1. Argon. Matheson Co.</li> <li>2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled.</li> </ul>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to	<pre>SOURCE AND PURITY OF MATERIALS; 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled.</pre>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed.	<ul> <li>SOURCE AND PURITY OF MATERIALS;</li> <li>1. Argon. Matheson Co.</li> <li>2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled.</li> <li>3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol,</li> </ul>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed.	<pre>SOURCE AND PURITY OF MATERIALS; 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol, dried in air. ESTIMATED ERROR:</pre>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett (1). The modifications include the	<pre>SOURCE AND PURITY OF MATERIALS; 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol, dried in air.</pre>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett (1). The modifications include the addition of a helical storage for the	<pre>SOURCE AND PURITY OF MATERIALS; 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol, dried in air. ESTIMATED ERROR:</pre>
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a reference pressure, and an extra buret for highly soluble gases. The solvent is	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol, dried in air. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033;
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is main- tained at 1 atm as the gas is ab- sorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett (1). The modifications include the addition of a helical storage for the solvent, a manometer for a reference pressure, and an extra buret for	SOURCE AND PURITY OF MATERIALS; 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Dibromobenzene. Eastman Kodak white label. Recrystal- lized twice from methanol, dried in air. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T.J.; Billett, F.

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	Containing Halogen 221		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Saylor, J. H.; Battino, R.		
2. Iodobenzene; C <sub>6</sub> H <sub>5</sub> I; 591-50-4	J. Phys. Chem. 1958, 62, 1334-1337		
VARIABLES:	PREPARED BY:		
T/K: 288.15 - 328.15 P/kPa: 101.325 (1 atm)	H. L. Clever		
	L		
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald		
$x_{1} \times 10^{3}$	Coefficient Coefficient α L		
288,15 0,486	0.099 0.104		
298.15 0.497 313.15 0.521	0.100 0.109 0.103 0.118		
328.15 0.560	0.109 0.131		
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = -RT \ln X$			
	Coef. Corr. = 0.9995		
	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -53.786$		
T/K Mol Fracti X <sub>1</sub> x 10 <sup>3</sup>	on $\Delta G^{o}/J mol^{-1}$		
288.15 0.481	18,303		
293.15 0.491	18,572		
298.15 0.500 303.15 0.510	18,841 19,110		
308.15 0.519	19,379		
313.15 0.528	19,648		
318.15 0.537 323.15 0.546	19,917 20,186		
328.15 0.555	20,454		
The solubility values were adjusted to a partial pressure of argon gas of 101.325 kPa (1 atm) by Henry's law.			
The Bunsen coefficients were calculate	d by the compiler.		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus was based on the design by Morrison and Billett (1), and the	<ol> <li>Argon. Matheson Co., Research grade.</li> </ol>		
version used was described by Clever,			
Battino, Saylor, and Gross (2).	2. Iodobenzene. Eastman, white label. Shaken with dil. aq.		
The degassed solvent was passed through a helical glass tube contain-	thiosulfate, washed with water, dried over $P_4O_{10}$ , distilled		
ing the gas. The gas dissolves ra-	$77.40 - 77.60^{\circ}C$ (30 mmHg).		
pidly and the saturated liquid flows	//.40 = //.80°C (30 mmrg).		
into a buret system. The volume of gas dissolved was determined by the			
increase in the liquid level in the			
buret system at constant pressure. The volume of the solvent was deter-	ESTIMATED ERROR:		
mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$		
	$\delta X/X = 0.02$		
	REFERENCES :		
	1. Morrison, T. J.; Billett, F. J. Chem. Soc. 1948, 2033.		
	<ol> <li>Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.</li> </ol>		
L	<u> </u>		

COMPONENTS :			
	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Clever, H.L.		
<pre>2. 1,4-Dimethylbenzene (p-Xylene);</pre>	J. Phys. Chem. 1957, <u>61</u> , 1082-1083.		
<pre>3. 1,4-Diiodobenzene; C<sub>6</sub>H<sub>4</sub>I<sub>2</sub>; 624-38-4</pre>	<u><u><u></u></u>. <u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u>		
VARIABLES:	PREPARED BY:		
T/K: 303.15 P/kPa: 101.325 (1 atm) 1,4-Diiodobenzene/X <sub>3</sub> : 0 - 0.078	C.E. Edelman A.L. Cramer		
EXPERIMENTAL VALUES:			
T/K 1,4-Diiodo- Mol Fract benzene Mol Fraction X <sub>1</sub> × 10 X <sub>3</sub>	- Coefficient Coefficient		
303.15         0.0         1.25           0.078         1.13	0.225 0.250 0.203 0.225		
The solubility values were adjusted to 101.325 kPa (1 atm) by Henry's law. The Bunsen coefficients were calculate	_		
AUXILIARY			
AUXILIARY INFORMATION			
METHOD.			
METHOD: Volumetric. The solvent is satu-	SOURCE AND PURITY OF MATERIALS:		
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of	SOURCE AND PURITY OF MATERIALS:		
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman		
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Matheson Co.</li> <li>2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled.</li> <li>3. 1,4-Diiodobenzene. Eastman Kodak white label. Recrystal- lized twice and dried in air.</li> </ul>		
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett (1). The modifications include the	<pre>SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Diiodobenzene. Eastman Kodak white label. Recrystal- lized twice and dried in air. ESTIMATED ERROR:</pre>		
Volumetric. The solvent is satu- rated with gas as it flows through an 8 mm x 180 cm glass helix attached to a gas buret. The total pressure of solute gas plus solvent vapor is maintained at 1 atm as the gas is absorbed. APPARATUS/PROCEDURE: The apparatus is a modification of the apparatus of Morrison and Billett	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co. 2. 1,4-Dimethylbenzene. Eastman Kodak white label. Distilled. 3. 1,4-Diiodobenzene. Eastman Kodak white label. Recrystal- lized twice and dried in air. ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta P/mmHg = 3$ $\delta X_1/X_1 = 0.03$ REFERENCES: 1. Morrison, T.J.; Billett, F.		

COMPONENTS:	EVALUATOR:
1. Argon; Ar; 7440-37-1 2. Carbon Disulfide; CS <sub>2</sub> ; 75-15-0	H. L. Clever Department of Chemistry Emory University Atlanta, GA 30322 USA June 1979

#### CRITICAL EVALUATION:

Reeves and Hildebrand (1) report values of the solubility of argon in carbon disulfide at one atmosphere and at five temperatures between 253.13 and 298.14 K. Gjaldbaek and Niemann (2) report three values at 298.15 K.

The average of Gjaldbaek and Niemann's three values is 0.4 percent higher than the smoothed data value of Reeves and Hildebrand at 298.15 K. This is well within the limits of experimental error. The eight experimental values from the two papers were used to obtain the tentative thermodynamic values and mole fraction solubilities. Although we have confidence in the data, they are classed as tentative because there is data on the temperature coefficient of solubility from only one laboratory.

The tentative thermodynamic values for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are

 $\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X_{1} = 1875.9 + 57.135 T$ 

Std. Dev.  $\Delta G^{O} = 12.352$ , Coeff. Corr. = 0.99993

 $\Delta H^{O}/J \text{ mol}^{-1} = 1875.9, \Delta S^{O}/J \text{ K}^{-1} \text{ mol}^{-1} = -57.135$ 

The recommended values of the mole fraction solubility at an argon partial pressure of 101.325 kPa and the Gibbs energy of solution are given as a function of temperature in Table 1.

Table 1 Solubility of argon in carbon disulfide at 101.325 kPa. Tentative mole fraction solubility and Gibbs energy of solution as a function of temperature.

т/к	Mol Fraction $x_1 \times 10^3$	∆G <sup>O</sup> /J mol <sup>-1</sup>
253.15	4.251	16,340
258.15 263.15	4.325 4.397	16,625 16,911
268.15	4.468	17,197
273.15 278.15	4.538 4.606	17,482 17,768
283.15	4.672	18,053
288.15 293.15	4.737 4.801	18,339 18,625
298.15	4.863	18,911

1. Reeves, L. W.; Hildebrand, J. H. J. Am. Chem. Soc. 1957, 79, 1313.

2. Gjaldbaek, J. C.; Niemann, H. Acta Chem. Scand. 1958, 12, 611.

Jolley and Hildebrand (3) report the partial molal volume of argon dissolved in carbon disulfide to be  $(45 \pm 1) \text{ cm}^3 \text{ mol}^{-1}$  at 298.15 K by a dilatometer measurement.

3. Jolley, J. E.; Hildebrand, J. H. J. Am. Chem. Soc. 1958, 80, 1050.

Argon Solubilities up to 200 kPa

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Reeves, L. W.; Hildebrand, J. H.	
2. Carbon disulfide; CS <sub>2</sub> ; 75-15-0	J. Am. Chem. Soc. 1957, 79, 1313-1314.	
VARIABLES:	PREPARED BY:	
T/K: 253.13 - 298.14 P/kPa: 101.325 (1 atm)	T. D. Kittredge	
17 KIU. 101.525 (1 UUM)	I. D. Alteredge	
EXPERIMENTAL VALUES: T/K Mol Fraction	Bunsen Ostwald	
$x_1 \times 10^3$	Coefficient Coefficient α L	
253.13 0.4272	0.166 0.154	
262.76 0.4391 273.22 0.4513	0.169 0.163 0.172 0.172	
283.14 0.4654	0.175 0.181	
298.14 0.4866	0.180 0.196	
The Bunsen and Ostwald coefficients w		
Smoothed Data: $\Delta G^{0}/J \text{ mol}^{-1} = -RT \ln J$	$x_1 = 1822.4 + 57.338 T$	
Std. dev. $\Delta G^0 = 8.5$ ,	Coef. corr. 0.9999	
$\Delta H^0/J \text{ mol}^{-1} = 1822.4,$	$\Delta S^{\circ}/J K^{-1} mol^{-1} = -57.338$	
See the evaluation sh	eet on the argon + carbon disulfide	
system for the tentat	ive equation for the system.	
AUXILIARY	INFORMATION	
METHOD	SOURCE AND PURITY OF MATERIALS:	
	1. Argon. Linde Co. Standard grade,	
The apparatus is a modified version of the apparatus of Hanson and Cook	99.9 per cent pure by spectro- . scopic analysis.	
(1). The gas is measured and admitted		
to the degassed solvent. The apparatu is shaken for 5 minutes. The residual	\$2. Carbon disulfide. Reagent grade. Dried over P.O., shaken with Hg.	
gas is measured. The procedure is	Dried over PO5, shaken with Hg, distilled. 25 Density	
repeated until the residual gas volume does not change.	1.2558 g cm <sup>-3</sup> at 298.15 K, normal boiling point 46.41 ± 0.05 <sup>O</sup> C.	
	ESTIMATED ERROR: $\delta T/K = 0.001$	
	$\delta x_1 / x_1 = 0.003$	
	REFERENCES :	
	1. Cook, M. W.; Hanson, D. N. Rev. Sci. Instr. 1957, 28, 370.	
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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Gjaldbaek, J. C.; Niemann, H.
2. Carbon disulfide; CS <sub>2</sub> ; 75-15-0	<u>Acta Chem</u> . <u>Scand</u> . 1958, <u>12</u> , 611 - 614.
VARIABLES:	PREPARED BY:
T/K; 298.15 P/kPa: 101.325 (1 atm)	J. Chr. Gjaldbaek
EXPERIMENTAL VALUES:	
T/K Mol Fract X <sub>1</sub> x 10	
298.15 0.491 0.484 0.486	0.1815 0.1981 0.179 0.195 0.1796 0.1960
AUXILI	ARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A calibrated all-glass combined ma ometer and bulb was enclosed in an air thermostat and shaken until equilibrium. Mercury was used for	n- 1. Argon. "L'air liquid". Dried, less
calibration and as the confining liquid. The solvents were degassed the apparatus. Details are in refe ences 1 and 2.	reagent grade. Distilled, normal in boiling point 46.03 <sup>O</sup> C.
calibration and as the confining liquid. The solvents were degassed the apparatus. Details are in refe	reagent grade. Distilled, normal boiling point 46.03 °C. er-

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226 Argon Solubilities up to 200 kPa			
COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Dymond, J. H.		
<pre>2. Sulfinylbismethane (Dimethyl Sulf- oxide); C<sub>2</sub>H<sub>6</sub>OS (CH<sub>3</sub>SOCH<sub>3</sub>); 67-68-5</pre>	<u>J. Phys. Chem</u> . 1967, <u>71</u> , 1829 - 1831.		
VARIABLES: T/K: 298.15 P/kPa: 101.325 (1 atm)	PREPARED BY: M. E. Derrick		
EXPERIMENTAL VALUES:			
T/K Mol Fraction $X_1 \times 10^3$	Bunsen Ostwald Coefficient Coefficient α L		
298.15 0.154	0.0484 0.0528		
AUXILIARY	INFORMATION		
METHOD:	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 Dymond and Hildebrand (1). The appa- ratus uses an all-glass pumping system to spray slugs of degassed solvent	<ol> <li>Argon. Linde Co. Dried before use.</li> <li>Dimethylsulfoxide. Matheson, Coleman, and Bell Co. Spectroquality reagent. Dried over 4A molecular sieve and a fraction frozen out. Melting point 18.37° C.</li> </ol>		
into the gas. The amount of gas dis- solved is calculated from the initial and final gas pressure.			
	ESTIMATED ERROR:		
	REFERENCES: 1. Dymond, J.; Hildebrand, J. H. <u>Ind. Eng. Chem. Fundam</u> . 1967, <u>6</u> , 130.		

COMPONENTS :		
	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Friedman, H. L.	
2. Nitromethane; CH <sub>3</sub> NO <sub>2</sub> ; 75-52-5	J. Am. Chem. Soc. 1954, 76, 3294-3297	
VARIABLES:	PREPARED BY:	
T/K: 298.00 P/kPa: 98.33 (700 mmHg)	P. L. Long	
EXPERIMENTAL VALUES:		
T/K Mol Fraction	Bunsen Ostwald	
$x_1 \times 10^3$	Coefficient Coefficient	
298.00	0.138 0.146	
0.315	0.146 0.131 0.143 av	
pressure. The Bunsen coefficient and the mole fraction solubility at 101.325 kPa argon pressure (760 mmHg) were calculated by the compiler with the assumptions that the gas is ideal, and that Henry's law is obeyed.		
AUXILIARY	INFORMATION	
AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS;	
	<ol> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Argon. Linde Air Products. Spectrograde.</li> <li>2. Nitromethane. Source not given. Distilled, dried by filtering at 253 K.</li> </ol>	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1	Saylor, J. H.; Battino, R.		
2. Nitrobenzene; C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub> ; 98-95-3	J. Phys. Chem. 1958, 62, 1334-1337.		
VARIABLES:	PREPARED BY:		
T/K: 288.15 - 328.15 P/kPa: 101.325 (1 atm)	H. L. Clever		
EXPERIMENTAL VALUES:			
T/K Mol Fraction	Bunsen Ostwald		
	Coefficient Coefficient α L		
288.15 0.431	0.095 0.100		
298.15 0.439 313.15 0.477	0.096 0.105 0.102 0.117		
328.15 0.483	0.102 0.123		
Smoothed Data: $\Delta G^{\circ}/J \mod^{-1} = - RT \ln$	1		
Std. Dev. $\Delta G^{\circ} = 40.8$ , $\Delta H^{\circ}/J \text{ mol}^{-1} = 2,468.9$ ,	Coef. Corr. = $0.9991$ $\Delta S^{\circ}/J K^{-1} mol^{-1} = -55.9$		
T/K Mol Frac X <sub>1</sub> x 1	tion ∆G°/J mol <sup>-1</sup>		
288.15 0.430	18,571		
293.15 0.438 298.15 0.445	•		
303.15 0.453	19,409		
308.15 0.460 313.15 0.467	•		
318.15 0.474	20,247		
323.15 0.481 328.15 0.488			
The solubility values were adjusted to	a partial pressure of argon gas of		
101.325 kPa (1 atm) by Henry's law. The Bunsen coefficients were calculate	d by the compiler		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus was based on the design by Morrison and Billett (1), and the	1. Argon. Matheson Co., Research grade.		
version used was described by Clever, Battino, Saylor, and Gross (2).	2. Nitrobenzene. Eastman white		
The degassed solvent was passed	label. Distilled from P4010,		
through a helocal glass tube contain-	reduced pressure of 10 mmHg, b.p. 81.0 - 81.2°C.		
ing the gas. The gas dissolves ra- pidly and the saturated liquid flows			
into a buret system. The volume of			
gas dissolved was determined by the increase in the liquid level in the			
buret system at constant pressure.	ESTIMATED ERROR:		
The volume of the solvent was deter- mined in the burets.	$\delta T/K = 0.03$ $\delta P/mmHg = 1$		
	$\delta X/X = 0.02$		
	REFERENCES :		
	1. Morrison, T. J.; Billett, F. J. <u>Chem</u> . <u>Soc</u> 948, 2033.		
	2. Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M.		
	J. Phys. Chem. 1957, 61, 1078.		
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	Or	ganic Compounds	Containing Nitrog	jen	229
COMPONENTS:		ORIGINAL MEASUR	EMENTS:		
1. Argon; Ar; 7	440-37-1		Wood, R. H.	; DeLaney, D.	E.
2. N-Methylacet	amide; C <sub>3</sub>	H <sub>7</sub> NO; 79-16-3	J. Phys. Ch	<u>em</u> . 1968, <u>72</u> ,	4651 <del>-</del> 4654.
VARIABLES :			PREPARED BY:		
T/K: 208.15 - 343.15 P/kPa: 101.325 (l atm)		P. L. Long			
EXPERIMENTAL VALUES	5:				
The authors obta	ined the	equation			
ln X	K₁ = - 399	.4/T - 1.12 li	nT - 0.0278		
	by a linear regression of their experimental data. The equation can be re-			can be re-	
۵G°	= - RT 1n	$x_1 = 399.4R$	+ 1.12 RT ln	T + 0.0278 RT	1
The experimental a thesis (l). T Ar gas and five the paper. The compiler.	he smooth degree in	ed mole fract: tervals betwee	ion argon sol en 308.15 and	ubilities at 343.15 K wer	101.325 kPa e given in
Smoothed Data:	T/K	Mol Fraction $X_1 \times 10^3$	Bunsen Coefficient a	Ostwald Coefficient L	
	308.15 313.15 318.15 323.15 328.15	0.4444 0.4456 0.4466 0.4476 0.44783	0.1289 0.1287 0.1285 0.1285 0.1282 0.1278	0.1455 0.1476 0.1496 0.1517 0.1536	
	333.15 338.15 343.15	0.4490 0.4494 0.4498	0.1275 0.1270 0.1266	0.1555 0.1572 0.1590	
		AUXILIARY	INFORMATION		
METHOD:				ITY OF MATERIALS Source not gi er cent.	S: iven. Purity
			given. in a dry water co	box. Typica	ed three times ally had a 4 mol per cent
			DATA CLASS:		
			ESTIMATED ERRO	R:	
APPARATUS/PROCEDUR connected to a a a three-way cap measured volume	solvent by illary sto	uret through opcock. A	percent.	cuns checked	to within 0.5
to a known volum equilibrium was pressure and vol measured (1). procedure were the solubility	measured volume of gas was transferred to a known volume of solvent; when equilibrium was reached the total pressure and volume of the system was measured (1). The apparatus and procedure were checked by measuring		REFERENCES: 1. DeLaney,	esis, Univers	ity of
the solubility of Ar in $H_2O$ at 298.15 K. The Bunsen coefficient of 0.03105 checked well with the literature (2).		Trans. Fa	, A.; Baer, S araday <u>Soc.</u> 1 54, <u>60</u> , 1736.	963, <u>59</u> , 2735	

COMPONENTS: 1. Argon; Ar; 7440-37-1 2. 1,1,2,2,3,3,4,4,4-Nonaflucro-N,N- bis(nonaflucrobuty1)-1-butanamine or Perflucrotributy1amine; $(C_4F_9)_{3N}$ , 311-89-7 VARLABLES: T/K: 277.65 - 304.98 F/KR1PENTAL VALUES: T/K: 207.65 - 304.98 F/KR1PENTAL VALUES: T/K: MOI Fraction Smoothed Data: $\Delta G^{0}/J$ mol <sup>-1</sup> = -2,097.3 + 51.084 T Std. dev. $\Delta G^{0}$ = 0.7, Coef. corr. = 0.9999 $\Delta H/J$ mol <sup>-1</sup> = -2,097.3 + 51.084 T Std. dev. $\Delta G^{0}$ = 0.7, Coef. corr. = 0.9999 $\Delta H/J$ mol <sup>-1</sup> = -2,097.3 + 51.084 T T/K MoI Fraction Gibbs Energy $X_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MoI Fraction Gibbs Energy $X_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MoI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MoI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MoI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -2,097.3 ( $A_1 \times 10^3$ $A^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $A_1 \times 10^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -20.07 $A_1 / 3, 20^3$ $\Delta G^{0}/J$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Colored AD PURITY OF NATERIALS: $A_1 / B_2 / B_1 / B_1 / B_2 / B_1 / B_1 / B_2 / B_1 / B_1 / B_1 / B_2 / B_1 $	Argon Solubilities up to 200 kPa			
2. $1,1,2,2,3,3,4,4,4$ -Nonafluoro-N,N- bis (nonafluorobuty1)-1-butanamine or Perfluorotributy1anne; $(C_qF_g)_{3N}$ , 311-89-7 VARIABLES: T/K: 277.65 - 304.98 P/KPa: 101.325 (1 atm) ZT/K: Mol Fraction Z77.65 5.322 274.78 5.265 0.312 272.68 5.265 0.321 0.346 272.58 5.265 0.321 0.346 272.58 5.265 0.302 0.346 273.15 5.265 0.306 0.342 The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\Delta G^3/J$ mol <sup>-1</sup> = -2,097.3 + 51.064 T Std. dev. $\Delta G^6 = 0.7$ , Coef. corr. = 0.9999 $\Delta H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ M <sup>-1</sup> mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ M <sup>-1</sup> mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\Delta H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\lambda H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\Delta H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\Delta H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -51.084 $\overline{T/K}$ Mol Fraction Gibbs Energy $\Delta H/J$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -50.094 $\overline{T/K}$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -2,097.3 $\overline{T/K}$ mol <sup>-1</sup> = -2,097.3, $\Delta S^3/J$ mol <sup>-1</sup> = -2,097.5 $\overline{T/K}$ mol <sup>-1</sup>	COMPONENTS:	ORIGINAL MEASUREMENTS:		
bis (nonafluorobuty1)-1-butanamine or Perfluorotributy1amine; $(C_{q}F_{9})_{3}N$ , 311-89-7 VARIABLES: T/K: 277.65 - 304.98 P/KPA: 101.325 (1 atm) EXPERIMENTAL VALUES: T/K MOI Fraction Bunsen Ostwald Coefficient Coefficient X1 x 103 Coefficient Coefficient A1 x 103 Coefficient Coefficie	1. Argon; Ar; 7440-37-1	Kobatake, Y.; Hildebrand, J. H.		
T/K: 277.65 - 304.98 F/KPa: 101.325 (1 atm) EXTERIMENTAL VALUES: T/K MOI Fraction $\frac{x_1 \times 10^3}{277.65}$ 5.322 277.65 5.322 277.65 5.322 284.78 5.205 0.332 0.344 298.74 4.992 0.314 0.343 304.98 4.906 0.306 0.342 The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\Delta^{0'}/J$ mol <sup>-1</sup> = -2,097.3 + 51.084 T Std. dev. $\Delta^{0'}$ = 0.7, Coef. corr. = 0.9999 $\Delta H^3/J$ mol <sup>-1</sup> = -2,097.3 + 51.084 T Std. dev. $\Delta^{0'}$ = 0.7, Coef. corr. = 0.9999 $\Delta H^3/J$ mol <sup>-1</sup> = -2,097.3 , $\Delta^{S'}/J$ K <sup>-1</sup> mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $\Delta^{G^3/J}$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $\Delta^{G^3/J}$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy $\Delta^{G^3/J}$ mol <sup>-1</sup> = -51.084 T/K MOI Fraction Gibbs Energy 293.15 5.200 12,367 298.15 5.210 12,462 293.15 5.201 13,133 303.15 4.932 13,389 309.15 4.866 13,644 METHOD: The apparatus consists of a gas BOURCE AND PURITY OF MATERIALS: 1. Argon. Linde Co. Standard grade, 99.9 per cent. 2. Perfluorotributylamine. Minnesota Mining and Manufacturing Co. Dried fractionated, boiling point 178.5 1.872. FUINDET is sequent from 5 to 30 C. The pipet at any temperature from 5 to 30 C. The pipet contains an iron bar in burst is thermostated at 25 °C, the pipet at any temperature from 5 to 30 C. The pipet contains an iron bar in digit in the pipet of final degassing Manipulation of the apparatus is such that the solvent never comes in con- tact with stoprook grasse. The liquid in the pipet is sealed off by mercury. It wolume is the difference between the caparity of the pipet and the vol- ume of mercury that conflines it. Gas is admitted into the pipet mercury. The volum is the difference between introduction of the gas into the equation the stapped of the preferred. Apparently the solvent sample used in this work was of inferior quality (1). Howell, R. J.	<pre>bis(nonafluorobuty1)-1-butanamine or Perfluorotributylamine;</pre>			
P/kPa: 101.325 (1 atm)M. E. DerrickEXPERIMENTAL VALUES: $\frac{1}{200}$ $\frac{1}{21} \times 10^3$ $\frac{0}{0}$ $\frac{1}{200}$ $\frac{1}{277.65}$ $5.322$ $0.342$ $0.346$ $277.65$ $5.322$ $0.342$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.58$ $5.083$ $0.321$ $0.346$ $292.59$ $4.992$ $0.314$ $0.344$ $304.98$ $4.996$ $0.306$ $0.342$ Std. dev. $\Delta G^9 = 0.7$ , Coef. corr. = $0.9999$ $\Delta H/J$ mol <sup>-1</sup> = $-2,097.3$ , $\Delta S^9/J$ K <sup>-1</sup> mol <sup>-1</sup> = $-51.084$ $T/K$ Mol Fraction Gibbs Energy $\frac{1}{7/K}$ Mol Fraction Gibbs Energy $\frac{1}{273.15}$ $5.315$ $12,677$ $288.15$ $5.230$ $12,677$ $289.15$ $5.001$ $13,133$ $303.15$ $4.966$ $13,644$ AUXILIARY INFORMATIONMETHOD: The apparatus consists of a gasSource and a reservoir for the solvent. The puret is charmostated at 25 °C, the plet at any temperature from 5 to 30C. The pipet contains an iron bain cont is flowed into the pipet is adailed for final degassing fractionated, boiling point 178.5 - 179.0 °C. Density, $\rho/g$ cm <sup>-3</sup> = 1.872.Stitumete the difference between that th	VARIABLES:	PREPARED BY:		
$\frac{T/K  Mol \ Fraction}{x_1 \times 10^3} \qquad \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c}$		C. E. Eddleman		
$\frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient Coefficient}}{a} \xrightarrow{\text{L}} \frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient}} \frac{\text{Coefficient}}{a} \xrightarrow{\text{L}} \frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient}} \frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient}} \frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient}} \frac{x_1 \times 10^3}{a} \xrightarrow{\text{Coefficient}} x $	EXPERIMENTAL VALUES:			
The Bunsen and Ostwald coefficients were calculated by the compiler. Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = -2,097.3 + 51.084 \text{ T}$ Std. dev. $\Delta G^{\circ} = 0.7$ , Coef. corr. = 0.9999 $\Delta H/J \text{ mol}^{-1} = -2,097.3$ , $\Delta S^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1} = -51.084$ $\hline T/K  Mol Fraction  Gibbs Energy \\ \hline X_1 \times 10^3  \Delta G^{\circ}/J \text{ mol}^{-1} = -51.084$ $\hline T/K  Mol Fraction  Gibbs Energy \\ \hline X_1 \times 10^3  \Delta G^{\circ}/J \text{ mol}^{-1} = -51.084$ $\hline T/K  Mol Fraction  Gibbs Energy \\ \hline X_1 \times 10^3  \Delta G^{\circ}/J \text{ mol}^{-1} = -51.084$ $\hline T/K  Mol Fraction  Gibbs Energy \\ \hline X_1 \times 10^3  \Delta G^{\circ}/J \text{ mol}^{-1} = -51.084$ $\hline T/K  Mol Fraction  Gibbs Energy \\ \hline Z73.15  5.404  11,856 \\ \hline Z73.15  5.315  12,121 \\ 283.15  5.301  12,367 \\ 298.15  5.001  13,133 \\ 303.15  4.932  13,369 \\ 308.15  4.866  13,644 \\ \hline MUXILIARY INFORMATION \\\hline METHOD: The apparatus consists of a gas  measuring buret, an absorption pipet, and a reservoir for the solvent. The buret is thermostated at 25 °C, the pipet contains an iron bar in glass for magnetic stirring. The pure solvent is degassed by freezing with 11 any temperature from 5 to 30 °C. The pipet contains an iron bar in glass for magnetic stirring. The pure solvent is flowed into the pipet where solvent is flowed into the pipet where solvent is topcook grease. The liquid introgen, evacuating, then boilt is again boiled for final degassing Mnipulation of the apparatus is such that the solvent never comes in contact with stopcook grease. The liquid in the pipet is sealed off by mercury. Its volume is the difference between the capacity of the pipet and the volume of mercury that conflines it. Gas is admitted into the pipet. Its exact mount is determined by P-V measure-ments in the buret before and after throwchion of the gas into the pipet mercury. The data of Powell (next page) are preferred. Apparently the solvent sample used in this work was of inferior quality (1). The measure of inferior quality (1). The measure of inferior quality (1). The data of Powell (next page) a$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	Coefficient         Coefficient           a         L           0.342         0.348           0.332         0.346           0.321         0.344           0.314         0.343		
$\frac{T/K}{X_1 \times 10^3}$ $\frac{T/K}{X_1 \times 10^3}$ $\frac{X_1 \times 10^3}{\Delta G^0 / J \text{ mol}^{-1}}$ $\frac{X_1 \times 10^3}{288.15 5.315 12,112}$ $\frac{288.15 5.200}{12,623}$ $\frac{298.15 5.001}{303.15 4.932}$ $\frac{13,333}{303.15 4.932}$ $\frac{308.15 4.932}{308.15 4.932}$ $\frac{13,644}{308.15}$ $\frac{X_1 \times 10^9}{308.15 4.866}$ $\frac{13,644}{308.15}$ $\frac{X_1 \times 10^9}{9.9 \text{ per cent.}}$ $\frac{1.47}{9.9.9 \text{ per cent.}}$ $\frac{1.47}{9.9.9 \text{ per cent.}}$ $\frac{2. \text{ Perfluorotributylamine. Minnesota}{Mining and Manufacturing Co. Dried fractionated, boiling point 178.5 - 179.0 \text{ °C. Density, } \rho/\text{ g cm}^{-3} = 1.872.$ $\frac{871MATED ERROR:}{6X_1/X_1 = 0.003}$ $\frac{871/X = 0.02}{6X_1/X_1 = 0.003}$ $\frac{871/X = 0.003}{11}$ $871/X_1 = 0.0$	Smoothed Data: $\Delta G^{\circ}/J \text{ mol}^{-1} = -2,097.3$ Std. dev. $\Delta G^{\circ} = 0.7$ , Co	ere calculated by the compiler. + 51.084 T pef. corr. = 0.9999		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} T/K & Mo1 \ Fraction \\ & & \frac{X_1 \ \times \ 10^3}{273.15} \\ \hline 5.404 \\ 278.15 & 5.315 \\ 283.15 & 5.230 \\ 288.15 & 5.150 \\ \end{array}$	$ \begin{array}{c} \text{Dn} & \text{Gibbs Energy} \\ \Delta G^{\circ}/J & \text{mol}^{-1} \\ \hline & \\ \hline & \\ 11,856 \\ 12,112 \\ 12,367 \\ 12,623 \\ \end{array} $		
measuring buret, an absorption pipet, and a reservoir for the solvent. The buret is thermostated at 25 °C, the pipet at any temperature from 5 to 30 °C. The pipet contains an iron bar in glass for magnetic stirring. The pure solvent is degassed by freezing with liquid nitrogen, evacuating, then boil- ing with a heat lamp. The degassing process is repeated three times. The solvent is flowed into the pipet where it is again boiled for final degassing Manipulation of the apparatus is such that the solvent never comes in con- tact with stopcock grease. The liquid in the pipet is sealed off by mercury. Its volume is the difference between the capacity of the pipet and the vol- ume of mercury that confines it. Gas is admitted into the pipet. Its exact amount is determined by P-V measure- ments in the buret before and after introduction of the gas into the pipet. The stirrer is set in motion. Equili- brium is attained within 24 heure	303.15 4.932 	13,389 13,644		
The stirrer is set in motion. Equili- 1. Powell, R. J.	measuring buret, an absorption pipet, and a reservoir for the solvent. The buret is thermostated at 25 °C, the pipet at any temperature from 5 to 30 °C. The pipet contains an iron bar in glass for magnetic stirring. The pure solvent is degassed by freezing with liquid nitrogen, evacuating, then boil ing with a heat lamp. The degassing process is repeated three times. The solvent is flowed into the pipet where it is again boiled for final degassing Manipulation of the apparatus is such that the solvent never comes in con- tact with stopcock grease. The liquid in the pipet is sealed off by mercury. Its volume is the difference between the capacity of the pipet and the vol- ume of mercury that confines it. Gas is admitted into the pipet. Its exact amount is determined by P-V measure-	<ol> <li>Argon. Linde Co. Standard grade, 99.9 per cent.</li> <li>Perfluorotributylamine. Minnesota Mining and Manufacturing Co. Dried, fractionated, boiling point 178.5 - 179.0 °C. Density, ρ/g cm<sup>-3</sup> = 1.872.</li> <li>ESTIMATED ERROR: δT/K = 0.02 δX<sub>1</sub>/X<sub>1</sub> = 0.003</li> <li>EVALUATION: The data of Powell (next page) are preferred. Apparently the</li> </ol>		
l l	introduction of the gas into the pipet The stirrer is set in motion. Equili-	of inferior quality (1).		

s Containing Nitrogen 23
ORIGINAL MEASUREMENTS:
Powell, R. J.
<u>J. Chem</u> . <u>Eng</u> . <u>Data</u> 1972, <u>17</u> , 302-304.
PREPARED BY: P. L. Long
••••••••••••••••••••••••••••••••••••••
$\begin{array}{rcl} & \text{Ostwald} & \text{N} = & \text{R}\frac{\Delta \log X 1}{\Delta \log T} \\ \text{L} & \text{L} \end{array}$
0.421 -1.54
re calculated by the compiler. measurements were made at temperatures the 298.15 K solubility value was giver Alog T) was given.
were calculated by the compiler from $^{3}$ ) - (1.54/R) log (T/298.15)
ction EVALUATOR'S NOTE: These data are preferred over the data of Kobatake and Hildebrand. See the EVALUATION at the bottom of the preceeding page.
INFORMATION
SOURCE AND PURITY OF MATERIALS:
1. Argon. Source not given. Research grade, dried over CaCl <sub>2</sub> before use
2. 1,1,2,2,3,3,4,4,4-Nonafluoro-N,N- bis(nonafluorobuty1)-1-butanamine. Minnesota Mining & Manufacturing Co. Distilled, used portion boiling between 447.85 - 448.64 K which gave a single GLC peak. ρ <sub>298.15</sub> = 1.880 g cm <sup>-3</sup> .
ESTIMATED ERROR: $\delta X_1/X_1 = 0.002$ $\delta N/cal K^{-1} mol^{-1} = 0.1$ REFERENCES: 1. Dymond, J. H.; Hildebrand, J. H. <u>Ind. Eng. Chem. Fundam. 1967, 6,130</u>

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; 7440-37-1 2. Hydrazine; NH2<sup>NH2</sup>; 302-01-2</pre>	Chang, E. T.; Gokcen, N. A.; Poston, T. M. J. Phys. Chem. 1968, 72, 638 - 642.
	•
VARIABLES:	PREPARED BY:
T/K: 278.15 - 308.18 P/kPa: 92.81 - 215.14 (0.9160 - 2.1233	A. L. Cramer P. L. Long atm)
EXPERIMENTAL VALUES:	
Constant <u> </u>	$ \begin{array}{cccc} \text{Mol Fraction Bunsen Ostwald} \\ \underline{X_1 \times 10^5} & \text{Coefficient Coefficient} \\ \underline{\alpha} & \underline{L} \\ \hline 1.04 & \underline{\alpha} & \underline{L} \end{array} $
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.20 0.97 0.0069 0.0070 1.03
$\frac{1.7985}{1.0}$ $\frac{1.19}{1.16}$	2.13 1.16 0.0082 0.0088
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.44 2.85 1.39 0.0097 0.0109
The Henry's constant is defined The solubility values at one atm constant by the compiler.	m were calculated from the average Henry's
Smoothed Data: The mole fractic bility at 1 atm pressure.	
$\Delta G^{\circ}/J \text{ mol}^{-1} = -RT \ln X_{1}$	278.15         0.96         26,711           288.15         1.10         27,364
= 8553.7 + 65.2787 Std. Dev. ΔG <sup>O</sup> = 26.5,	298.151.2328,016308.151.3828,669
Coef. Corr. = 0.9996 $\Delta H^{\circ}/J \text{ mol}^{-1} = 8553.7, \Delta S^{\circ}/J \text{ k}^{-1}$	
AU.	UXILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
liquid was stirred, and the pres was observed until there was no ther change. Hydrazine did not to decompose with time as did th substituted hydrazines.	catus. 2. Hydrazine. No information on source. It was freshly distilled before use. The density was measured, and fitted to the equation: $\rho/g ml^{-1} = 1.02492 - 0.000865t/C.$
The apparatus was of all glass of struction. It consisted of three calibrated volumes for the measur ment of the gas, a container for solvent, which was stirred with glass enclosed magnet, and a may meter for measuring the pressure a microslide cathetometer. The solvent container had a capacity 100 g of solvent with a 5 ml gas space above the liquid surface. apparatus sections were calibrat	The result of the sure- the sure- $\delta T/K = 0.03$ $\delta P/mmHg = 0.01$ $\delta X_1/X_1 = 0.05$ REFERENCES: 1. Chang, E. T.; Gokcen, N. A. <u>J. Phys. Chem</u> . 1966, <u>70</u> , 2394.
to $\pm$ 0.0002-3 cm <sup>3</sup> (1). There are additional solubility data in the author's other discussions (2,3) the system.	the J. Spacecr. Rockets 1969, 6, 1177.

		Organic Compounds	oomannig	in ogon	233
COMPONENTS :			ORIGINAL MI	EASUREMENTS:	
1. Argon	; Ar; 74	40-37-1		E. T.; Gokcen,	N. A.
<ol> <li>Methylhydrazine; NHCH<sub>3</sub>NH<sub>2</sub>;</li> </ol>		Poston, T. M.			
60-34		me, men <sub>3</sub> m <sub>2</sub> ,	J. Phys	. Chem. 1968, 7	2, 638 - 642.
				<u></u> , <u>_</u>	_,
1					
VARIABLES:	m /11 0	52.24.200.34	PREPARED B		
	T/K: 2	53.24 - 298.14 13.13 - 206.14		P. L. Long A. L. Crame	r
1	(	1.1165 - 2.0344 atm)		III DI CLUMO	-
EXPERIMENT	AL VALUES:				
	P/Atm		l Fractio	n Bunsen	Ostwald
	.,		$x_1 \times 10^5$	Coefficient	
253.24	1.1165	14.91	$\frac{n_1}{16.65}$	<u>` α</u>	L
255.24	2.0127	14.77	29.75		
1	1.0	14.85	14.85	0.0659	0.0611
273.15	1.1685	15.91	18.59		
	$\frac{2.0344}{1.0}$	16.02	32.60		
200.14	1.0	15.97	15.97	0.0694	0.0694
298.14	1.1680 2.0182	17.98 18.04	21.00 36.40		
]	1.0	18.0	18.0	0.0762	0.0832
The Henry		ant is defined where	1 / /		
		ant is defined K/atm <sup>-</sup>			
constant	by the c	lues at 1 atm were ca	lculated	from the averag	e Henry's
Smoothed		ompiter.			
1	-		<u></u> т/к	Mol Fraction	$\Delta G^{O}/J \text{ mol}^{-1}$
∆G <sup>O</sup> /J mol			27 10	$x_1 \times 10^5$	
		4.5 + 62.560 T		<u>1 x 10</u>	·
Std. Dev.	$\Delta G^{O} = 2$	7.0,	258.1		18,884
}	Coef.	Corr. = 0.9998	268.1 278.1		19,510 20,136
∆H <sup>O</sup> /J mol			288.1		20,761
	∆s <sup>o</sup> /J	$\kappa^{-1} \text{ mol}^{-1} = -62.560$	298.1	5 17.9	21,387
			<u> </u>		,
<u> </u>					
		AUXILIARY	INFORMATION	N	
METHOD /APP	ARATUS/PRO	OCEDURE :	SOURCE AND	PURITY OF MATERIA	ALS;
The solv	ent was	degassed under vacuum	1. Argon	. No informati	lon given.
in the p	reviousl	y weighed apparatus.			
Apparatu	s and de Gas wa	gassed solvent were s introduced into the		lhydrazine. So lled prior to u	
apparatu	s at a k	nown P and T, the		$1^{-1} = 0.89338$ -	
liquid .s	tirred,	and the pressure ob-	p/g	T - 0.83338 -	- 0.0009430/ C.
		re was no further rium was established			
		the P was followed			
for 40 m		ituted hydrazines			
		ose with time. For ents the P was fol-			i.
		2 h, and the solu-	ESTIMATED	ERROR:	
		corrected for the		$\delta T/K = ($	.03
gaseous (	-	-		$\delta P/mmHg = 0$	0.01
		s of all Pyrex glass		$\delta X_1 / X_1 = 0$	1.05
		t consisted of three es for the measure-	REFERENCES	S .	
ment of t	the gas,	a container for the		; E. T.; Gokcer	n. N. A.
		as stirred with a	J. Ph	ys. Chem. 1966,	70, 2394.
		agnet, and a mano- roslide cathetometer			
for measu	uring th	e pressure. The solv		iner had a capa	
of solve	ent with	a 5 ml gas space above $1 + 0 + 0 = 0$	e the lig	uid surface.	The apparatus
		alibrated to + 0.0002 l references.	- 3 Cm <sup>3</sup> (	1). See comment	: on page 232

234 Argon Solubilitie	5 up to 200 kra	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Chang, E. T.; Gokcen, N. A. Poston, T. M.	
<pre>2. 1,1-Dimethylhydrazine; N(CH<sub>3</sub>)<sub>2</sub>NH<sub>2</sub>; 57-14-7</pre>	<u>J. Phys</u> . <u>Chem</u> . 1968, <u>72</u> , 638 - 642.	
VARIABLES:	PREPARED BY:	
T/K: 253.05 - 293.16 P/kPa: 97.12 - 201.58 (0.9585 - 1.9894 atm)	P. L. Long A. L. Cramer	
EXPERIMENTAL VALUES:		
Constant	raction Bunsen Ostwald <sub>× 10</sub> 5 Coefficient Coefficient	
$\frac{1}{253.05}  \frac{1}{0.9695}  \frac{1}{64.39}  \frac{1}{62}$	<u>α L</u> 2.43	
1.0 64.38 64	5.2 4.38 0.200 0.185	
1.9894 65.87 131	6.35 1.0 5.87 0.199 0.199	
1.7669 68.75 121	5.84	
	3.73 0.201 0.216	
The Henry's constant is defined as $K/atm^{-1} = X_1/P/atm$ . The solubility values at one atm were calculated from the average Henry's constant by		
the compiler. Smoothed Data: Mole fraction solubility $T/K$ Mol Fraction $\Delta G^{O}/J$ mol <sup>-1</sup> at one atm.		
$\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X_{1}$	$\frac{X_1 \times 10^5}{258.15} - \frac{64.7}{15,760}$	
= 1012.2 + 57.130  T	268.15 65.9 16,332	
Std. Dev. $\Delta G^{\circ} = 16.4$ ,	278.15 67.0 16,903 288.15 68.0 17,474	
Coef. Corr. = 0.9999 $\Delta H^{\circ}/J \text{ mol}^{-1} = 1012.2,$	<u>298.15 68.9 18,046</u>	
$\Delta S^{\circ}/J K^{-1} mol^{-1} = -57.130$		
AUXILIARY	INFORMATION	
METHOD / APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The solvent was degassed under vacuum in the previously weighed apparatus.	1. Argon. No information given.	
Apparatus and degassed solvent were weighed. Gas was introduced into the	2. 1,1-Dimethylhydrazine. Source not given. Distilled just prior to use.	
apparatus at a known P and T, the	Density, $\rho/g ml^{-1} = 0.80980$ -	
liquid stirred, and the pressure observed until there was no further	0.001030 t/°c	
change. Equilibrium was established within 10 m and the P was followed		
for 40 m. Substituted hydrazines		
appear to decompose with time. For decomposing solvents the P was fol-		
lowed for up to 2 h, and the solu-	ESTIMATED ERROR:	
bility value was corrected for the gaseous decomp. prod. The apparatus	$\delta T/K = 0.03$	
was of all Pyrex glass construction. It consisted of three calibrated	$\begin{array}{rcl} \delta P/mmHg &= 0.01\\ \delta X_1/X_1 &= 0.05 \end{array}$	
volumes for the measurement of the		
gas, a container for the solvent, which was stirred with a glass en-	REFERENCES: 1. Chang, E. T.; Gokcen, N. A.	
closed magnet, and a manometer with a microslide cathetometer for meas-	J. Phys. Chem. 1966, 70, 2394.	
uring the pressure. The solvent container had a capacity for 100 g of		
solvent with a 5 ml gas space above the liquid surface. The apparatus sections were calibrated to $\pm$ 0.0002 - 3 cm <sup>3</sup> (1). See comment on page 232 about additional references.		
about additional references.		

i

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>1,2-Dimethylhydrazine; NHCH<sub>3</sub>NHCH<sub>3</sub>; 540-73-8</li> </ol>	Chang, E. T.; Gokcen, N. A. Poston, T. M. <u>J</u> . <u>Phys</u> . <u>Chem</u> . 1968, <u>72</u> , 638-642.	
VARIABLES: T/K: 273.15 - 298.15 P/kPa: 101.325	PREPARED BY: P. L. Long	

#### EXPERIMENTAL VALUES:

The authors made no experimental measurements on this system. The authors do given an estimated Gibbs energy equation for the solution of argon in 1,2-dimethylhydrazine. They used logical assumptions to find a linear relationship between the Gibbs energy of solution of argon in hydrazine, methylhydrazine, and 1,1-dimethylhydrazine as a function of  $1/r^{12}$ , where r is the distance of approach of solvent and solute molecules. The value of r in each solvent was determined from a simple cell model. The linear relationship was extrapolated to obtain the estimated value of the Gibbs energy of solution of argon in 1,2-dimethylhydrazine. The estimated equation is

 $\Delta G^{O}/cal mol^{-1} = -RT ln K/atm^{-1} = 720 + 9.05 T$ 

where K is the Henry's constant defined as  $K/atm^{-1} = X_1/P$ . The pressure is in atm. The mole fraction solubilities at 101.325 kPa (1 atm) tabulated below were calculated from the equation by the compiler.

T/K	Henry's Constant K x 10 <sup>5</sup>	Mol Fraction X <sub>1</sub> x 10 <sup>5</sup>
273.15	279	279
278.15	286	286
283.15	293	293
288.15	299	299
293.15	306	306
298.15	312	312

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Estimated data, see above.	
	i
	ESTIMATED ERROR:
	REFERENCES:

236	6 Argon Solubilities up to 200 kPa				
COMPONEN	COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Argon; Ar; 7440-37-1		Chang, E. T.; Gokce	n, N. A.		
2. Hydrazine; NH <sub>2</sub> NH <sub>2</sub> ; 302-01-2		<u>J. Phys</u> . <u>Chem</u> . 1968	, <u>72</u> , 2556-2562.		
3. 1, 57	l-Dimethylhydra -14-7	zine; N(CH <sub>3</sub> ) <sub>2</sub> NH <sub>2</sub> ;			
VARIABLE		· · · · · · · · · · · · · · · · · · ·	PREPARED BY:		
	P/kPa: 50.66	5 - 303.15 - 253.31 - 2.5 atm)	P. L. L	ong	
EXPERIME	INTAL VALUES:			····	
	Mol Fraction	Gibbs Energy	Henry's Constant	Mol Fraction	
	l,l-Dimethyl- hydrazine/X <sub>2</sub>	$\Delta G^{O}/cal mol^{-1} =$	$K/atm^{-1} = X_1/P/atm$	$x_1 \times 10^5$	
	inyurazine/x <sub>3</sub>	-RT ln K/atm <sup>-1</sup>	K x 10 <sup>5</sup> at 288.15K		
	0.0	2040 + 15.61 T*	1.10	1.10	
	0.1	1490 + 15.6 T 1080 + 15.6 T	2.89 5.91	2.89 5.91	
	0.3	1080 + 15.6 T 810 + 15.5 T		9.96	
	0.4	730 + 15.1 T	14.0	14.0	
	0.5	700 + 14.5 T		20.0	
	0.6 0.7	640 + 14.1 T 560 + 13.9 T	27.1 34.5	27.1 34.5	
	0.8	470 + 13.8 T	42.4	42.4	
	0.9	360 + 13.7 T	54.1	54.1	
	1.0	240 + 13.67 T*	67.7	67.7	
temp The pres 288. ener The	The Gibbs energy equation was fitted to data taken in the 273.15 - 303.15K temperature range. The Henry's constant is based on data measured over the 0.5 - 2.5 atm pressure range. The value in the Table above is the Henry's constant at 288.15 K. Values at other temperatures can be calculated from the Gibbs energy equation. The mole fraction solubility at 288.15 K and 101.325 kPa (1 atm) was				
	ulated by the c		INFORMATION		
METHOD /APPARATUS/PROCEDURE: The solvent was degassed under vacuum in the previously weighed apparatus. Apparatus and degassed solvent were weighed. Gas was introduced into the apparatus at a known P and T, the liquid stirred, and the pressure observed until there was no further change. Equilibrium was established within 10 m and the P was followed for 40 m. Substituted hydrazines appear to decompose with time. For decomposing solvents the P was fol- lowed for up to 2 h, and the solu-		were not given. The refractive index of	y of the materials density and the solvent compo- their mixtures ents were freshly		
bility value was corrected for the gaseous decomp. product. The apparatus was of all Pyrex glass construction. It consisted of three calibrated volumes for the measure- ment of the gas, a container for the solvent, which was stirred with a glass enclosed magnet, and a mano- meter with a microslide cathetometer for measuring the pressure. The solvent container had a capacity for 100 g of solvent with a 5 ml gas		δP/mmHg δX1/X1 REFERENCES: <ol> <li>Chang, E. T.; Gok</li> <li>Phys. Chem. 19</li> </ol> The apparatus section	= 0.05 cen, N. A. 66, <u>70</u> , 2394. ns were cali-		
solven 100 g	for measuring the pressure. The solvent container had a capacity for 100 g of solvent with a 5 ml gas space above the liquid surface.		The apparatus sectio brated to $\pm$ 0.0002 -	ns were cali- 3 cm <sup>3</sup> (1).	

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COMPONENTS:       ORIGINAL MEASUREMENTS:         1. Argon; Ar; 7440-37-1       Chang, E. T.; Gokcen, N. A.         2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6       J. Phys. Chem. 1966, 70, 2394-         VARIABLES:       T/K: 262.02 - 303.16         Ar P/kPa: 36.29 - 193.33       P. L. Long         (0.3582 - 1.908 atm)       A. L. Cramer	-2399.				
2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6 UARIABLES: T/K: 262.02 - 303.16 Ar P/kPa: 36.29 - 193.33 (0.3582 - 1.908 atm) PREPARED BY: P. L. Long A. L. Cramer	-2399.				
VARIABLES: T/K: 262.02 - 303.16 Ar P/kPa: 36.29 - 193.33 (0.3582 - 1.908 atm) PREPARED BY: P. L. Long A. L. Cramer	-2399.				
T/K: 262.02 - 303.16 Ar P/kPa: 36.29 - 193.33 (0.3582 - 1.908 atm) P. L. Long A. L. Cramer					
T/K: 262.02 - 303.16 Ar P/kPa: 36.29 - 193.33 (0.3582 - 1.908 atm) P. L. Long A. L. Cramer					
Ar P/kPa: 36.29 - 193.33 (0.3582 - 1.908 atm) A. L. Cramer					
EXPERIMENTAL VALUES:					
T/K P/Atm Henry's Constant Mol Fraction Bunsen Ostwal K $\times 10^4$ X $\times 10^3$ Coefficient Coefficient L					
262.02 0.7110 8.69 0.618					
1.2670 8.81 1.116					
1.5162 8.76 1.328					
1.8037     8.79     1.585       1.908     8.82     1.683					
$\frac{1.503}{1.0}$ $\frac{3.32}{0.877}$ $\frac{1.033}{0.324}$ $0.313$	ī				
273.15 0.3582 9.05 0.324	-				
0.5702 9.03 0.515					
0.6879 9.14 0.629					
0.9366 9.08 0.850					
<u>1.8425 9.10 1.676</u>					
1.0 0.908 0.330 0.330	)				
298.15 0.3801 9.92 0.377					
0.4158 9.81 0.408					
0.4897 9.80 0.480					
0.6340 9.81 0.622					
0.8037 9.88 0.794 0.9912 9.81 0.972					
1.1053 9.85 1.089					
1.0 0.984 0.344 0.376	5				
303.16 0.4470 9.89 0.442					
0.5912 9.90 0.585					
1.0 0.989 0.343 0.381	1				
The solubility values at 1.0 atm argon pressure were calculated by the compiler from the average Henry's constant. The authors define the Henry's constant, $K/atm^{-1} = X_1/P$ . Smoothed Data: Mole Fraction solubility at 1.0 atm argon pressure.	16				
$\Delta G^{O}/J \text{ mol}^{-1} = -RT \ln X_{1} = 1999.5 + 50.900 T$					
Std. Dev. $\Delta G^{O} = 8.9$ , Coef. Corr. = 0.9999					
$\Delta H^{O}/J \text{ mol}^{-1} = 1999.5, \Delta S^{O}/J K^{-1} \text{ mol}^{-1} = -50.900.$					
T/K Mol Fraction $\Delta G^{O}/J \text{ mol}^{-1}$					
$x_1 \times 10^3$					
263.15 0.880 15,394					
273.15 0.910 15,903					
283.15 0.938 16,412					
293.15 0.966 16,921					
298.15 0.979 17,175 303.15 0.993 17,430					
	to				
The mole fraction solubility at 1 atm argon pressure would be equal 1 Henry's constant.					

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Argon Solubilities up to 200 kPa

COMPORENTS:       ORIGINAL MEADERMENTS:         1. Argon; Ar; 7440-37-1       Chang, E. T.; Gokcen, N. A.         2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6       J. <u>Phys. Chem. 1966, 70</u> , 2394-2399.         VARIABLES:       7/K: 262.02 - 303.16 Ar P/Ar2: 36.29 - 193.33 (0.3562 - 1.906 atm)       PREPARED EY:         FFERMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         MSIIIOD/APPARATUS/PROCEDURES:       Source AND PURITY OF MATERIALS; 1. Argon. No source given.         The solvent was degassed under vacuum in the proviously weighed apparatus. Apparatus and degassed solvent was digas enclosed angert, and a mano- meter for measuring the pressure oth- served util there was of all glass con- struction. It consisted of three of the gaparatus was of all glass con- struction. It consisted of three solvent which was stirred with a nicroslide cathcherenter. The solvent container had a capacity for 100 g of Solvent with a 5 ml gas space above the liquid surface. The solvent container had a capacity for 100 g of solvent with a 5 ml gas space above the liquid surface. The solvent container had a capacity for 100 g of solvent with a 5 ml gas space above the liquid surface. The solvent container had a capacity for 100 g of solvent with a 5 ml gas	1. Argon; Ar; 7440-37-1       Chang, E. T.; Gokcen, N. A.         2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6       J. Phys. Chem. 1966, 70, 2394-2399.         VARIABLES: T/K: 262.02 - 303.16 Ar P/KP: 36.29 - 193.33 (0.3522 - 1.908 atm)       PREPARED BY: P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         METHOD/APPARATUS/PROCEDURE: The solvent was degassed under vacuum in the provisuly weighed apparatus. Apparatus and degassed solvent were weighed. Gas was introduced into the apparatus sta a Known P and T, the plaqued satic there was followed for 40 m.       Source AND FURITY OF MATERIALS: 1. Argon. No source given.         National the P was followed for 40 m.       Source AND FURITY OF MATERIALS: 1. Argon. No source given.         Phys. Chem. 1966, 70, 2394-2399.       Source and Precedent Paratus and degassed under vacuum apparatus sta chown P and T, the solvent, which was tirred with a glass enclosed magnet, and a mano- meter for the measuring the pressure the glowent container had a capacity for 100 g of solvent ignid a Starge. The solvent, which was tirred with a glass enclosed magnet, and a mano- meter for measuring the pressure whithe a librated volumes for the measure- meter for measuring the pressure where solvent, which was tirred with a glass enclosed magnet, and a capacity for 100 g of solvent ignid a Starge. The solvent, container had capacity for 100 g of solvent ignid a Starge. The solvent, container had capacity for 100 g of solvent ignid a Starge. The solvent, container had capacity for 100 g of solvent ignid a Starge. The solvent, container had capacity for 100 g of solvent ignid a Starge. The solvent, container had capacity		•		
2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6 J. <u>Phys. Chem</u> . 1966, <u>TO</u> , 2394-2399. VARIABLES: T/K: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3562 - 1.906 atm) EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION AUXILIARY INFORMATION AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: The solvent was degassed under vacuum in the previously weighed apparatus. Apparatus and degassed solven were weighed. Gas was introduced into the apparatus was of all glass con- struction. It consisted of three change. Eguilibrium was established for 40 m. The apparatus was of all glass con- struction. It consisted of three change. Eguilibrium was established for 40 m. The apparatus was of all glass con- struction. It consisted of three change. Eguilibrium was established for 40 m. The apparatus was of all glass con- struction. It consisted of three change. Solvent winch was furted with a glass enclosed magnet, and a marco- ment of the gas, a container for the solvent. which was trired with a glass enclosed magnet, and a marco- ment of object with a 5 ml gas pape above the liquid sufface. The apparatus sections, were calibrated Solvent. which was settred with a solvent. Which was three with a Solvent. Which was t	2. Nitrogen Oxide; N <sub>2</sub> O <sub>4</sub> ; 10544-72-6 VARIABLES: T/K: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.908 atm) EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION MUSICAL PARAMETERS See preceeding page. AUXILIARY INFORMATION MUSICAL PARAMETERS See preceeding page. AUXILIARY INFORMATION NUTROD/APPARATOS/PROCEDURE:	COMPONENTS:	ORIGINAL MEASUREMENTS:		
VARIABLES: T/K: 262.02 - 303.16 Ar P/K: 262.02 - 303.16 (0.3382 - 1.908 atm) EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION METROD/APPARATUS/PROCEDURE: The solvent was degased under vacuum in the previously weighed apparatus. Apparatus and degased solvent were weighed. Gas was introduced into the paparatus and degased solvent were weighed. Gas was introduced into the paparatus was of all glass con- struction. It consisted of three is paparatus was of all glass con- struction. It consisted of three is anicrositide cathetometer. The solvent container had a capacity for (0.9 of solvent with a 5 ml gas space above the liquid surface. The apparatus sections were calibrated NETRENCES: 1. Chang, E. T., Goken, N. A.; postor, T. W. J. Spaceer. Rockets 1969, 6, 1177.	VARIALES:       PREPARED BY:         YK: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.906 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.       See preceeding page.         METHOD/APPARATUS/PROCEDURE:       No Source given.         The appentus and degassed under vacuum explants and degassed solvent were weighed. Gas was introduced into the liquid stirred, and the pressure ob- served until there was no further change. Eguilibrium was established for 40 m.       Nitrogen Oxide. Source not given.         FM apparatus was of all glass con- struction. It consisted of three calibrated volumes of the measure- met of the gas, a container for the glass enclosed magnet, and a mano- meter for measuring the pressure with a flores above the liquid surface. The polvent, which was settred with a glass enclosed magnet, and a mano- meter for measuring the pressure with a flore above the liquid surface. The polvent, which was were calibrated to $\pm 0.0002 - 3$ cm <sup>3</sup> .       EFERENCES: 1. Chang, E. T., Gokcen, N. A.; Spaceor. Rockets 1969, G. 1177.	1. Argon; Ar; 7440-37-1	Chang, E. T.; Gokcen, N. A.		
VARIABLES: T/K: 262.02 - 303.16 Ar P/Ka: 36.25 - 193.33 (0.3532 - 1.908 atm) EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION EXPERIMENTAL VALUES: See preceeding page. AUXILIARY INFORMATION NETROD/APPARATUS/PROCEDURE: The solvent was degased under vacuum in the previously weighed apparatus. Apparatus and degased solvent were weighed. Gas was introduced into the paparatus and degased solvent were weighed. Gas was introduced into the respect of the gas, a construction in the previously weighed apparatus. Auxiliary interview of the pressure ob- lestrud string on the pressure ob- lestrud thil there was of all glass con- struction. It consisted of three solvent container had a capacity for folds contendent. The solvent container had a capacity for 100 g of solvent with a 5 ml gas space above the liquid surface. The apparatus sections, were calibrated EXTIMATED ERROR: EXTIMATED ERROR: EXTIMATED ERROR: $EXTIMATED ERROR:EXTIMATED ERROR:$	VARIALES:       PREPARED BY:         YK: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.906 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.       See preceeding page.         METHOD/APPARATUS/PROCEDURE:       No Source given.         The appentus and degassed under vacuum explants and degassed solvent were weighed. Gas was introduced into the liquid stirred, and the pressure ob- served until there was no further change. Eguilibrium was established for 40 m.       Nitrogen Oxide. Source not given.         FM apparatus was of all glass con- struction. It consisted of three calibrated volumes of the measure- met of the gas, a container for the glass enclosed magnet, and a mano- meter for measuring the pressure with a flores above the liquid surface. The polvent, which was settred with a glass enclosed magnet, and a mano- meter for measuring the pressure with a flore above the liquid surface. The polvent, which was were calibrated to $\pm 0.0002 - 3$ cm <sup>3</sup> .       EFERENCES: 1. Chang, E. T., Gokcen, N. A.; Spaceor. Rockets 1969, G. 1177.	2. Nilas non Ordilas, N.O 10544, 72. (	7 Dhung Cham 1000 70 2204 2200		
T/K: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.       See preceeding page.         MILLIARY INFORMATION       See preceeding page.         METHOD /APPARATUS/PROCEDURE:       Source and the pressure ob- served until there was no further change. Eguilibrized and the pressure ob- served until there was followed for 40 m.       Source AND FURITY OF MATERIALS: 1. Argon. No source given.         The apparatus was of all glass con- metr of the gas, a container for the solvent, which was stirred with a microsiole cathoremeter. The solvent container had a capacity for 100 g of solvent with a 5 mil gas space above the liquid surface. The solvent sections, were calibrated       Source not 30 (CT/K = 0.03 (CT/K = 0.	T/K: 262.02 - 103.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.         AUXILIANY INFORMATION         See preceeding page.         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         SUBLEX INFORMATION FUNCTION FU	2. Nitrogen Oxide; $N_2O_4$ ; 10544-72-6	<u>J. Phys. Chem</u> . 1966, <u>70</u> , 2394-2399.		
T/K: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.       See preceeding page.         MILLIARY INFORMATION       See preceeding page.         METHOD /APPARATUS/PROCEDURE:       Source and the pressure ob- served until there was no further change. Eguilibrized and the pressure ob- served until there was followed for 40 m.       Source AND FURITY OF MATERIALS:         The apparatus was of all glass con- metr of the gas, a container for the solvent, which was stirred with a microsile cathetometer. The solvent container had a capacity for 100 g of solvent with a 5 mil gas space above the liquid surface. The solvent sections, were calibrated       Source and the pressure with a microsile cathetometer. The solvent sections, were calibrated	T/K: 262.02 - 103.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.         AUXILIANY INFORMATION         See preceeding page.         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         SUBLEX INFORMATION FUNCTION FU				
T/K: 262.02 - 303.16 Ar P/KPa: 36.29 - 193.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.       See preceeding page.         MILLIARY INFORMATION       See preceeding page.         METHOD /APPARATUS/PROCEDURE:       Source and the pressure ob- served until there was no further change. Eguilibrized and the pressure ob- served until there was followed for 40 m.       Source AND FURITY OF MATERIALS:         The apparatus was of all glass con- metr of the gas, a container for the solvent, which was stirred with a microsile cathetometer. The solvent container had a capacity for 100 g of solvent with a 5 mil gas space above the liquid surface. The solvent sections, were calibrated       Source and the pressure with a microsile cathetometer. The solvent sections, were calibrated	T/K: 262.02 - 103.33 (0.3582 - 1.908 atm)       P. L. Long A. L. Cramer         EXPERIMENTAL VALUES:       See preceeding page.         See preceeding page.         AUXILIANY INFORMATION         See preceeding page.         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         MULLIANY INFORMATION         See preceeding page.         MULLIANY INFORMATION         SUBLEX INFORMATION FUNCTION FU				
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	- 2. Gokcen, N. A.; Chang, E. T.		<u>J. Spacecr. ROCKETS</u> 1969, <u>6</u> , 1177.		
	T Chem Ed 1077 54 360		2. Gokcen, N. A.; Chang. E. T.		
T Chom Ed 1077 54 269	<u>5. Chem. Ed.</u> 1777, <u>54</u> , 508.		J. Chem. Ed. 1977, 54, 368.		

COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Argon; Ar;		Wilcock, R.J.; McHale, J.L.;			
TI DEGONI DEJ			, B.; Wilhelm, E.		
2 Octomothylayaloto	magilovano.	Battino	, b., willeim, b.		
2. Octamethylcycloted		Divid Dhama	Travility 1070 0 005 000		
C <sub>8</sub> H <sub>24</sub> O <sub>4</sub> Si <sub>4</sub> ; 556-67	/-2	Fluid Phase	Equilib.1978, 2, 225-230		
0 2					
		1			
VARIABLES:		PREPARED BY:			
т/к: 292.15 ·	- 313.17				
		н н	.L. Clever		
P/kPa: 101.325	(1 atm)				
EXPERIMENTAL VALUES:					
EXPERIMENTAL VALUES: T/K	Mol Fraction	Bunsen	Ostwald		
	$x_1 \times 10^3$	Coefficient	Coefficient		
	^1 <sup>× 10</sup>	α	L		
		t			
292.1	5 4.817	0.3499	0.3742		
292.1		0.3519	0.3764		
298.6		0.3456	0.3779		
			0.3807		
313.1	7 4.689	0.3321	0.3807		
The solubility values	were adjusted t	o a gas parti.	al pressure of 101.325		
kPa by Henry's law.					
		ad her the err	nilon		
The Bunsen coefficien					
Smoothed Data: $\Delta G^O/J$	$mol^{-1} = -RT \ln$	$X_{-} = -1.084.2$	+ 48.040 T		
Std. 1	Dev. $\Delta G^{O} = 6.5$ ,	Coef. Corr. =	0.9999		
∆H°∕J	$mol^{-1} = -1.084.$	2, ∆S <sup>-</sup> /J K <sup>-</sup>	mol = -48.040		
	T/K Mol Fr	action $\Delta G^O/J$	mol		
	x <sub>1</sub> x	: 10 <sup>3</sup>			
		827 13	,000		
	298.15 4.	791 13,240			
		757 13,480			
		723 13,720			
			,961		
	515.15 4.	572 15	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
·····	·····				
	ΔΗΥΤΙΤΑΡΥ	INFORMATION			
	AUXILIANI	INFORMATION			
METHOD/APPARATUS/PROCED	URE:	COURCE AND DUDI	TY OF MATERIALS:		
The apparatus is b	ased on the de-	1. Argon. Matheson Co., Inc.			
sign of Morrison and	Billett (1), and	l Minimum	per cent purity 99.995.		
the version used is d			• • •		
Battino, Evans, and D		2. Octamet	hylcyclotetrasiloxane.		
The demonstration property	un and procedure				
The degassing apparatus and procedure					
are described by Battino, Banzhof,			at 298.15 K was 0.9500		
Bogan, and Wilhelm (3).		g cm <sup>-3</sup> .			
Degassing. Up to 500 cm of sol-		g cm.			
vent is placed in a flask of such					
size that the liquid is about 4 cm		1			
deep. The liquid is	ranidly stirred				
reeb. The Trdata 18	intormittonti.	1			
and vacuum is applied	THEETHTEEHEIT				
through a liquid N2 t	rap until the	ESTIMATED ERROR:			
permanent gas residua		$\delta T/K = 0.03$			
			· ·		
drops to 5 microns.	nation Mha 2-	$\delta P/mmHg = 0.5$			
Solubility Determination. The de- gassed solvent is passed in a thin film down a glass spiral tube con-		[ X <sup>0</sup>	$x_1 = 0.01$		
		۔ ۱			
		REFERENCES;	······································		
taining the solute ga	s plus the sol-		m.T .Billott P		
vent vapor at a total pressure of			T.J.;Billett,F.		
one atm The volume of gas absorbed			Soc. 1948, 2033.		
one atm. The volume of gas absorbed		2.Battino, H	R.;Evans,F.D.;Danforth,W.H		
is found by difference between the		J.Am.Oil	Chem.Soc. 1968, 45, 830.		
initial and final volumes in the		3.Battino	R.; Banzhof, M.; Bogan, M.;		
buret system. The solvent is col-					
lected in a tared flask and weighed.					
lected in a tared fla	sk and weighed.	Wilhelm, H			
lected in a tared fla	sk and weighed.		<u>em</u> . 1971, <u>43</u> , 806.		

Argon Solubilities up to 200 kPa

COMPONENTS: ORIGINAL MEASUREMENTS: Singleton, J. H.; Halsey, G. D. Jr. 1. Argon; Ar; 7440-37-1 J. Phys. Chem. 1954, 58, 1011 - 1017. 2. Krypton; Kr; 7439-90-9 VARIABLES: PREPARED BY: т/к: 77.  $(P/P^{O})_{Ar}: 0 - 0.8$ H. L. Clever EXPERIMENTAL VALUES: The "solubility" of argon in bulk krypton was measured at 77 K and at 18 values of  $(P/P^O)$  of argon between 0.1 and 0.8. PO is the vapor pressure of argon at 77 K. The results were fitted to the equation  $(P/P^{O})_{Ar} = X_{Ar} \exp\{(w/kT)X_{Ar}^{2}\} = X_{Ar} \exp\{1.32 X_{Ar}^{2}\}$  where  $X_{Ar}$  is the mole fraction solubility of argon. The value of w/kT = 1.32 was from the average of four experiments at the lowest argon pressure. The extreme values of w/kT ranged from 1.20 to 1.60. Figure 5 in the paper compares the experimental and calculated values. AUXILIARY INFORMATION METHOD: SOURCE AND PURITY OF MATERIALS: Both 3 and 11  $\text{cm}^3$  samples of krypton 1. Argon. Air Reduction Co. 99.9 per were used. The argon was "condensed" cent argon. in at various pressures. The estab-2. Krypton. No information given. lishment of equilibrium was found to be very slow, and was incomplete in 12 hours. There is some question as to whether or not true equilibrium was attained. Many other experiments were carried out on the absorption of agon on predeposited layers of krypton and xenon (1) on various solid surfaces. **ESTIMATED ERROR:** APPARATUS / PROCEDURE : **REFERENCES**: 1. Singleton, J. H.; Halsey, G. D. Jr. J. Phys. Chem. 1954, 58, 330.

COMPONENTS :	EVALUATOR:
1. Argon; Ar; 7440-37-1	H. L. Clever
2. Olive Oil	Department of Chemistry Emory University Atlanta, GA 30322 U. S. A.
	June 1979

## CRITICAL EVALUATION:

The solubility of argon in olive oil at 101.325 kPa (1 atm) argon pressure was measured at temperatures of 295.15 and 310.15 K by Lawrence, Loomis, Tobias and Turpin (1), at 311.15 K by Behnke and Yarbrough (2), and at temperatures of 297.91, 307.84, 318.36 and 327.51 K by Battino, Evans and Danforth (3).

The work of Battino et al. appears to be the most reliable. They gave special attention to degassing and to the establishment of equilibrium in the solubility measurement. Thus the tentative values of the thermodynamics of the transfer of one mole of argon gas at 101.325 kPa to the hypothetical unit mole fraction solution and the tentative solubility values are based entirely on the data of Battino, et al.

The olive oil was assumed to have a molecular weight of 884 on the basis of an NMR study (1). This agrees well with the molecular weight of 885.46 of 1,2,3-propane-triyl ester of Z-9-octadecenoic acid or triolein which is assumed to be the principle component of olive oil. The density of the olive oil used by Battino, et al. has a density  $\rho/g$  cm<sup>-3</sup> = 0.9152 - 0.000468t/°C.

The tentative values of the thermodynamic changes for the transfer of one mole of argon from the gas at 101.325 kPa (1 atm) to the hypothetical unit mole fraction solution are:

 $\Delta G^{\circ}/J \text{ mol}^{-1} = - RT \ln X_1 = -1727.0 + 48.382 T$ 

Std. Dev. ∆G° = 2.5, Coef. Corr. = 0.9999

 $\Delta H^{\circ}/J \text{ mol}^{-1} = -1727.0, \quad \Delta S^{\circ}/J \text{ K}^{-1} \text{ mol}^{-1} = -48.382$ 

A table of the tentative mol fraction solubility and Gibbs energy values as a function of temperature appears below.

The solubility of argon in olive oil. The tentative values of the Table 1. mole fraction solubility at an argon partial pressure of 101.325 kPa (1 atm) and the Gibbs energy change as a function of temperature.

T/K	Mol Fraction $X_1 \times 10^3$	∆G°/J mol-l
293.15	6.03	12,456
298.15	5.96	12,698
	• · ·	
303.15	5.89	12,940
308.15	5.83	13,182
313.15	5.77	13,424
318.15	5.71	13,666
323.15	5.65	13,908
	5,59	
328.15	5.59	14,150

The solubility values determined by both Lawrence, et al., and Behnke and Yarbrough are 5 to 8 percent higher than the tentative recommended values.

- 1. Lawrence, J. H.; Loomis, W. F.; Tobias, C. A.; Turpin, F. H. J. Physiol. 1946, 105, 197.
- Behnke, A. R.; Yarbrough, O. D., Am. J. Physiol. 1939, 126, 409. Battino, R.; Evans, F. D.; Danforth, W. F. J. Am. Oil Chem. Soc. 1968, 2.
- З. 45, 830.
- 4. Johnson, L. F.; Shoolery, J. N. Anal. Chem. 1962, 34, 1136.

Argon Solubilities up to 200 kPa				
COMPONENTS :	ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1	Behnke, A. R.; Yarbrough, O. D.			
2. Olive Oil	<u>Am</u> . <u>J</u> . <u>Physiol</u> . 1939, <u>126</u> , 409 - 415.			
VARIABLES: T/K: 311.15 P/kPa: 101.325 (1 atm)	PREPARED BY: P. L. Long			
EXPERIMENTAL VALUES:				
	Bunsen Ostwald efficient Coefficient $\alpha$ L			
311.15 6.09	0.1395 0.1589			
The mole fraction solubility and Ostw the compiler.	ald coefficient were calculated by			
The molecular weight of olive oil was calculated from the equation $\rho/g$ cm <sup>-3</sup> fraction calculation (1).	taken to be 885 and the density was = 0.9152 - 0.000468t/ <sup>o</sup> C for the mole			
See the evaluation sheet for the argo information.	n + olive oil system for more			
AUXILIARY	INFORMATION			
METHOD:	SOURCE AND PURITY OF MATERIALS:			
Gas-liquid equilibrium was establishe at 311.15 K by bubbling argon through the olive oil.	41. Argon. Source not given. 86 per			
	2. Olive Oil. No information given.			
APPARATUS/PROCEDURE:	ESTIMATED ERROR:			
After establishment of equilibrium the gas was extracted from the sat- urated solution in vacuo by repeated shaking in a Van Slyke apparatus.The	REFERENCES :			
procedure and calculations were similar to those developed by Van Slyke (2). Nitrogen corrections were made.	<pre>1. Battino, R.; Evans, F. D.; Danforth, W. F. J. Am. Oil Chem.Soc. 1968,45, 830.</pre>			
	<ol> <li>Van Slyke, D. D.; Dillon, R. T.; Margaria, R. J. <u>Biol</u>. <u>Chem</u>. 1934, 105, 571.</li> </ol>			

COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1 2. Olive Oil	Lawrence, J. H.; Loomis, W. F.; Tobias, C. A.; Turpin, F. H. J. <u>Physiol</u> . 1946, <u>105</u> , 197 - 204.	
VARIABLES: T/K: 295.15 - 310.15 P/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever A. L. Cramer	

EXPERIMENTAL VALUES:

т/к	Mol Fraction $X_1 \times 10^3$	Bunsen Coefficient	Ostwald Coefficient L
295.15	6.5	0.15	0.16
310.15	6.1	0.14	0.16

The mole fraction solubilities and the Ostwald coefficients were calculated by the compiler.

The molecular weight of the olive oil was taken to be 885 and the density was calculated from the equation  $\rho/g \text{ cm}^{-3} = 0.9152 - 0.000468t/^{\circ}C$  for the mole fraction calculation (1).

See the evaluation sheet for the argon + olive oil system for more information.

AUXILIARY	INFORMATION
Me Thod:	SOURCE AND PURITY OF MATERIALS:
Radiochemical method. No details of the method were given, but the authors state that they used an isotope of argon with a half life of 110 minutes. Possibly the isotope was argon-41.	No information given.
	DATA CLASS:
	· · · · ·
APPARATUS/PROCEDURE:	ESTIMATED ERROR:
	$\delta \alpha / \alpha = 0.05$ (Compiler)
	REFERENCES :
	<pre>1. Battino, R.; Evans, F. D. Danforth, W. F. J. <u>Am. Oil Chem. Soc</u>. 1968, <u>45</u>, 830.</pre>

14		Argon Solubil	ities up to 200 kPa	3
OMPONENTS :			ORIGINAL MEAS	UREMENTS:
l. Argon; Ar;	7440-37-	1	Battino, R Danforth	.; Evans, F. D.;
2. Olive Oil				•
			J. <u>Am. Oil</u> 830-833.	<u>Chem. Soc. 1968, 45</u> ,
VARIABLES :			PREPARED BY:	
	297.91 - 101.325 (			H. L. Clever A. L. Cramer
XPERIMENTAL VALU	ES:			
	т/к	Mol Fraction	Bunsen Coefficient	Ostwald
		X <sub>1</sub> x 10 <sup>3</sup>	a	L
	297.91	5.96	0.1366	0.1490
	307.84	5.84	0.1332	
	318.36	5.70	0.129 <sub>1</sub>	0.1505
	327.51	5.60	0.1263	0.1514
he solubility Pa (1 atm) by he Bunsen coef Smoothed Data:	Henry's 1 ficients	aw. were calculat	ed by the com	-
moothed Data:			*	
	Std. Dev	$\Delta G^{\circ} = 2.5,$	Coef. Corr.	= 0.9999
ee the evaluation				for the recommended Gibbs

## AUXILIARY INFORMATION

METHOD: The apparatus is based on the design by Morrison and Billett (1)	SOURCE AND PURITY OF MATERIALS: 1. Argon. Matheson Co., Inc.
and the version used is a modification of the apparatus of Clever, Battino,	99.9995 Min. Vol % Purity.
Saylor and Gross (2).	<ol> <li>Olive Oil. A. U.S.P. Fisher Scientific Co., 0.58% free fatty acid.</li> </ol>
APPARATUS/PROCEDURE: Degassing. The solvent is sprayed into an evacua- ted chamber of an all glass apparatus; it is stirred and heated until the pressure drops to the vapor pressure of the liquid. Solubility Determina-	B. Nutritional Biochemicals Corp. 0.30% free fatty acid. The den- sity was measured and fitted to the equation $\rho/g \text{ cm}^{-3} = 0.9152 -$ 0.000468t/C. The average mol wt is 884 ± 45.
tion. The degassed liquid passes in a thin film down a glass spiral tube at a total pressure of one atm of sol- ute gas plus solvent vapor. The gas absorbed is measured in the attached buret system, and the solvent is col-	ESTIMATED ERROR: $\delta T/K = 0.03$ $\delta P/mmHg = 0.5$ $\delta X_1/X_1 = 0.03$
lected in a tared flask and weighed.	REFERENCES:
	1. Morrison, T. J.; Billett, F. <u>J. Chem. Soc</u> . 1948, 2033.
	<ol> <li>Clever, H. L.; Battino, R.; Saylor, J. H.; Gross, P. M. J. Phys. Chem. 1957, <u>61</u>, 1078.</li> </ol>

		mobolianooc		Juan	g Biological Flui		245
COMPONE	NTS:			ORIG	INAL MEASUREME	NTS:	
1. Arg	Jon; Ar; 744(	0-37-1		Shł	col'nikova, 1	R. I.	
Į	cer; H <sub>2</sub> 0: 773	32-18-5		Uch Sei	1. Zap. Leniı . Khim. Naul	ngr. <u>Gos. Un:</u> c. 1959, <u>18</u> ,	<u>iv</u> . 64 - 86.
3. Ge:	latin			Che	em. <u>Abstr</u> . 19	961, <u>55</u> , 254	43b.
VARIABL	ES:			PREP	ARED BY:		
Ge		283.15 - 313 101.325 1 - 10	3.15		A. L	. Cramer	
EXPERIM	ENTAL VALUES:		······································		<u> </u>	<u></u>	
Т/К	Gelatin/ 1	wt %	Gelatin	/ 5	wt 8	Gelatin/ 1	) wt %
-/	Bunsen	Ostwald	Bunsen		Ostwald	Bunsen	Ostwald
	Coefficient	Coefficient L x 10 <sup>3</sup>	Coeffici a x 10	ent	Coefficient L x 10 <sup>3</sup>		
283.15	33.1	34.3	28.4		29.5	24.8	25.7
288.15	29.4	31.0	25.9		26.9	22.2	23.4
293.15	25.2	27.0	23.2		25.0	19.6	21.1
298.15	22.2	24.2	20.4		22.3	17.3	18.9
303.15	19.4	21.5	17.2		19.0	15.3	17.0
808.15	16.2	18.3	14.1		15.9	13.1	14.8
B13.15	13.6	15.6	12.8		14.7	10.9	12.5
	in the p	es for the s paper.					<b>,</b>
			AUXILIARY	INFO	RMATION		
METHOD				SOUL	RCE AND PURITY	OF MATERIALS:	
				1.	Argon. 99.9 cent N <sub>2</sub> .	per cent Ar	, 0.1 per
ADDADA				EST	IMATED ERROR:	<u></u>	<u></u>
The ap	IUS/PROCEDURE: pparatus and .ed Lannung (	procedure we	ere				
				<b></b>			<u></u>
					ERENCES:		
				1.	Lannung, A. J. <u>Am</u> . <u>Chem</u>	. <u>Soc</u> . 1930,	<u>52</u> , 68.
							,
L				1			

COMPONEN	ΤC.					
{	13: (on; Ar; 7440)	-37-1		ORIGINAL MEASUF Shkol'nikov		
}						
	er; H <sub>2</sub> 0; 773	2-18-5		Khim. Nauk.	<u>eningr</u> . <u>Gos. U</u> 1959, Nr. 18,	$\frac{110.}{64} - \frac{5er}{86.}$
3. Ova	lbumin			Chem. Abstr	. 1961, <u>55</u> , 25	443b.
					, <u></u> ,	
VARIABLE		283. 15 - 3	313.15	PREPARED BY:		
0175		101.325 ()	l atm)		A. L. Cramer	
			<i></i>		·····	
	NTAL VALUES:	575 Q	Ovelhu		Ovalbumin	(2.02.8
т/к -	Bunsen	Ostwald	Bunser		d Bunsen	Ostwald
	Coefficient ( a x 10 <sup>3</sup>	L x 10 <sup>3</sup>	Coeffic: a x l	Lent Coefficion $L \times 10^3$	ent Coefficien <sup>3</sup> a x 10 <sup>3</sup>	t Coefficient L x 10 <sup>3</sup>
283.15	36.4	38.1	33.2	34.4	30.8	31.9
288.15	34.9	36.8	31.0			29.6
293.15	32.0	34.3	30.9			29.7
298.15	28.4	31.0	27.1	29.6	25.2	27.5
303.15	26.5 25.3	29.4 28.5	24.1 22.3		20.9 19.2	23.2 21.6
313.15	23.4	26.8	21.2	24.3	16.7	19.1
	<u> </u>		AUXILIARY	INFORMATION		
METHOD/A	PPARATUS/PRO	CEDURE:		SOURCE AND PURI	TY OF MATERIALS:	
Modific	ations of the	e apparatus	and	1. Argon 99	.9 percent arg	on, and
	re of Lannung			0.1 perc	ent nitrogen.	
				ESTIMATED ERROR	R:	
ł						
				REFERENCES :		
				1. Lannung,	А.	
				<u>J. Am. C</u>	hem. Soc. 1930	, <u>52</u> , 68.

| | | |

Miscellaneous	Fluids	Including	<b>Biological</b>	Fluids
	1 14140	nie aan g	million ground	iaiao

		IVIISCEIIAIIEOUS FI	ulas ind	របបរករ្	Biological Fluids		247
COMPONENTS:				ORIG	NAL MEASUREMENTS	5:	
1. Argon;	; Ar; 7440-3	7-1		Sł	kol'nikova, R	. I.	
2. Water	; H <sub>2</sub> O; 7732-	18-5		Uc Se	h. Zap. Lenin er. Khim. Nauk	<u>gr. Gos. Univ</u> . 1959, Nr. 1	8, 64-86
3. Serum	Albumin		i		em. Abstr. 19		
VARIABLES:	т/к:	202 15 21	2 1 5	PREP	ARED BY:		
Serum All	P/kPa: bumin/Wt %:	101.325 (1	atm)		A. L.	Cramer	
EXPERIMENTA	L VALUES:				<u> </u>		
-	T/K	Buns	en Coe	effic	ient, $\alpha \times 10^3$	· · · · · · · · · · · · · · · · · · ·	
		0.575 wt %	1.15	wt 9	<u>1.68 wt %</u>	1.99 wt %	
ł	283.15 288.15	32.2 28.9	29.4 27.3		26.5 24.8	24.4 21.8	
	293.15	28.2	24.2		24.8	19.4	
	298.15	25.1	20.9		19.2 14.0	18.0 12.8	
ł	303.15 308.15	22.3 20.9	16.		13.5	12.1	
	313.15	19.4	15.3		12.4	11.0	}
	T/K	Ostw			icient, L x 10	3	
	<del></del>	0.575 wt %	1.15	wt	1.68 wt %	1.99 wt %	
	283.15 288.15	33.4 30.5	30. 28.		27.5 26.2	25.3 23.0	
	293.15	30.2	26.	0	22.6	20.8	
	298.15	27.4	22.		20.9	19.7	
	303.15 308.15	24.7 23.6	20. 18.		15.5 15.2	14.2 13.6	
	313.15	22.2	17.		14.2	12.6	-
icient of 4340, 527 albumin s	E the Bunsen 70, and 607 solutions, r	coefficient 0 cal mol-1 espectively. gon in water	, are for 0. is no	2110 575, ot gi	lated from th cal mol <sup>-1</sup> in l.115, l.68, ven in the pa	water, and 3 and 1.99 wt	410.
 			ILIARY		MATION		
METHOD /AP	PARATUS/PROC	CEDURE:		SOUR	CE AND PURITY OF	MATERIALS:	
Modificat procedure	ions of the of Lannung	apparatus an (1) are used	nd 1.	1.	Argon. 99.9 0.1 percent r		a, and
				ESTI	MATED ERROR:		
1							
				REFI	CRENCES :		
				1.	Lannung, A. J. <u>Am</u> . <u>Chem</u> .	<u>Soc</u> . 1930, <u>5</u>	2, 68.
L				<u> </u>	······		]

Argon Solubilities up to 200 kPa ORIGINAL MEASU

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Byrne, J. E.; Battino, R.; Danforth, W. F.
2. Benzene; C <sub>6</sub> H <sub>6</sub> ; 71-43-2	
3. Cephalin	J. <u>Chem</u> . <u>Thermodyn</u> . 1974, <u>6</u> , 245-250.
VARIABLES:	PREPARED BY:
т/к: 310.65	FREFARED DI;
Total P/kPa: 101.325 (1 atm)	H. L. Clever
EXPERIMENTAL VALUES:	
	vald "Salting Out" Parameter
Cephalin Coeffi Wa I	$k = (1/W_{\star}) \log (I_{\star}/I_{\star})$
	2545 2544
310.61 0.1995 0.2 310.62 0.1995 0.2	229 0.24 <u>+</u> 0.05
310.65 1.0 0.1	46*
*Extrapolated argon solubilit	y in hypothetical liquid cephalin.
L and L are the argon Ostwa	ald coefficients in benzene and in
the benzene + cephalin solution	
	INFORMATION
METHOD / APPARATUS / PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
The solubility apparatus is based on the design of Morrison and Billett	1. Argon. Matheson Co., Inc.
(1) and the version used is described	99.995 per cent.
by Battino, Evans and Danforth (2). The degassing apparatus is that	<ol> <li>Benzene. J. T. Baker Analyzed Reagent Grade. 99.9 mol per cent,</li> </ol>
described by Battino, Banzhof, Bogan,	thiophene free.
and Wilhelm (3).	3. Cephalin. Nutritional Biochemicals
Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size	Corp. Homostatic phosphatide
that the liquid is about 4 cm deep.	Corpt nomed during Final
The liquid is rapidly stirred, and vacuum is intermittently applied	obtained from bovine brain tissue,
through a liquid nitrogen trap until	obtained from bovine brain tissue, used as received.
	obtained from bovine brain tissue, used as received. ESTIMATED ERROR:
the permanent gas residual pressure drops to 5 microns.	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHq = 0.5$
the permanent gas residual pressure	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_0/L_0 = 0.01$
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_O/L_O = 0.01$ $\delta L_W/L_W = 0.02$
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_O/L_O = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES:
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm.	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_O/L_O = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033.
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_0/L_0 = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F.D.; Danforth, W.F.
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and final volumes in the buret system.	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_O/L_O = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F.D.; Danforth, W.F. J. Am. Oil Chem.Soc. 1968, 45, 830. 3. Battino, R.; Banzhof, M.; Bogan, M.;
the permanent gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm. The volume of gas absorbed is found by difference between the initial and	obtained from bovine brain tissue, used as received. ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_0/L_0 = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES: 1. Morrison, T.J.; Billett, F. J. Chem. Soc. 1948, 2033. 2. Battino, R.; Evans, F.D.; Danforth, W.F. J. Am. Oil Chem.Soc. 1968, 45, 830.

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COMPONENTS :			ORIGINAL MEASUREMENTS:
1. Argon; Ar; 744	0-37-1		Byrne, J. E.; Battino, R.;
2. Benzene; C <sub>6</sub> H <sub>6</sub> ;	71-43-2		Danforth, W. F.
3. Cholest-5-en-3 C <sub>27</sub> H <sub>46</sub> O; 57-88		erol;	<u>J</u> . <u>Chem</u> . <u>Thermodyn</u> . 1974, <u>6</u> , 245-250.
VARIABLES:			PREPARED BY:
T/K: 31	0.65 1.325 (l atm)		H. L. Clever
i/kiu. iu	1.525 (1 atm)		
EXPERIMENTAL VALUES:			
T/K	Mass Fraction		twald "Salting Out" Parameter
	Cholesterol <sup>W</sup> 3		ficient $k = (1/W_3) \log (L_0/L_W)$
310.64	0.0	0.2	2545 –
310.69	0.0	0.2	2544
310.62	0.0525	0.2	251

0.247

0.252

0.241

0.237

0.143\*

 $0.15 \pm 0.16$ 

0.25 ± 0.09

310.62

310.63

310.62

310.62

310.65

0.0521

0.0521

0.1065

0.1065

1.0

*Extrapolated argon solubility in hypothetical liquid choleterol	*;	Extrapolated	argon	solubility	in	hypothetical	liquid	choleterol.
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 ${\tt L}_{\rm p}$  and  ${\tt L}_{\rm w}$  are the argon Ostwald coefficients in benzene and in the benzene + cholesterol solution, respectively.

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus is based on the design of Morrison and Billett (1) and the version used is described by Battino, Evans and Danforth (2). The degassing apparatus is that described by Battino, Banzhof, Bogan, and Wilhelm (3). Degassing. Up to 500 cm <sup>3</sup> of solvent is placed in a flask of such size that the liquid is about 4 cm deep. The	<ul> <li>99.995 per cent.</li> <li>2. Benzene. J. T. Baker Analyzed Reagent Grade. 99.9 mol per cent, thiophene free.</li> <li>3. Cholesterol. Source not given.</li> </ul>
liquid is rapidly stirred, and vacuum is intermittently applied through a	
liquid nitrogen trap until the perm- ament gas residual pressure drops to 5 microns. Solubility Determination. The de- gassed solvent is passed in a thin film down a glass helical tube con- taining solute gas plus the solvent vapor at a total pressure of one atm.	ESTIMATED ERROR: $\delta T/K = 0.01$ $\delta P/mmHg = 0.5$ $\delta L_0/L_0 = 0.01$ $\delta L_W/L_W = 0.02$ REFERENCES:
The volume of gas absorbed is found by difference between the initial and final volumes in the buret system. The solvent is collected in a tared flask and weighed.	2.Battino, R.; Evans, F.D.; Danforth, W.F.

COMPONENT		Argon Solul	lities up to 200 kPa
	S:	······	ORIGINAL MEASUREMENTS:
1	n; Ar; 7440		Byrne, J. E.; Battino, R.; Danforth, W. F.
2. Benz	ene; C <sub>6</sub> H <sub>6</sub> ;	71-43-2	J. Chem. Thermodyn. 1974, 6, 245-250.
3. Leci	thin		
VARIABLES	:	<u> </u>	PREPARED BY:
Tota	T/K: 31 1 P/kPa: 1	0.65 01.325 (l atm)	H. L. Clever
EXPERIMEN	TAL VALUES:	······	·····
	T/K M		stwald "Salting Out" Parameter fficient $k = (1/W_3) \log (L_0/L_w)$
	310.64 310.69	0.0 0.0	0.2545 0.2544
	310.64 310.65	0.2004 0.2004	0.223 0.228 0.26 <u>+</u> 0.05
	310.65	1.0	0.140*
			twald coefficients in benzene and in ution, respectively.
		AUXILI	
METHOD / Z	APPARATUS/PI		RY INFORMATION SOURCE AND PURITY OF MATERIALS:
The sol the des (1) and by Bath The ded descrift and Will Degass is place	lubility app sign of Morn d the versic tino, Evans gassing appa bed by Batt: Lhelm (3). ing. Up to ced in a fla		<pre>SOURCE AND PURITY OF MATERIALS: n 1. Argon. Matheson Co., Inc. 99.995 per cent. ed 2. Benzene. J. T. Baker Analyzed Reagent Grade. 99.9 mol per cent, thiophene free. t 3. Lecithin. Nutritional Biochemicals Corp. Vegetable source, about 95 rest word source, about 95</pre>

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Steen, J. B.
2. Eel Blood	<u>Acta Physiol. Scand</u> . 1963, <u>58</u> , 124 - 137.
VARIABLES :	PREPARED BY:
T/K: 279.65 P/kPa: 101.325 (1 atm)	A. L. Cramer
EXPERIMENTAL VALUES:	
T/K pH Range Number of Determinat	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.70 - 3.73       3.72         3.89 - 4.01       3.93
*Volume per cent argon at 1 atr	n argon.
AUXILIARY	INFORMATION
METHOD:	SOURCE AND PURITY OF MATERIALS:
Blood equilibrated with pure argon or	
with argon + oxygen mixtures. A	
tonometer was constructed. The gas	2. Eel Blood. Blood from female eels kept in running fresh water before
was presaturated with water vapor by bubbling through a isotonic NaCl	heart puncture.
solution. The content of N2 and Ar	1 · · · ·
was estimated by the method of Edwards, Scholander, and Roughton (1,	
2).	
	ESTIMATED ERROR:
2). APPARATUS/PROCEDURE:	$\delta T/K = 1$
2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for	$\delta T/K = 1$
<pre>2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is around 8.5 for eels kept in fresh</pre>	δ <b>τ/</b> κ = 1
<pre>2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is</pre>	$\delta T/K = 1$ REFERENCES:
2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is around 8.5 for eels kept in fresh water about one month. The pH of the eel blood was lowered	<pre>δT/K = 1 REFERENCES: 1. Roughton, F. J. W.; Scholander, P.I</pre>
<pre>2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is around 8.5 for eels kept in fresh water about one month. The pH of the eel blood was lowered by the addition of lactic acid. At</pre>	δT/K = 1 REFERENCES: 1. Roughton, F. J. W.; Scholander, P.I J. <u>Biol</u> . <u>Chem</u> . 1943, <u>148</u> , 541, 573
<pre>2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is around 8.5 for eels kept in fresh water about one month. The pH of the eel blood was lowered by the addition of lactic acid. At a pH of 7.5 - 7.7 there is a sudden significant decrease in the solubility</pre>	δT/K = 1 REFERENCES: <ol> <li>Roughton, F. J. W.; Scholander, P.I. J. <u>Biol</u>. <u>Chem</u>. 1943, <u>148</u>, 541, 573</li> <li>Edwards, G. A.; Scholander, P. F.</li> </ol>
<pre>2). APPARATUS/PROCEDURE: The normal pH of eel blood is 7.5 for freshly caught individuals, and it is around 8.5 for eels kept in fresh water about one month. The pH of the eel blood was lowered by the addition of lactic acid. At a pH of 7.5 - 7.7 there is a sudden</pre>	δT/K = 1 REFERENCES: <ol> <li>Roughton, F. J. W.; Scholander, P.I.</li> <li><u>J. Biol. Chem</u>. 1943, <u>148</u>, 541, 573</li> <li>Diversity G. D. Scholander, P. F.</li> </ol>

# ARGON SOLUBILITIES ABOVE 200 kPa (2 BAR)

General Remarks for High Pressure Solubility Studies on Mixtures Containing Argon

C. L. Young, August 1978

In view of the number of studies on the solubility of argon in liquids at or near atmospheric pressure, the relatively low cost and widespread availability of argon, it is surprising that there are so few detailed studies of the solubility of argon in liquids at high pressure. Almost half of the systems covered in this section were studied nearly forty years ago and then only at one or two temperatures and one or two pressures. It is only in a very few cases, possible to give a critical evaluation of the available data.

All the data of Sisskind and Kasarnowsky (1,2) must be classified as tentative, but it should be pointed out that this classification is based on the authors' claims regarding precision and not on any direct comparison with other workers' data. It is possible to compare Sisskind and Kasarnowsky (1,2) results with the data at lower pressures (atmospheric) of other workers, assuming the mole fraction solubility is a linear function of pressure. Such comparisons would indicate that Sisskind and Kasarnowsky data are probably too large; however, in view of the nature of the assumption involved, this conclusion should be treated with caution.

Argon + Carbon Tetrachloride Argon + n-Octane Argon + 2,2,4-Trimethylpentane Argon + Tetradecafluoroheptane

These systems have been studied by Graham and Weale (3) and are classified as tentative on the basis of other systems reported in the original publication where comparison with other data is possible. There appears to be no other high pressure data on these systems.

Argon + Chlorodifluoromethane

The data of Nohka *et al*. (4) appear to be self-consistent and in the absence of evidence to the contrary appear to be reasonably accurate. The data are therefore classified as tentative.

Argon + Carbon Dioxide

There are two sets of data (5,6) on this system, both from the same group. In the absence of any other data with which these results can be compared, we classify them as tentative.

Argon + Carbon Monoxide

The data of Christiansen  $et \ al$ . (7) are classified as tentative. Other data from this group appears to be of good accuracy where comparison with different workers is possible.

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The two sets of data on this system cover different ranges of
temperature and pressure so that comparison is difficult.
that the mole fraction solubility data of Eckert and Prausnitz (8)
extrapolated to 115.5 K is slightly greater than that of Elshayal and Lu
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(9) at that temperature.

Argon + Ethane

Argon + Propene

This system has been studied by Orobinsky et al. (10) and their results are classified as tentative. There are no other data with which to compare the results either on the same system or closely related systems.

It appears

Argon + 2,2-Dimethylpropane

This system has been studied by Rogers and Prausnitz (11) and their data are classified as tentative.

Argon + Hexane

This system has been studied by Baranovich  $et \ al.$  (12) at pres-There are no other data with which to compare their sures up to 7 bar. results but in view of the good agreement between these workers' results and other published data for the system nitrogen + n-octane, the present results are likely to be of reasonable accuracy.

Argon + Propylene carbonate

Argon + N-methyl-2-pyrrolidinone

Argon + Glycerol triacetate

Argon + Tributyl phosphate

These four systems have been studied by Shakhova and Zubchenko This study and several others have (12) and are classified as tentative. been carried out by these workers on apparatus capable of good accuracy.

Argon + Benzene Argon + Toluene

These two systems have been studied by Gorodetskii, Skurat and Tal'roze (14) who observed a linear relationship between mole fraction of argon in the liquid phase and pressure. Their data are broadly consistent with the data at low pressure (one atmosphere) but because of the presentation in small graphical form the data are rejected.

## References

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1. Sisskind, B.; Kasarnowsky, I. 2. Anorg. Chem. 1933, 214, 385.
2. Sisskind, B.; Kasarnowsky, I. 2. Anorg. Chem. <u>1931</u>, 200, 279.
3. Graham, E. B.; Weale, K. E. Progr. Internat. Res. Thermodynamic and
         Transport Properties, Symposium on Thermophysical Properties
         Princeton 1962, 153.
4. Nohka, J.; Sarashina, E.; Arai, Y.; Saito, S. J. Chem. Engng. Japan
         1973, 6, 10.
5.
  Sarashina, E.; Arai, Y.; Saito, S. J. Chem. Engng. Japan 1971, 4, 379.
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    Kaminishi, G.; Arai, Y.; Saito, S. J. Chem. Engng. Japan <u>1968</u>, 1,
109.
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- 7. Christiansen, L. J.; Fredenslund, A.; Mollerup, J. Cryogenics 1973, 13, 405.
- 8. Eckert, C. A.; Prausnitz, J. M. Am. Inst. Chem. Eng. J. <u>1965</u>, 11, 886.
- 9. Elshayal, I. M.; Lu, B. C.-Y. Cryogenics 1971, 11, 285.
- Orobinsky, N. A.; Blagoi, Yu. P.; Semyannikova, E. L. Ukrain. Fiz. Zhur. <u>1968</u>, 13, 372.
- 11. Rogers, B. L.; Prausnitz, J. M. J. Chem. Thermodynamics <u>1971</u>, 3, 211.
- 12. Baranovich, Z. N.; Bogdanova, L. P.; Smirnova, A. M. Zhur. Prikl. Khim. <u>1969</u>, 42, 1393.
- 13. Shakhova, S. F.; Zubchenko, Yu. P. Khim. Prom. <u>1973</u>, 49, 595.
- 14. Gorodetskii, I. G.; Skurat, V. E.; Tal'roze, V. L. Zhur. Fiz. Khim. <u>1970</u>, 44, 1852.

COMPONENTS:		EVALUATOR:
-		Colin L. Young, School of Chemistry,
2. Water;	-	University of Melbourne, Parkville, Victoria 3052, AUSTRALIA.
		July, 1978.

## CRITICAL EVALUATION:

The solubility of argon in water at high pressures does not appear to have been studied in great detail. Namoit and Bondereva (1) are reported to have studied this system, but we have been unable to obtain details of this work. Lentz and Franck (2) made a study to establish the existence of gas-gas immiscibility and presented data in a graphical form. Tskilis and Prokhorov (3) have also made a study to establish details of gas-gas equilibria in this system at pressures up to  $4 \times 10^3$  bar and have presented their data in a small graphical form.

The data of Sisskind and Kasarnowsky (4) appear to be the only results which are presented numerically and are therefore classified as tentative.

## References

- Namoit, A. Yu.; Bondereva, M. M. Trudy Vses Neftegaz. Nauch.-Issled. Inst. 1962, No. 34, 210.
- 2. Lentz, H.; Franck, E. U. Ber. Bunsenges. Phys. Chem. 1969, 73, 28.
- 3. Tsiklis, D. S.; Prokhorov, V. M. Zhur. Fiz. Khim. <u>1966</u>, 40, 2335.
- 4. Sisskind, B.; Kasarnowsky, I. Z. Anorg. Chem. <u>1931</u>, 200, 279.

ADDED NOTE: Potter and Clynne (5) Have used a new method to measure the solubility of argon in water at moderate pressures (gas fugacities from 3.515 to 29.676 x  $10^{5}$ Pa) over the 298 to 561 K temperature range. Their experimental values are given on page 258. Their results are compared with the recommended 101.325 kPa argon partial pressure solubilities from 273 to 353 K on pages 5 - 7.

5. Potter, R. W. II; Clynne, M. A. J. Soln. Chem. 1978, 7, 837.

	Water 2
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.
2. Water; H <sub>2</sub> O; 7732-18-5	
YARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of an	rgon
T/K P/bar in liquid,	· ·
x <sub>Ar</sub>	
273.35 25.3 0.001037 50.7 0.002024	
76.0 0.002809	
101.3 0.003484 126.7 0.004049	
	ARY INFORMATION
ETHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	<pre>SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given.</pre>
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.
AUXILIA ÆTHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed by volumetric methods.	<pre>SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given. ESTIMATED ERROR:</pre>
ÆTHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	<pre>SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given. ESTIMATED ERROR:</pre>
ÆTHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	<pre>SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given. 2. No details given. ESTIMATED ERROR:</pre>
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	<pre>SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given. 2. No details given. ESTIMATED ERROR:</pre>
ETHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in source. Liquid phase analysed	<pre>SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent nitrogen and 0.1 per cent oxygen. 2. No details given. 2. No details given. ESTIMATED ERROR:</pre>

Argon Solubilities above 200 kPa

258 Argon Solubiliti	es above 200 kPa				
COMPONENTS :	ORIGINAL MEASUREMENTS:				
1. Argon; Ar; [7440-37-1]	Potter, R.W.; Clynne, M.A.				
2. Water; H <sub>2</sub> O; [7732-18-5]	J. Soln. Chem. <u>1978</u> , 7, 837-44.				
VARIABLES:	PREPARED BY: C.L. Young				
Temperature, pressure (fugacity)	C.I. Toung				
EXPERIMENTAL VALUES: T/K Fugacity, $f$ 10 <sup>5</sup> x Mole	T/K Fugacity, $f$ 10 <sup>5</sup> x Mole /10 <sup>5</sup> Pa fraction of				
/10 <sup>5</sup> Pa fraction of argon in	argon in				
liquid,	$\begin{array}{c} \text{liquid,} \\ x_{\text{Ar}} \times 10^5 \end{array}$				
$x_{\rm Ar} \times 10^5$	Ar				
298.18 29.676 73.7	323.16 5.483 10.4				
298.25         8.082         20.1           298.16         6.231         15.5	323.15 4.968 9.4 338.25 5.158 9.5				
298.26 3.823 9.5	353.15 5.702 10.5				
303.19         3.718         8.5           303.24         3.915         9.0	364.26 5.142 9.5 365.50 5.135 9.4				
303.25 4.038 9.2	398.85 5.748 10.7 399.03 5.344 10.0				
308.15 4.880 10.5	495.80 3.515 9.1				
308.14         4.405         9.5           313.22         4.406         9.0	506.55 5.170 14.0 540.42 4.635 18.0				
313.14 5.450 11.0	561.12 3.960 20.9				
313.20 4.933 9.9					
* No values of pressure given given for fugacity, f, where	in original paper but data				
$\ln f/P = -\int_0^P \frac{1-PV/RT}{P} dP$					
AUXILIARY	INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;				
High pressure pvT cell. Vessel					
filled with gas and water forced	No details given.				
into cell with displacement pump. Bubble point determined from plot					
of pressure against volume of water added.					
water audeu.					
1					
	ESTIMATED ERROR:				
	$\delta T/K = \pm 0.05; \ \delta f/x = \pm 0.3$ up to				
1	420 K, ±0.5 up to 470 K, ±1.0% up to 520 K, ±2.0% above 520 K.				
	REFERENCES :				
	]				

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	Salt Solu	utions (Aque	eous)		2	
S:		ORIGINA	ORIGINAL MEASUREMENTS:			
on; Ar; 7440-37-		Matheson, I. B. C.; King, A. D.				
er; H <sub>2</sub> O; 7732-18	5	$\frac{J}{464}$	J. Coll. Interface Sci. 1978, 66,			
ium salt (sodium e or SDS); C <sub>12</sub> H <sub>2</sub> ,	dodecyl sul-					
		PREPARE	ED BY:			
T/K: 298.15 303.4 - 903.2 (4. $kg^{-1}$ H <sub>2</sub> O: 0 - 0	4.0-131.0 ps: .300			Clever		
TAL VALUES:					••••••••••••••••••••••••••••••••••••••	
Sulfuric acid monodecyl ester sodium salt mol kg <sup>-1</sup> H <sub>2</sub> O	square			Ambient Temperature °C	Henry's constant K $\times$ 10 <sup>3</sup> mol Ar kg <sup>-1</sup> H <sub>2</sub> O atm <sup>-1</sup>	
0	44.0 73.2 90.0 109.0	11.8 19.2 22.9 27.9	749.7 748.9 752.2 746.6	20.1 20.9 21.1 22.5	1 51 40 00	
0.100	66.6 84.0 130.0	18.6 23.7 35.1	757.3 754.8 756.7	21.9 22.6 22.0	1.51±0.03	
0.200	59.8 79.8 120.0	18.3 24.0 36.1	748.0 747.3 746.8	23.5 23.7 24.0	1.74±0.02	
0.300	53.5 74.4 118.0	17.0 23.6 36.4	743.9 748.5 753.3	22.5 21.1 22.6	1.82±0.02	
	on; Ar; 7440-37- er; $H_2O$ ; 7732-18 furic acid monod ium salt (sodium e or SDS); $C_{12}H_2$ : T/K: 298.15 303.4 - 903.2 (4 kg <sup>-1</sup> $H_2O$ : 0 - 0 TAL VALUES: Sulfuric acid monodecyl ester sodium salt mol kg <sup>-1</sup> $H_2O$ 0 0.100 0.200	on; Ar; 7440-37-1 er; $H_20$ ; 7732-18-5 furic acid monododecyl ester ium salt (sodium dodecyl sul- e or SDS); $C_{12}H_{26}O_{4}S.Na;$ -21-3 : T/K: 298.15 303.4 - 903.2 (44.0-131.0 ps. kg <sup>-1</sup> $H_20$ : 0 - 0.300 TAL VALUES: Sulfuric acid Pressure monodecyl ester pounds per sodium salt square mol kg <sup>-1</sup> $H_20$ inch, gauge 	On; Ar; 7440-37-1Mathemer; $H_2O$ ; 7732-18-5J. Cofuric acid monododecyl esterJ. Coium salt (sodium dodecyl sul- e or SDS); $C_{12}H_{26}O_{4}S.Na;$ -21-3PREPARET/K: 298.15 303.4 - 903.2 (44.0-131.0 psig) kg <sup>-1</sup> $H_2O$ : 0 - 0.300PREPARETAL VALUES:Sulfuric acid Pressure volume monodecyl ester pounds per gas sodium salt square evolved mol kg <sup>-1</sup> $H_2O$ Volume inch, gauge ml044.011.8 73.2044.011.8 73.2044.023.7 131.00.10066.618.6 84.084.023.7 130.035.1 0.2000.20059.818.3 79.80.30053.517.0 74.40.30053.517.0 74.4	$\begin{array}{c} Arise function for the function$	$\begin{array}{c} \mbox{Matheson, I. B. C.; King, I} \\ Matheson, I. B. C.; King, I] \\ \mbox{Matheson, I. B. C.; I] \\ \mbox{Matheson, I] \\ \mbox{Matheson, I. B. C.; I] \\ \mbox{Matheson, I] $	

thermostated thick-walled cylindrical brass bomb which rests on a variable speed magnetic stirrer. An inlet line to the bomb is connected to a gas manifold, and an exit line is connected to a Warburg manometer. Bourden gauges are used to record the pressure.

The solution, consisting of 100 g of water and the colloidal electrolyte, is contained in a glass liner inside of the bomb. The solution is degassed ESTIMATED ERROR: by evacuation to just above water vapor pressure and then stirring for several hours. The gas is introduced over the solution at the desired pressure and the solution is stirred for a minimum of five hours.

- ly pure or equivalent of 99.5 mol per cent purity or better.
- 2. Water. Laboratory distilled.
- 3. Sulfuric acid monododecyl ester sodium salt. Aldrich Chemical Co., Inc. Recrystallized from ethanol and dried in vacuo.

 $\delta K/K = 0.02$ 

The gas is vented to atmospheric pressure. The gas from the supersaturated solution is collected in the Warburg manometer and its volume measured at atmospheric pressure and ambient temperature. Corrections for gas lost during venting and thermal equilibration and for water vapor pressure are made. The solubility is reported as Henry's constant, K/mol gas kg<sup>-1</sup> water atm<sup>-1</sup> = gas molality/pressure, m/p.

Argon Solubilities above 200 kPa COMPONENTS: ORIGINAL MEASUREMENTS: 1. Argon; Ar; 7440-37-1 Matheson, I. B. C.; King. A. D. 2. Water; H<sub>2</sub>O; 7732-18-5 J. Coll. Interface Sci. 1978, 66, 3. N,N,N-Trimethyl-l-hexadecanaminium 464 - 469. Bromide (Cetyl trimethylammonium bromide or CTAB); C<sub>19</sub>H<sub>42</sub>N.Br; 57-09-0 VARIABLES: PREPARED BY: T/K: 298.15 P/kPa: 186.8 - 813.6(27.1-118.0 psig) H. L. Clever CTAB/mol kg<sup>-1</sup> H<sub>2</sub>O; 0 - 0.300 **EXPERIMENTAL VALUES:** T/K 1-Hexadecana- Pressure Volume Ambient Ambient Henry's minium,N,N,N- pounds per gas trimethyl am- square evolve Pressure Temperature constant evolved mmHq °C K x 10<sup>3</sup> monium bromide inch, gauge ml mol kg<sup>-1</sup>  $H_2O$ mol Ar kg-1 H20 atm-1 298.15 0 44.0 11.8 749.7 20.1 73.2 19.2 748.9 20.9 90.0 22.9 752.2 21.1 27.9 109.0 746.6 22.5 131.0 1.51±0.03 33.0 750.5 19.7 0.100 27.1 7.9 746.9 25.1 63.8 18.1 748.1 23.5 750.6 68.6 19.3 23.5 93.1 748.8 26.3 24.8 118.0 747.4 1.63±0.02 32.6 23.9 0.200 43.3 13.6 753.4 22.9 73.6 22.9 752.1 22.8 111.0 33.7 748.7 22.3 1.80±0.03 0.300 45.3 15.8 742.0 23.2 78.4 26.6 746.6 23.9 84.9 28.8 746.5 22.6 1.97±0.02 AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The apparatus consists of a jacketed 1. Argon. Source not given. Chemically pure or equivalent of 99.5 mol thermostated thick-walled cylindrical brass bomb which rests on a variable per cent purity or better. speed magnetic stirrer. An inlet line to the bomb is connected to a gas 2. Water. Laboratory distilled. manifold, and an exit line is connected to a Warburg manometer. Bourden 3. 1-Hexadecanaminium, N, N, N-trimethyl gauges are used to record the pressure. bromide. Eastman. Technical grade, recrystallized from ethyl acetate-The solution, consisting of 100 g of ethanol mixture and dried in vacuo water and the colloidal electrolyte, is contained in a glass liner inside of the bomb. The solution is degassed ESTIMATED ERROR: by evacuation to just above water vapor pressure and then stirring for  $\delta K/K = 0.02$ several hours. The gas is introduced over the solution at the desired pressure and the solution is stirred for a minimum of five hours. The gas is vented to atmospheric pressure. The gas from the supersaturated solution is collected in the Warburg manometer and its volume measured at atmospheric pressure and ambient temperature. Corrections for gas lost during venting and thermal equilibration and for water vapor pressure are made. The solubility is reported as Henry's constant, K/mol gas  $kg^{-1}$  water  $atm^{-1} =$ gas molality/pressure, m/p.

COMPONENTS :	EVALUATOR:
<ol> <li>Argon; Ar; [7440-37-1]</li> <li>Methane, CH<sub>4</sub>; [74-82-8]</li> </ol>	Colin L. Young, School of Chemistry, University of Melbourne, Parkville, Victoria 3052, AUSTRALIA.
	July, 1978

CRITICAL EVALUATION:

The data of Duncan and Hiza (1) and Christiansen and coworkers (2) appear to be of high accuracy, but the temperature ranges of the two These workers are known to have sets of measurements do not overlap. made accurate measurements on other systems where comparison with other workers' data is possible therefore these two sets of data (1) and (2) are The results of Gravelle and Lu (3) are in classified as tentative. essential agreement with those of Duncan and Hiza (1) though of slightly The results of Cheung and lower accuracy and are considered tentative. Wang (4) of lower accuracy than those above and are over a limited range of conditions although generally in agreement with others, so may also be regarded as tentative. The data of Miller  $et \ al.$  (5) are in agreement with previous work from the same group, but are not considered further because they are reported only at 112 K at pressure between 1 and 7 bar.

## References

1.	Duncan, G; Hiza, M. J. Ind. Eng. Chem. Fund. <u>1972</u> , 11, 38.
2.	Christiansen, L. J.; Fredenslund, A.; Mollerup, J.
	Cryogenics <u>1973</u> , 13, 405.
3.	Gravelle, D.; Lu, B. CY. Can. J. Chem. Eng., <u>1971</u> , 49, 144.
4.	Cheung, H.; Wang, D. IJ. Ind. Eng. Chem. Fund. 1964, 3, 355.

5. Miller, R. C.; Kidnay, A. J.; Hiza, M. J. Am. Inst. Chem. Engnrs. J. <u>1973</u>, 19, 145.

COMPONENTS:			ORIGINAL MEASUREMENTS:
l. Argon	n; Ar; 7440	-37-1	Cheung, H. and Wang, D. IJ., Ing. Eng. Chem. Fund., <u>1964</u> , 3, 355.
2. Metha	ane; CH <sub>4</sub> ; 7	4-82-8	1ng. Eng. chem. runa., <u>1994</u> , 0, 999.
a, neen			
VARIABLES:			PREPARED BY:
Townorst			C. L. Young
remperati	ire, pressur	e	C. L. Young
EXPERIMENTA	L VALUES:		
т/к	Mc P/bar	ole fraction of arc in liquid, <sup>x</sup> Ar	Jon
		Ar	
91.6	0 161	0 0100	
91.6	0.161 0.340	0.0108 0.102	
91.6	0.578	0.227	
91.6 92.0	0.857 0.242	0.380 0.044	
97.2	1.348	0.380	
104.8 104.9	0.615 1.016	0.0107* 0.102	
104.9	1.641	0.227	
105.2	0.785 2.112	0.044 0.101	
114.5	1.412	0.0106*	
114.5 114.5	1.652 3.191	0.043 0.226	
123.9	2.652	0.0105	
123.9 124.0	3.870 3.069	0.101 0.043	
124.0	5.009	0.045	
* Inconsi tempera		other data at same	2
		AUXILIARY	INFORMATION
METHOD /AI	PPARATUS/PRC	CEDURE:	SOURCE AND PURITY OF MATERIALS:
		volume with mag-	
netic sti   from sepa		ponents injected	No details given.
Solvent	metered into	degassed bulb	
	by solute i adjusted an	njection. Tem-	
total pre	essure const	ant ( $\sim$ 1 hr).	
		e found from iquid and gas	
phase and	l compositio	ons determined	
		um relations	
solvent =	1), using	saturation pres-	ESTIMATED ERROR:
for vapor	ı vırıal egu non-ideali	ation of state ty (ref. 1).	$\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.001;$
		• • • • • • • •	$\delta x_{\rm Ar} = \pm 5  \text{s}  .$
			REFERENCES:
1			1. Prausnitz, J. M., Amer. Inst.
			Chem. Eng. J., <u>1959</u> , 5, 3.
1			1

}

		i	Saturated H	ydrocarbons			263
COMPONENTS	:			ORIGINAL M	EASUREME	NTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Methane; CH<sub>4</sub>; 74-82-8</li> </ol>				Christiansen, L. J. Fredenslund, A. and Mollerup, J., <i>Cryogenics</i> , <u>1973</u> , 13, 405.			
WARTARIES		<u></u>					
VARIABLES:				PREPARED B			
Tempera	ture, p	ressure		С. L. Y	oung		
EXPERIMENT	AL VALUE	S:					
т/к	P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar		P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar
150.72	11.74 12.94 15.53 16.96 17.98 20.61 24.17 33.05 38.94 40.68 44.16 45.12 20.43 22.88 26.18 27.36	0.0250 0.0620 0.1430 0.1910 0.2230 0.3040 0.4140 0.5740 0.6650 0.8100 0.8500 0.9200 0.9200 0.9350 0.0410 0.0980 0.1750 0.1960	$\begin{array}{c} 0.1050\\ 0.1900\\ 0.3460\\ 0.4180\\ 0.4620\\ 0.5630\\ 0.6540\\ 0.7520\\ 0.7970\\ 0.8740\\ 0.8740\\ 0.9520\\ 0.9420\\ 0.9520\\ 0.1130\\ 0.2220\\ 0.3330\\ 0.3620 \end{array}$	164.00	30.60 35.14 35.64 38.97 42.09 45.05 48.76 50.99 32.10 33.09 36.48 39.85 42.29 43.66 46.29 49.76 49.95	0.2680 0.3680 0.3740 0.4410 0.5050 0.5620 0.6300 0.6650 0.0240 0.1090 0.1650 0.2040 0.2270 0.2680 0.3220 0.3330	$\begin{array}{c} 0.4450\\ 0.5350\\ 0.5420\\ 0.5900\\ 0.6310\\ 0.6680\\ 0.7000\\ 0.0530\\ 0.0900\\ 0.1850\\ 0.2530\\ 0.2920\\ 0.3140\\ 0.3550\\ 0.3870\\ 0.3760\\ \end{array}$
			AUXILIARY	INFORMATIO			
METHOD /A	ווייעסעס	S/PROCEDURE:		SOURCE AN		OF MATERIALS:	
Recircu Tempera resista measure gauge.	lating ture me nce the d with Coexi chromat	vapor flow appa asured with pla	atinum essure ston analysed			ails given.	
				$\delta x_{AT} = \frac{(es)}{(es)}$ REFERENCE 1. Free and	±0.01; ±0.004; ±1imated 2S: edenslur	$\delta P/bar = \pm 0.0$ $\delta y_{Ar} = \pm 0.00$ d by compiler). and, A., Mollerug tiansen, L. J., $a_{A}, \frac{1973}{7}, 13, 41$	3 p, J.

COMPONENTS:ORIGINAL MEASUREMENTS:1. Argon; Ar; 7440-37-1Gravelle, D., Lu, I Can. J. Chem. Eng.2. Methane; CH4; 74-82-8Can. J. Chem. Eng.VARIABLES: Temperature, pressurePREPARED BY: C. L. YoungEXPERIMENTAL VALUES:Can. J. Chem. Eng.				
2. Methane; CH <sub>4</sub> ; 74-82-8 VARIABLES: Temperature, pressure EXPERIMENTAL VALUES:				
2. Methane; CH4; 74-82-8Can. J. Chem. Eng.VARIABLES: Temperature, pressurePREPARED BY: C. L. YoungEXPERIMENTAL VALUES:				
2. Methane; CH <sub>4</sub> ; 74-82-8 VARIABLES: PREPARED BY: Temperature, pressure C. L. Young EXPERIMENTAL VALUES:				
Temperature, pressure C. L. Young				
Temperature, pressure C. L. Young				
Temperature, pressure C. L. Young				
EXPERIMENTAL VALUES:				
	<u></u>			
	e fraction of argon			
	liquid, in gas,			
x <sub>Ar</sub> y <sub>Ar</sub>	<sup>x</sup> Ar <sup>y</sup> Ar			
	0.349 0.723			
	0.372 0.747 0.433 0.791			
3.03 0.170 0.594 8.14	0.447 0.788			
	0.500 0.815			
	0.576 0.848			
	0.599 0.865			
	0.609 0.863 0.645 0.881			
	0.702 0.903			
6.27 0.615 0.863* 11.45	0.724 0.913			
	0.768 0.923			
	0.858 0.954			
	0.862 0.955 0.867 0.957			
	0.874 0.960			
	0.880 0.962			
	0.040 0.169			
	0.076 0.281			
	0.114 0.371 0.194 0.497			
	0.292 0.615			
8.85 0.953 0.986 11.91	0.295 0.613			
	0.470 0.751			
6.48 0.290 0.677 18.26	0.597 0.819			
AUXILIARY INFORMATION				
METHOD / APPARATUS/PROCEDURE: SOURCE AND PURITY OF MA	TERIALS:			
Forced recirculation cell using 1. Linde sample,	1. Linde sample, purity 99.995 mole			
magnetic pump with vapor sample in per cent.				
magnetic pump with vapor sample in per cent. recirculation loop and liquid sample 2. Matheson sample	e, purity 99.99			
magnetic pump with vapor sample in recirculation loop and liquid sample 2. Matheson sample withdrawn from 100 ml Jerguson cell. mole per cent.	e, purity 99.99			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated	e, purity 99.99			
magnetic pump with vapor sample in recirculation loop and liquid sample 2. Matheson sample withdrawn from 100 ml Jerguson cell. mole per cent.	e, purity 99.99			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib-	e, purity 99.99			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours.	e, purity 99.99			
<pre>magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re-</pre>	e, purity 99.99			
<pre>magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while press.</pre>	e, purity 99.99			
<pre>magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres- sures kept constant by system volume</pre>				
<pre>magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres-</pre>	bar = ±0.08;			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres- sures kept constant by system volume reduction. $ESTIMATED ERROR:\delta T/K = \pm 0.02; \delta P/N$	bar = ±0.08;			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres- sures kept constant by system volume reduction. $\begin{aligned} & ESTIMATED ERROR: \\ & \delta T/K = \pm 0.02;  \delta P/I \\ & \delta x_{\rm Ar},  \delta y_{\rm Ar} = \pm 0.00 \end{aligned}$	bar = ±0.08; 7.			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres- sures kept constant by system volume reduction. $ESTIMATED ERROR:\delta T/K = \pm 0.02; \delta P/N$ $\delta x_{Ar}, \delta y_{Ar} = \pm 0.00$ REFERENCES: 1. Chang, S. D., 1	bar = ±0.08; 7. Lu, B. CY.,			
per cent. per cent. 2. Matheson sample mole per cent. 2. Matheson sample mole per cent. 2. Matheson sample mole per cent. 2. Matheson sample mole per cent. 5. Matheson sample 5. M	bar = ±0.08; 7. Lu, B. CY., g. Symp. Ser.,			
magnetic pump with vapor sample in recirculation loop and liquid sample withdrawn from 100 ml Jerguson cell. See ref. 1 for details. Evacuated cell charged with heavier component, then lighter component. Recircula- tion started after thermal equilib- rium reached and run for 2 hours. Vapor sample taken from tube in re- circulation loop: liquid sample withdrawn at slow rate while pres- sures kept constant by system volume reduction. $\frac{\delta T/K = \pm 0.02;  \delta P/N}{\delta x_{Ar},  \delta y_{Ar} = \pm 0.00}$ REFERENCES: 1. Chang, S. D., 1	bar = ±0.08; 7. Lu, B. CY., g. Symp. Ser.,			

COMPONENTS:				ORIGINAL MEASUREMENTS:			
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Methane; CH<sub>4</sub>; 74-82-8</li> </ol>				Gravelle, D., Lu, B. CY., Can. J. Eng., <u>1971</u> , 49, 144.			
		PREPARED	BY:				
ressure		C.L. You	ung				
ES:	<u></u>	<u></u>					
Mole fraction in liquid, <sup>x</sup> Ar		т/К	P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>Y</sup> Ar		
0.2980 0.3715 0.4882 0.5814 0.7021 0.7063 0.7682 0.8279	0.6299	123.75	5.34 5.88 7.17 7.19 8.55 9.48 10.12 11.45	0.1689 0.2071 0.3024 0.3031 0.4050 0.4729 0.5209 0.6234			
	AUXILIARY	INFORMATI	ON				
PROCEDURE :		SOURCE AN	ND PURITY	OF MATERIALS:			
	CH <sub>4</sub> ; 74-82-8 ressure ES: Mole fraction in liquid, <i>x</i> Ar 0.2980 0.3715 0.4882 0.5814 0.7021 0.7063 0.7682 0.8279	CH <sub>4</sub> ; 74-82-8 ressure ES: Mole fraction of argon in liquid, in gas, <sup>x</sup> Ar - 0.6299 0.2980 - 0.3715 - 0.7604 0.4882 0.5814 0.8549 0.7021 - 0.9109 0.7682 - 0.8279 - 0.8279 - 0.8279 - 0.8211 - 0.82111 - 0.8211 - 0.82	c; 7440-37-1       Gravel1         CH4; 74-82-8       PREPARED         ressure       PREPARED         cs:       Mole fraction of argon in liquid, in gas, T/K         *Ar       YAr         -       0.6299         0.2980       -         0.3715       -         0.5814       0.8549         0.7021       -         0.7063       -         0.8279       -         AUXILIARY INFORMATI         PROCEDURE:       SOURCE AI	:; 7440-37-1       Gravelle, D., Eng., 1971, 49         CH <sub>4</sub> ; 74-82-8       PREPARED BY:         ressure       PREPARED BY:         C.L. Young       ES:         Mole fraction of argon in liquid, in gas, T/K P/bar       *         *Ar       YAr         -       0.6299       123.75       13.31         0.2980       -       126.00       5.34         0.3715       -       5.88         -       0.7604       7.17         0.4882       -       7.19         0.5814       0.8549       8.55         0.7021       -       9.48         0.7063       -       10.12         -       0.9109       11.45         0.8279       -       11.70         0.8279       -       11.70	;; 7440-37-1       Gravelle, D., Lu, B. CY.,         CH.; 74-82-8       PREPARED BY:         ressure       C.L. Young         ES:       Mole fraction of argon in liquid, in gas, T/K P/bar in liquid, xar         -       0.6299         123.75       13.31         0.2980       -         -       0.6299         126.00       5.34         0.514       0.8549         0.7021       -         -       0.9109         0.7603       -         0.7604       0.122         0.7603       -         0.7604       0.429         0.7605       -         0.7604       0.12         0.721       -         -       0.9109         11.45       0.6234         0.7602       -         -       0.9109         11.70       0.6417         0.8279       -         AUXILIARY INFORMATION         FREMARTION PURITY OF MATERIALS:		

COMPONENTS :				ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-37-1				Duncan, A. G. and Hiza, M. J., Ind. Eng. Chem. Fund., <u>1972</u> , 11, 38.			
2. Methane; CH4; 74-82-8							
VARIABLES:				PREPARED	BY:		
Temperature, pressure				с. г. у	Young		
EXPERIMEN	TAL VALU	ES:		4 <u></u>			
т/к	<i>P/</i> bar	Mole fraction in liquid, <sup>x</sup> Ar		т/к	<i>P/</i> bar	Mole fraction in liquid, <sup>x</sup> Ar	-
105.00	1.82	0.2623 0.3458	-	112.00	3.75 4.53		-

		2.19	0.3458	-		4.53	0.5118	-	
		2.43	0.4066	-		5.28	0.6353	-	
		2.62	0.4569	-		5.59	0.6853	-	
		2.65	0.4609	-	115.75	2.47	_	0.4797	
		2.86	0.5154	-		3.06	0.1824	_	
		3.04	0.5668	-		3.54	-	0.6743	
ļ		3.23	0.6230	-		3.92	0.2844	-	
		3.40	0.6691	-		4.70	0.3807	_	
		3.59	0.7218	-		4.96	0.4143	-	
	109.00	1.84	0.1603	-		5.04	_	0.8114	
1		2.41	0.2592	-		5.89	0.5295	_	
		2.51	0.2859			6.53	-	0.8925	
		3.04	0.3729	_		6.93	0.6666	-	
i		3.09	0.3848	-		7.58	0.7548	-	
		3.65	0.4949			7.99	0.8079	-	
		3.78	0.5239	-	119.75	3.80	0.1722	-	
	1	3.93	0.5548	-		5.11	0.3014	-	
		4.25	0.6217	-		6.10	0.4000		
	l	4.40	0.6475	-		7.21	0.5175	-	
		4.64	0.6943	-		8.20	0.6160	-	
		4.69	0.7122	-		9.14	0.7144	-	
	1	4.86	0.7461		123.75	4.26	-	0.4670	
	112.00	2.24	0.1582	-		4.54	0.15424		
		2.93	0.2571	_		5.32	0.2150	-	
	1								

AUXILIARY	NFORMATION				
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
Equilibrium cell with room tempera- ture vapor recirculation pump. Liquid samples withdrawn directly, vapor samples isolated in vapor loop and analysed by gas chromatography. See ref. 1, for details.	No details given.				
	ESTIMATED ERROR:				
	$\delta T/K = \pm 0.01;  \delta P/bar = \pm 0.02;$				
	$\delta x_{\rm Ar} = \pm 0.5\%.$				
	REFERENCES:				
	1. Duncan, A. G. and Hiza, M. J.,				
	Adv. Cryog. Eng., <u>1970</u> , 15, 42.				

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COMPONENTS:		ORIGINAL MEASUREMENTS:				
(1) Argon; Ar;	Duncan, A. G. and Hiza, M. J., Ind. Eng. Chem. Fund., <u>1972</u> , 11, 38.					
(2) Methane; C			<u> </u>			
VARIABLES :			PREPARED	BY:		
Temperature, pr	essure		C.L. You	ung		
EXPERIMENTAL VALUE	S:				······································	
T/K P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar	т/к	<i>P</i> /bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar
137.1 20.23 22.16 23.83		0.862 0.899 0.930	137.1	24.68 26.09		0.944 0.967
* Inconsiste	ent with other	data at s	ame temp	perature		
		AUXILIARY	INFORMATI	ON		
METHOD /APPARATUS /	PROCEDURE:		SOURCE AND PURITY OF MATERIALS:			
			ESTIMATE	D ERROR:		
			REFERENC	ES:		

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Argon Solubilities above 200 kPa

268 Argon Solubilitie	55 ADUVE 200 KI A		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
<ol> <li>Argon; Ar; [7440-37-1]</li> <li>Methane; CH<sub>4</sub>; [74-82-8]</li> </ol>	Miller, R. C.; Kidnay, A. J.; Hiza, M. J., <i>Am. Inst. Chem. Engnrs.</i> J., <u>1973</u> , <i>19</i> , 145.		
VARIABLES:	PREPARED BY:		
Pressure	C. L. Young		
EXPERIMENTAL VALUES:			
Mole fraction of argor T/K P/bar in liquid in vapor <sup>x</sup> Ar <sup>y</sup> Ar			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Recirculating vapor flow apparatus. Temperature measured with platinum resistance thermometer. Pressure measured with Bourdon gauge. Gas and liquid samples analysed by gas chromatography. Details in source and refs. 1 and 2.	No details given.		
	ESTIMATED ERROR: $\delta T/K = \pm 0.05;  \delta P/bar = \pm 0.02;$ $\delta x_{Ar},  \delta y_{Ar} = \pm 1$ %. REFERENCES: 1. Kidnay, A.J.; Miller, R.C.; Hiza, M.J., Ind. Eng. Chem. Fundam., 1971, 10, 459. 2. Miller, R.C.; Kidnay, A.J.; Hiza, M.J., J. Chem. Thermoaynamics, 1972, 4, 807.		

		Saturated Hy			269		
COMPONENTS	5:		ORIGINAL MEASUREMENTS:				
l. Argo	on; Ar; 74	40-37-1	Elshayal, I. M. and Lu, B. CY.,				
2. Eth	74-84-0	Cryogenics, <u>1971</u> , 11, 285.					
VARIABLES	:		PREPARED BY:				
Pressur	e		C. L. 1	Young			
EXPERIMENT	TAL VALUES:						
т/к	Mo P/bar	ole fraction of argor in liquid, <sup>x</sup> Ar	т/к	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar		
115.5	1.696 1.737 2.048 2.048 2.124 2.330 2.351 2.482 2.841 2.992 3.337 3.516 3.985 4.406 4.875 5.522 5.640 6.012	0.0690 0.0710 0.0712 0.0926 0.0980 0.1119 0.1135 0.1222 0.1450 0.1546 0.1760 0.1873 0.2176 0.2470 0.2835 0.3422 0.3540 0.3946	115.5	6.026 6.267 6.502 6.957 7.274 7.453 7.570 7.639 7.791 7.943 8.012 8.019 8.170 8.487 8.584 8.991 8.998 9.177	0.3969 0.4259 0.4577 0.5046 0.5355 0.6120 0.6638 0.6978 0.7304 0.7581 0.8004 0.8210 0.8230 0.8619 0.9151 0.9265 0.9570 0.9654 0.9813		
		AUXILIARY	INFORMATI	ON			
METHOD /A	PPARATUS/P	ROCEDURE:	SOURCE A	ND PURITY	OF MATERIALS:		
externa pump. two the measure mercury taken f sample pressur solid c	I room tem Temperatu rmocouples d with Bou manometer rom recirc taken from e. Sampl	rdon gauge or . Vapor sample ulation loop, liquid cell at constant es analysed by gas phy. Details in	mi ce 2. Ma mi	nimum pu nt. theson r	research grade sample writy 99.998 mole per research grade sample writy 99.9 mole per		
			$\delta T/K = \delta x_{Ar} =$ REFERENCE 1. Ch	to.001 CES: ang, S. em. Eng.	<pre> δP/bar = ±0.1%; (estimated by compiler), D., Lu, B. CY., Prog. Symp. Ser., no. 81, 18.</pre>		

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Argon Solubilities above 200 kPa

270 Argon Solubilitie	s adove 200 kPa		
COMPONENTS:	ORIGINAL MEASUREMENTS:		
<ol> <li>Argon; Ar; [7440-37-1]</li> <li>Ethane; C<sub>2</sub>H<sub>6</sub>; [74-84-0]</li> </ol>	Eckert, C. A.; Prausnitz, J. M., Am. Inst. Chem. Eng. J., <u>1965</u> , 11, 886.		
VARIABLES:			
	PREPARED BY:		
Temperature, pressure	C. L. Young		
EXPERIMENTAL VALUES:			
Mole fraction of argon T/K P/bar in liquid, in vapor <sup>x</sup> Ar <sup>y</sup> Ar			
81.44       0.4104       0.312       0.999+         84.76       0.6464       0.445       0.998         90.00       1.1877       0.611       0.999         99.10       2.517       0.581       0.999+         102.98       3.365       0.499       0.999         113.52       6.908       0.660       0.998			
METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:		
Recirculating vapor flow apparatus with heavy-wall glass cell. Temperature measured with thermo- couple. Pressure measured with Bourdon gauge. Samples of both phases analysed by gas chromatography.	<ol> <li>Linde sample, purity 99.995 mole per cent.</li> <li>Phillips Petroleum sample, purity 99.96 mole per cent.</li> </ol>		
	ESTIMATED ERROR: $\delta T/K = \pm 0.05;  \delta P/bar = \pm 0.007 \text{ up to}$ 2 bar, $\pm 0.02$ above 2 bar; $\delta x_{Ar},  \delta y_{Ar}$ = $\pm 0.005$ or better.		
	REFERENCES :		

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2. Pentane; $C_{5}H_{12}$ ; 109-66-0	Z. Anorg. Chem., <u>1931</u> , 200, 279.
2. iencane, eş. 12, 10, 00 0	
VARIABLES :	PREPARED BY:
VARIABLES.	
	C. L. Young
EXPERIMENTAL VALUES:	<u></u>
Mole fraction of argon	
T/K P/bar in liquid,	,
<sup>x</sup> Ar	
273.35 25.4 0.169	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Static equilibrium cell. Details in	1. Contained 3-4 per cent of nitrogen
source. Liquid phase analysed by volumetric methods.	and 0.1 per cent oxygen.
	2. Highest purity KAHLBAUM sample.
· · ·	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5 \%.$
	REFERENCES:

272 Argon Solubiliti	Argon Solubilities above 200 kPa		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
<ol> <li>Argon; Ar; 7440-37-1</li> <li>2,2-Dimethylpropane; C<sub>5</sub>H<sub>12</sub>; 463-82-1</li> </ol>	Rogers, B. L. and Prausnitz, J. M., J. Chem. Thermodynamics, <u>1971</u> , 3, 211.		
VARIABLES:	PREPARED BY:		
Pressure	C. L. Young		
EXPERIMENTAL VALUES:	L		
Mole fraction of ar T/K P/bar in liquid, in g <sup>x</sup> Ar <sup>y</sup> A	ās,		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8 7 2 2 5 5 5 5 6 7 7 5		
AUXILIARY	INFORMATION		
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Stainless steel equilibrium cell fitted with pistons which enabled sample of gas and liquid to be taken without a change in pressure. Pressure measured with floating piston gauge and temperature with four thermocouples. Cell charged with components and magnetically stirred. Samples removed and analysed using gas chromatography. Details in ref. 1.	<ol> <li>Matheson, high purity sample; purity 99.995 mole per cent.</li> <li>Phillips Petroleum Co. Research grade sample; purity 99.97 mole per cent.</li> </ol>		
	ESTIMATED ERROR: $\delta T/K = \pm 0.05;  \delta P/bar = \pm 0.07;$ $\delta x_{Ar},  \delta y_{Ar} = \pm 1$ %. REFERENCES: 1. Rogers, B. L. and Prausnitz, J. M. Ind. Eng. Chem. Fundam., <u>1970</u> , 9, 74.		

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Saturated H	ydrocarbons 273
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; 7440-37-1 2. Hexane; C<sub>6</sub>H<sub>14</sub>; 110-54-3</pre>	Baranovich, Z. N., Bogdanova, L. P. and Smirnova, A. M., <i>Zhur. Prikl.</i> <i>Khim.</i> , <u>1969</u> , 42, 1393.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argon T/K P/bar in liquid, . <sup>x</sup> Ar	•
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
5.1       0.001038         7.1       0.001437         273.15       2.0       0.000321         3.0       0.000537         5.1       0.001013	
7.1       0.001385         293.15       2.0       0.000284         3.0       0.000472         5.1       0.001007         7.1       0.001444	
	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell fitted with agitator. Liquid composition determined by stripping and measuring gas volumetrically.	No details given.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.1;$ $\delta x_{Ar} = \pm 0.5 \times 10^{-5} \text{ (compiler's estimate).}$
	REFERENCES :

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Argon Solubilities above 200 kPa

2/4		Arg	on Solubilitie	es above 20	оо кра		
COMPONENT	S:			ORIGINAL	MEASUREM	ENTS:	
1. Argon; Ar; 7440-37-1			Graham,	Graham, E. B. and Weale, K. E.,			
1. Argon, Ar, /440-5/-1			Progr. Internat. Res. Thermodynamic				
2. Octa		C <sub>8</sub> H <sub>18</sub> ; 111-65-	-0	and Ira	nsport	Properties, Syn	nposium
2. UCLA	uic,	C8118, TTT-00-		on Ther	mophysi	cal Properties,	,
				Princet	on, <u>196</u>	<u>2</u> , 153.	
VARIABLES				PREPARED	RV.		<u></u>
	•						
Temperat	cure, pr	essure		С. L. Y	oung		
EXPERIMEN	ITAL VALU	ES:		<b></b>		·····	
т/к	<i>P/</i> bar	Mole fraction in liquid,	of argon in gas,	T/K	<i>P/</i> bar	Mole fraction in liquid,	of argon in gas,
1/K	rybar	<sup>x</sup> Ar	<sup>y</sup> Ar	1/1	rybai	<sup>x</sup> Ar	<sup>y</sup> Ar
		AL	AL			AL	AL
323.15	1	0.0024	_	348.15	152.0	0.301	0,9951
	50.7	0.114	_		177.3	0.340	
	76.0	0.163	-		202.7	0.376	0.9949
	101.3 126.7	0.209 0.252	-		228.0 253.3	0.410 0.441	0.9942
	152.0	0.294	-		278.6	0.469	-
	177.3	0.335	-		304.0	0.496	-
	202.7 228.0	0.376 0.411	_	373.15	76.0 126.7	0.169 0.259	-
	253.3	0.442	-		152.0	0.301	0.9900
348.15	76.0	0.169	-		202.7	0.376	0.9905
	101.3 126.7	0.215 0.259	-		253.3 304.0	0.441	- 0.9895
			AUXILIARY	INFORMAT			
VERMON /2						V OF WATERIALS.	
		S/PROCEDURE:				Y OF MATERIALS:	
copper	of 2 x	ssel made of b 10 <sup>5</sup> mm <sup>3</sup> capaci	eryilium tv		merciai t purit	sample, 99.9 1	mole per
attache	ed to sm	all sampling v	essel.	1	-	and dried.	
Magneti vessel. equilib admitte analyse volumet	ic stirr Solv orium ve ed and e ed by gr	red with Bourd er in equilibr ent introduced ssel, compress equilibrated. avimetric (liq s) techniques.	ium into ed gas Samples uid) and			and drift.	
				ESTIMATE	ED ERROR:		
						$\delta P/\text{bar} = \pm 0.5;$	
				$\delta x_{\rm Ar} =$	±l%;	$y_{\rm Ar} \simeq 0.1$ %.	
				REFEREN	CES:		<u> </u>
				1. Gr	aham, E	. B., Ph.D. Th	esis,
						y of London, 1	
						· · · · · · ·	
				1			

			Saturated H	ydrocarb	ons		275
COMPONEN	TS:			ORIGINA	L MEASUREM	ENTS:	
2.2,	-	r;7440-37-1 methylpentane;	C <sub>8</sub> H <sub>18</sub> ;	Progr and I on Th	r. Interno Transport	and Weale, K. at. Res. Therma Properties, S ical Propertie 52, 153.	odynamic ymposium
VARIABLE	S :			PREPARE			
Temper	ature,	pressure		С. L.	. Young		
EXPERIME	NTAL VALU	ES:					
т/к	P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar	т/к	<i>P.</i> /bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar
323.15	1.0 50.7 76.0 101.3 126.7 152.0 177.3 202.7 228.0 253.3 1.0 50.7 76.0 101.3 126.7	0.0027 0.126 0.178 0.228 0.274 0.318 0.358 0.396 0.428 0.455 0.0028 0.135 0.193 0.246 0.298	- - - 0.995 0.994 0.993 - - 0.9875	348.15	177.3 202.7 228.0 253.3	0.345 0.389 0.429 0.467 	0.988 0.988 
			AUXILIARY	INFORMA	TION	<u></u>	
Equilib copper attache Pressur Magneti Solvent vessel, equilib gravime	of 2 × of 2 × ed to sm c measu c stirr introd compre rated.	US/PROCEDURE: ssel made of be 10 <sup>5</sup> mm <sup>3</sup> capacit all sampling ve red with Bourde er in equilibr uced into equil ssed gas admit Samples analy iquid) and volu es. Details	ty essel. on gauge. ium vessel. librium ted and ysed by umetric	1. Co ce 2. Di ESTIMAT	ommercial ent purit istilled FED ERROR:	OF MATERIALS: sample, 99.9 y. and dried. \deltaP/bar = ±0.5;	mole per
				δx <sub>Ar</sub> = REFEREN 1. Gr	= ±l%; δ NCES: caham, E.	B., Ph.D. The	

COMPON	IENTS :		ORIGINAL	MEASUREMEN	TS :	
1. Argon; Ar; 7440-37-1			Orobinsky, N. A., Blagoy, Yu. P.			
2. Propene; C <sub>3</sub> H <sub>6</sub> ; 115-07-1				and Semyannikova, E. L., Ukrain. Fiz. 2hur., 1968, 13, 372.		
2.	Propene; C3n	6, 110 0, 1	F 64. 1	2 <i>nui</i> ., <u>190</u>	<i>io</i> , <i>io</i> , <i>i</i> /2.	
WARTA	DT 120 .					
VARIA	BLES:		PREPARED	D BY:		
Temp	perature, pres	sure	C. L.	Young		
EXPERI	IMENTAL VALUES:					
т/к	P/bar	ole fraction of argo in liquid, <sup>x</sup> Ar	on T/K	<i>P/</i> bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	
	·····	• • • • • • • • • • • • • • • • • • •				
100	1.39 1.57	0.060 0.057	130	15.00 16.83	0.158 0.190	
	3.07	0.120		19.66	0.290	
110	3.35	0.057	140	6.50	0.045	
	4.09	0.085		12.12	0.075	
1	4.12 5.03	0.090 0.110		15.49 16.8	0.101 0.103	
	5.05	0.107		20.0	0.148	
	5.20	0.114		22.2	0.150	
	5.91	0.121		30.3	0.262	
1 1 2 2	6.37	0.167	150	31.5	0.360	
120	3.77 3.86	0.044 0.048	150	12.01 20.5	0.059 0.106	
1	3.87	0.048		20.5	0.106	
	7.19	0.091		21.1	0.113	
}	10.30	0.146		26.5	0.139	
1	10.49 11.82	0.1580		36.3	0.209 0.328	
130	3.68	0.2050 0.028		43.7 45.9	0.328	
1 - 50	6.40	0.058		46.0	0.410	
1	10.89	0.102		46.2	0.412	
ĺ	11.67	0.106		47.1	0.460	
]	11.87	0.119				
		AUXILIARY	INFORMAT	ION		
METHO	D/APPARATUS/P	ROCEDURE :	SOURCE	AND PURITY	OF MATERIALS:	
fitt	ed with magne	or flow apparatus tic pump.		ample puri ent.	ity 99.97 mole per	
		red with platinum meter; pressure	2. P	urified sa	ample contained about	
	sured with Bou				per cent nitrogen,	
		phase analysed by			carbon dioxide and	
	chromatograph				).5 mole per cent n impurity.	
l				Jazooazbo.	pull031	
f						
l						
			1	ED ERROR:		
1				= ±0.03;	$\delta P/\text{bar} = \pm 0.4\%;$	
			δx <sub>Ar</sub>	= ±0.5%.		
			REFEREN	ICES :	· · · · · · · · · · · · · · · · · · ·	
1			1			
1			1			
1						
1			1			
			1			
1						

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Cyclohexane; C<sub>6</sub>H<sub>12</sub>; 110-82-7</li> </ol>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY: C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostwa T/K P/bar of argon coeffic in liquid, <sup>x</sup> Ar	ald <sup>†</sup> . cient
298.15 50.7 0.0732 0.3	302
<sup>†</sup> incorrectly called Bunsen coeffici	ent in original paper
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
	REFERENCES :
	<ol> <li>Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u>, 200, 279.</li> </ol>

278	Argon Solubilitie	s above 200 kPa		
COMPONENTS :		ORIGINAL MEASUREMENTS:		
l. Argon; Ar; 7	440-37-1	Sisskind, B. and Kasarnowsky, I.,		
2. Methylcycloh 108-87-2	exane; CH <sub>3</sub> C <sub>6</sub> H <sub>11</sub> ;	Z. Anorg. Chem., <u>1933</u> , 214, 385.		
VARIABLES:		PREPARED BY: C. L. Young		
EXPERIMENTAL VALUES:				
T/K P/bar	Mole fraction Ostw of argon coeffi in liquid, <sup>x</sup> Ar			
298.15 50.7	0.0899 0.	311		
<sup>†</sup> incorrectly	called Bunsen coeffi	cient in original paper		
		ΤΝΕΩΡΜΑΤΙΩΝ		
METHOD /APPARATUS/		INFORMATION SOURCE AND PURITY OF MATERIALS:		
Static equilibri	um cell. Details in phase analysed by			
		ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.		
		REFERENCES: 1. Sisskind, B. and Kasarnowsky, I. Z. Anorg. Chem., <u>1931</u> , 200, 279.		

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Aromatic Hy	ydrocarbons 279
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., 1933, 214, 385.
2. Benzene; C <sub>6</sub> H <sub>6</sub> ; 71-43-2	<i>b</i> , <i>Anorg</i> , <i>chem</i> , <u>1955</u> , <i>b</i> 14, 565.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw. T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
101.3 0.0792 0.	197 203 204
	INFORMATION
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>2. Highest purity KAHLBAUM sample.</li> </ul>
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I. Z. Anorg. Chem., <u>1931</u> , 200, 279.

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2. Methylbenzene (Toluene);	Z. Anorg. Chem., <u>1933</u> , 214, 385.
C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub> ; 108-88-3	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	- +
noie maction	wald <sup>†</sup> icient
in liquid,	
<sup>x</sup> Ar	
	200
76.0 0.0745 0.	200 214
280.15 50.7 0.0457 0.	195
<sup>†</sup> incorrectly called Bunsen coeffici	ent in original paper
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details	1. Contained 3-4 per cent of
in ref. 1. Liquid phase analysed by volumetric methods.	nitrogen and 0.1 per cent oxygen.
by volumetric methods.	2. Highest purity KAHLBAUM sample.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5 \%.$
	REFERENCES :
	1. Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1931</u> , 200, 279.

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Aromatic Hydrocarbons 281		
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,	
<pre>2. Dimethylbenzene (Xylene); C<sub>8</sub>H<sub>10</sub>; 1330-20-7</pre>	Z. Anorg. Chem., <u>1933</u> , 214, 385.	
VARIABLES:	PREPARED BY:	
Pressure	C. L. Young	
EXPERIMENTAL VALUES:		
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	rald <sup>†</sup> cient	
	196 211	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Static equilibrium cell. Details in ref. 1. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>	
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5\%.$	
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Argon; Ar;7440-37-1	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.
2. Methanol; CH <sub>3</sub> OH; 67-56-1	
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argo T/K P/bar in liquid, <sup>x</sup> Ar	on
273.35         25.3         0.0137           50.7         0.0286           76.0         0.0417           101.3         0.0526	
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in source. Liquid phase analysed by volumetric methods.	
	2. Purity 99.8 per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5$ (estimated by compiler).
	REFERENCES :

Organic Compounds	Containing Oxygen 283
COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., 19 <u>31</u> , 200, 279.
2. Ethanol; $C_2H_5OH$ ; 64-17-5	
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argo T/K P/bar in liquid, <sup>x</sup> Ar	n ·
273.35         25.3         0.0192           50.7         0.0400           76.0         0.0556           101.3         0.0667	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Static equilibrium cell. Details in source. Liquid phase analysed by	<ol> <li>Contained 3-4 per cent nitrogen and 0.1 per cent oxygen.</li> </ol>
volumetric methods.	2. Purity 99.8 per cent.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{Ar} = \pm 0.5$ % (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>1-Propanol; C<sub>3</sub>H<sub>7</sub>OH; 71-23-8</li> </ol>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>xx</sup> Ar	ald <sup>†</sup> cient
273.15 50.7 0.0360 0.	220
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
	REFERENCES :
	<ol> <li>Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u>, 200, 279.</li> </ol>

arnowsky, I., <u>3</u> , <i>214</i> , 385.
r
RIALS:
r cent of per cent
AHLBAUM sample.

286	Argon Solubiliti	es above 200 kPa
COMPO	NENTS:	ORIGINAL MEASUREMENTS:
11.	Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
1		Z. Anorg. Chem., <u>1933</u> , 214, 385.
2.	2-Butanol; C <sub>4</sub> H <sub>9</sub> OH; 78-92-2	
}		
VARIA	ABLES:	PREPARED BY:
		C. L. Young
EXPER	RIMENTAL VALUES:	
ĺ	Ostu	vald <sup>†</sup>
Т/К	Mole fraction	lcient
	in liquid,	
	<sup>x</sup> Ar	
273	.15 50.7 0.0422 0.	.210
{	tingorroatly galled pursue of the	
ł	<sup>†</sup> incorrectly called Bunsen coeffi	icient in original paper
ł		
1		
Į		
}		
<b> </b>	AUXILIARY	INFORMATION
METHO	DD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
1	tic equilibrium cell. Details	
in	ref. 1. Liquid phase analysed	nitrogen and 0.1 per cent
by .	volumetric methods.	oxygen.
1		2. Highest purity KAHLBAUM sample.
Ì		
1		
}		
1		ESTIMATED ERROR:
		$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
{		$\delta x_{\rm Ar} = \pm 0.5\%.$
		REFERENCES :
		1. Sisskind, B. and Kasarnowsky, I.
1		Z. Anorg. Chem., 1931, 200, 279.
1		
1		1

Organic Compounds	s Containing Oxygen 287
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>2. 2-Methylpropanol; C<sub>4</sub>H<sub>10</sub>O;</li> </ol>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 385.
78-83-1	
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	vald <sup>†</sup> .cient
273.15 30.7 0.0461 0.	228
•	ζ.
	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> </ol>
	2. Highest purity KAHLBAUM sample.
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279:

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288
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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2. 2-Methylbutanol; C <sub>5</sub> H <sub>11</sub> OH; 137-32-6	2. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
273.15 25.4 0.0251 0. 50.7 0.0501 0.	210 210
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., 2. Anorg. Chem., <u>1931</u> , 200, 279.

Organic Compounds	Containing Oxygen 289
COMPONENTS:	ORIGINAL MEASUREMENTS:
l. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1933</u> , 214, 385.
2. Hexanol; C <sub>6</sub> H <sub>13</sub> OH; 111-27-3	
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
	t ·
Mole fraction Ostw T/K P/bar of argon coefficient	
in liquid,	crent.
<sup>x</sup> Ar	
273.15 25.4 0.0238 0.	174
<sup>†</sup> incorrectly called Bunsen coeffic	cient in original paper
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details	1. Contained 3-4 per cent of
in ref. I. Liquid phase analysed by volumetric methods.	nitrogen and 0.1 per cent oxygen.
by volumetite methods.	2. Highest purity KAHLBAUM sample
	of 1-hexanol.
· · ·	
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5  \text{s}  .$
	REFERENCES:
	1. Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1931</u> , 200, 279,

Argon Solubilities above 200 kPa

250 Argon Solubilitie	es adove 200 kpa
COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1933</u> , 214, 385.
2. Octanol; C <sub>8</sub> H <sub>17</sub> OH; 111-87-5	
VARIABLES:	PREPARED BY:
	FREFARED DI:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
273.15 50.7 0.0562 0.	163
+.	
<sup>†</sup> incorrectly called Bunsen coeffi	cient in original paper
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details	1. Contained 3-4 per cent of
in ref. 1. Liquid phase analysed by volumetric methods.	nitrogen and 0.1 per cent oxygen.
	2. Highest purity KAHLBAUM sample
	of 1-octanol.
}	
	ESTIMATED ERROR:
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5 \&.$ REFERENCES:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5 \&.$ REFERENCES:
×	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5 \&.$ REFERENCES: 1. Sisskind, B. and Kasarnowsky, I.
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5\%.$ REFERENCES: 1. Sisskind, B. and Kasarnowsky, I.
,	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.

COMPONENTS:	Containing Oxygen 291
	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
<pre>2. Octanol; C<sub>8</sub>H<sub>17</sub>OH: 29063-28-3 (ambiguously referred to as     sec-octanol)</pre>	Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi- in liquid, <sup>x</sup> Ar	,
273.15 25.4 0.0297 0.	172
AUXILIARY	INFORMATION
AUXILIARY METHOD /APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1933</u> , 214, 385.
2. Cyclohexanol; C <sub>6</sub> H <sub>12</sub> O; 108-93-0	
VARIABLES:	DEED DEE DU
VARIABLES .	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
	÷
Mole fraction	vald <sup>†</sup>
T/K P/bar of argon coeffi in liquid,	Clent
<sup>x</sup> Ar	
298.15 25.3 0.0132 0.	112
<b>Names and a second s</b>	, , , , , , , , , , , , , , , ,
<sup>†</sup> incorrectly called Bunsen coeffic	cient in original paper
incorrectly carred Bunsen Coerrig	cient in original paper
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> </ol>
	2. Highest purity KAHLBAUM sample.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5 \%.$
	REFERENCES :
	1. Sisskind, B. and Kasarnowsky, I.,
	Z. Anorg. Chem., <u>1931</u> , 200, 279.

	s Containing Oxygen 2
OMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2. Benzenemethanol (Benzyl alco- hol); C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> OH; 100-51-6	Z. Anorg. Chem., <u>1933</u> , 214, 385.
/ARIABLES:	PREPARED BY:
Pressure	C. L. Young
XPERIMENTAL VALUES:	1
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
	060
AUXILIARY	INFORMATION
	INFORMATION SOURCE AND PURITY OF MATERIALS;
AUXILIARY METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in ref. 1. Liquid phase analysed by volumetric methods.	SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in ref. l. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent of nitrogen and 0.1 per cent
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in ref. l. Liquid phase analysed	SOURCE AND PURITY OF MATERIALS; 1. Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.

Argon Solubilities above 200 kPa

294 Argon Solubilitie	s above 200 kPa
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Diethylether, (Ethane, 1,1-oxy- bis-); (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>O; 60-29-7</li> </ol>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
T/K P/bar Mole fraction of argon in liquid, <sup>x</sup> Ar	
273.35 25.4 0.0640	
	-
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in source. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> </ol>
	2. Highest purity KAHLBAUM sample.
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5$ , $\delta P/Dar = \pm 0.5$ ;
	REFERENCES:
	REFERENCES:

Organic Compounds	Containing Oxygen 29
COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
<pre>2. Benzene, 1,1-[oxybis(methylene) bis]-; (Benzyl ether), (C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>)<sub>2</sub>O; 103-50-4</pre>	2. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
50.7 0.0291 0.	068 059 072
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Static equilibrium cell. Details in ref. 1. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> </ol>
	2. Highest purity KAHLBAUM sample.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2. Benzaldehyde; C7H6O; 100-52-7	Z. Anorg. Chem., <u>1931</u> , 200, 279.
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argon	
T/K P/bar in liquid, <sup>x</sup> Ar	
273.35 25.4 0.0121	
METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in	SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent of
source. Liquid phase analysed by	nitrogen and 0.1 per cent
volumetric methods.	oxygen. 2. Highest purity KAHLBAUM sample.
}	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5\%.$
	REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
1	Z. Anorg. Chem., <u>1931</u> , 200, 279.
2. 2-Propanone (Acetone); C <sub>3</sub> H <sub>6</sub> O; 67-64-1	
VARIABLES:	
VARIABLES:	PREPARED BY:
	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argon T/K P/bar in liquid, <sup>x</sup> Ar	•
273.35 25.4 0.0289	
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in	1. Contained 3-4 per cent of
source. Liquid phase analysed by volumetric methods.	nitrogen and 0.1 per cent oxygen.
	2. Highest purity KAHLBAUM sample.
-	ESTIMATED ERROR:
	$\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
	$\delta x_{\rm Ar} = \pm 0.5 $
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; 7440-37-1 2. 2-Propanone (Acetone); C<sub>3</sub>H<sub>6</sub>O; 67-64-1</pre>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 1978.
VARIABLES:	PREPARED BY:
Pressure	C. L. Young
EXPERIMENTAL VALUES:	
Ostw. Mole fraction T/K P/bar of argon coeffic in liquid, <sup>x</sup> Ar	
50.7 0.0397 0.1	238 249 254
<sup>†</sup> incorrectly called Bunsen coeffic	
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
	ESTIMATED ERROR: $\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.

Organic Compound	is Containing Oxygen 299
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>2-Butanone, (Methylethylketone); C<sub>4</sub>H<sub>8</sub>O; 78-93-3</li> </ol>	Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARIABLES:	PREPARED BY: C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction Ostv T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	vald <sup>†</sup> . Lcient
273.15 25.4 0.216 0.	.222
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
	ESTIMATED ERROR:
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
	REFERENCES :
	<ol> <li>Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u>, 200, 279.</li> </ol>

300	Argon Solubilitie	es above 200 kPa
COMPO	NENTS:	ORIGINAL MEASUREMENTS:
1.	Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2.	2-Pentanone (Methylpropylketone); C <sub>5</sub> H <sub>10</sub> O; 107-87-9	Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARTA	ABLES :	PREPARED BY:
, vincer		
		C. L. Young
EXPER	RIMENTAL VALUES:	I
т/к	Mole fraction Ostw P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
273	.15 50.7 0.0544 0.	234
	<sup>†</sup> incorrectly called Bunsen coeffi	cient in original paper
		······································
		INFORMATION
METH	OD /APPARATUS/PROCEDURE :	SOURCE AND PURITY OF MATERIALS;
in	tic equilibrium cell. Details ref. l. Liquid phase analysed volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> </ol>
		2. Highest purity KAHLBAUM sample.
		ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$
		$\delta x_{\rm Ar} = \pm 0.5 \%.$
1		REFERENCES:
		<ol> <li>Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u>, 200, 279.</li> </ol>

		Organic C	Compounds	Containing Oxygen	<b>30</b> 1
COMPONENT	rs:			ORIGINAL MEASUREMENTS:	
2. 3-		7440-37-1 e, (Diethylketor -22-0	ne);	Sisskind, B. and Kasarnowsky, I Z. Anorg. Chem., <u>1933</u> , 214, 385	
VARIABLES	S :			PREPARED BY:	
				C. L. Young	
EXPERIMEN	NTAL VALUE	:S :			
т/к	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	Ostwa coeffic	•	
273.15	50.7	0.0546	0.2	37	
†ir.	ncorrect!	ly called Bunsen	coeffic	ient in original paper	

AUXILIARY	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE: Static equilibrium cell. Details in ref. 1. Liquid phase analysed by volumetric methods.	<pre>INFORMATION SOURCE AND PURITY OF MATERIALS: 1. Contained 3-4 per cent of    nitrogen and 0.1 per cent    oxygen. 2. Highest purity KAHLBAUM sample.</pre>
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
	REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.

302	Argon Solubiliti	es above 200 kPa
COMPON	ENTS:	ORIGINAL MEASUREMENTS:
1.	Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,
2.	3-Hexanone (Ethylpropylketone); C <sub>6</sub> H <sub>12</sub> O; 589-38-8	Z. Anorg. Chem., <u>1933</u> , 214, 385.
VARIA	SLES:	PREPARED BY:
		C. L. Young
EXPERI	MENTAL VALUES:	I
т/к	Mole fraction Ostw P/bar of argon coeffi in liquid, <sup>x</sup> Ar	
273.	15 50.7 0.0637 0.	238
	AUXILIARY	INFORMATION
METHO	D/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
in re	ic equilibrium cell. Details ef. l. Liquid phase analysed olumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
1		ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.
		REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.

Organic Compounds	s Containing Oxygen	303
COMPONENTS:	ORIGINAL MEASUREMENTS:	
1. Argon; Ar; 7440-37-1	Sisskind, B. and Kasarnowsky, I.,	
<pre>2. 2-Octanone, (Methylhexylketone); C<sub>8</sub>H<sub>16</sub>O; 111-13-7</pre>	Z. Anorg. Chem., <u>1933</u> , 214, 385.	
VARIABLES:	PREPARED BY:	
	C. L. Young	
EXPERIMENTAL VALUES:	L	
Mole fraction Ostw T/K P/bar of argon coeffi in liquid, <sup>x</sup> Ar	vald <sup>†</sup> cient	
273.15 50.7 0.0660 0.	193	
AUXILIARY	INFORMATION	
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Static equilibrium cell. Details in ref. l. Liquid phase analysed by volumetric methods.	<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sampl</li> </ol>	0
	2. Highest purity KAHLBAUM sampl	с.
	, ,	
	ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} = \pm 0.5$ %.	
	REFERENCES :	
	<pre>I. Sisskind, B. and Kasarnowsky, Z. Anorg. Chem., <u>1931</u>. 200, 2</pre>	

304

ORIGINAL MEASUREMENTS: Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1933</u> , 214, 385. PREPARED BY:
Z. Anorg. Chem., <u>1933</u> , 214, 385.
PREPARED BY:
C. L. Young
vald <sup>†</sup> .cient
127 128 124
INFORMATION
SOURCE AND PURITY OF MATERIALS:
<ol> <li>Contained 3-4 per cent of nitrogen and 0.1 per cent oxygen.</li> <li>Highest purity KAHLBAUM sample.</li> </ol>
ESTIMATED ERROR: $\delta T/K = \pm 0.3;  \delta P/bar = \pm 0.5;  \delta x_{Ar} = \pm 0.5 \&.$ REFERENCES: 1. Sisskind, B. and Kasarnowsky, I., Z. Anorg. Chem., <u>1931</u> , 200, 279.

COMPONEN		-	Compounds	Containing	genjgen		30	
	COMPONENTS:				ORIGINAL MEASUREMENTS:			
l. Ar	. Argon; Ar; 7440-37-1			Shakhova, S. F. and Zubchenko, Yu.				
(P	-				Khim. Prom., <u>1973</u> , 49, 595.			
VARIABLES: Temperature, pressure				PREPARED				
				C. L. Young				
EXPERIME	NTAL VALUES			I			_	
т/к	<i>P/</i> bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	α†	т/к	P/bar	Mole fractio of argon in liquid, <sup>x</sup> Ar	α+	
298.15	54.41 77.51 80.45 82.88 94.64	0.0168 0.0238 0.0241 0.0256 0.0281	4.5 6.4 6.5 6.9 7.6	323.15 343.15	54.72 68.50	0.0374 0.0135 0.0190 0.0230	8.2 10.2 3.6 5.1 6.2	
323.15	119.16 39.21 60.80 74.58	0.0349 0.0139 0.0201 0.0241	9.5 3.7 5.4 6.5		95.04 117.03 121.18		8.4 9.6 10.3	
			AUXILIARY	INFORMAT	ION			
METHOD /	APPARATU:	S/PROCEDURE:	AUXILIARY			OF MATERIALS:		
Mixture autocla analyse	e stirred ave. Sam	by ball in ro mples of liqu: umetric method	ocking id	SOURCE A	ND PURITY	mole per cen	t.	
Mixture autocla analyse	e stirred ave. Sar ed by volu	by ball in ro mples of liqu: umetric method	ocking id	SOURCE A 1. Pur 2. No ESTIMATH 6T/K =	ND PURITY details ED ERROR: ±0.1; 6 ±5% (est	mole per cen		

COMPONENTS :				ORIGINAL MEASUREMENTS:				
1. Argon; Ar; 7440-37-1				Shakhova, S. F. and Zubchenko, Yu. P.,				
<pre>2. 1,2,3-Propanetriol, triacetate (Glycerol triacetate); C<sub>9</sub>H<sub>14</sub>O<sub>6</sub>; 102-76-1</pre>				Khim. Prom., <u>1973</u> , 49, 595.				
VARIABLE	S:			PREPARED B		·		
Temperature, pressure			C. L. Young					
EXPERIME	NTAL VALU	ES:						
т/к	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	α† vol/vol	т/к	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	α† vol/vol	
298.15 323.15	34.35 47.52 64.75 84.61 104.47 122.10 31.92 55.93 60.39 62.21 73.06	0.0421 0.0535 0.0677 0.0793 0.0899 0.0311 0.0505 0.0535 0.0558	3.7 5.2 6.7 8.6 10.2 11.7 3.8 6.3 6.7 7.0 8.0	323.15 343.15	90.99 114.29 125.04 134.36 31.41 42.05 72.14 85.82 101.53 119.16 134.36	0.0906 0.0996 0.1037 0.0295 0.0382 0.0618 0.0721 0.0828 0.0961	9.5 11.8 13.1 13.7 3.6 4.7 7.8 9.2 10.7 12.6 14.4	
	Ť/1	oted in origina K = 273.15 and liquid at room	P = 1 atn	nosphere a	dsorbed	by unit volum	e	
			AUXILIARY	INFORMATIO	N			
Mixtur autocl analys	e stirre ave. s	US/PROCEDURE: ed by ball in r Samples of liqu olumetric metho f. l.	id	1. Pur		OF MATERIALS: 8 mole per cen given.	t.	
				$\delta x_{\rm Ar} =$	±0.1; ±5% (es	δP/bar = ±0.l; timated by com		
				Yu.	khova, S P. and	S. F., Zubchen Kaplan, L. K. ., <u>1973</u> , 5, 10	,	

		Organic Co	ompounds	Contaiı	ning Halogen	30	
COMPONENTS :			ORIGINAL MEASUREMENTS:				
l. Arg	on; Ar; 7	440-37-1		Gra	ham, E. B. and Weale, K.	Е.,	
2 0114	-			Progr. Internat. Res. Thermodynami			
<ol> <li>Cyclohexane, undecafluoro (tri- fluoromethyl)- (Tetradecafluoro-</li> </ol>				and	Transport Properties, Sy	тровіит	
met	hylcycloh	lcyclohexane); C <sub>7</sub> F <sub>14</sub> ;			Thermophysical Properties	,	
335-02-2			Princeton, <u>1962</u> , 153.				
VARIABLES:				PREPARED BY:			
Pressu.	Le			с.	L. Young		
XPERIMEN	TAL VALUES:						
		Mole fraction	n of arg	on	,		
Т/К	P/atom	in liquid,	in ga	s,			
		<sup>x</sup> Ar	${}^{\mathcal{Y}}$ Ar				
323.15	1.0 76.0	0.0047 0.266	-				
	101.3	0.324	0.986				
	152.0 172.3	0.424	- 0.981				
	202.7	0.507	-				
	233.0 253.3	0.569	0.965				
	263.4	-	0.955				
	329.3	0.631	-				
	<u> </u>		AUXILIARY	INFORM	IATION		
METHOD /1	APPARATUS,	/PROCEDURE:		SOURC	E AND PURITY OF MATERIALS:		
Equilib	orium ves	sel made of ber 0 <sup>5</sup> mm <sup>3</sup> capacity	ryllium	11.	Commercial sample, 99.9	mole per	
attache	ed to small	ll sampling ve	y ssel.		cent purity.		
Pressu	re measure	ed with Bourdon	n gauge.	2.	Purity at least 99.5 mol cent.	e per	
Magnet: vessel		r in equilibriunt introduced i					
	orium ves	sel, compressed	d gas	1			
admitte	ed and equed by grave	uilibrated. S vimetric (liqui	Samples				
volume	tric (gas	) techniques.		1	,		
in ref	. 1.						
				ESTIN	ATED ERROR:		
				δт/	$K = \pm 0.1;  \delta P / bar = \pm 0.5$	;	
				δxA	$r = \pm 1$ %; $\delta y_{Ar} \simeq 0.1$ %.		
				REFE	RENCES :		
				\ <u>_</u> .	Graham, E. B., Ph.D. The		
				1	University of London, <u>19</u>	58.	
				1			
				I			

308		A	rgon Solubilitie	s above 200	) kPa		
	argon; A	r; 7440-37-1		and Sait	., Sara o, S.,	NTS: shina, E., Ara J. Chem. Engna	•
	.n10r0a11 75-45-6	luoromethane;	CHC1F <sub>2</sub> ;	<u>1973</u> , 6,	10.		
VARIABI	LES:			PREPARED E	BY:		
Tempe	erature,	pressure		C. L. Yo	ung		
EXPERIM	ÆNTAL VAL	UES:		L			
т/к	P/bar	Mole fraction in liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar	т/к	<i>P/</i> bar	Mole fraction in liquid, <sup>x</sup> Ar	n of argon in gas, <sup>y</sup> Ar
273.15	25.3 50.7 75.2 100.9 122.6	0.0249 0.0483 0.110 0.171 0.237 0.295	0.660 0.758 0.852 0.872 0.874 0.873	298.15	147.4 154.0 160.5 165.9 169.2 25.3	0.381 0.411 0.445 0.473 0.520 0.0146	0.736 0.725 0.704 0.674 0.634 0.176
298.15	142.4 162.8 178.3 187.5 193.8 25.3 50.7 76.2 100.9 123.4 141.4	0.357 0.421 0.482 0.530 0.587 0.0343 0.0987 0.163 0.234 0.298 0.361	0.864 0.842 0.814 0.783 0.745 0.495 0.704 0.756 0.776 0.765 0.748	348.15	50.7 75.2 101.3 101.8 122.6 130.3 133.8 50.7 75.2 88.7	0.0804 0.145 0.227 0.231 0.307 0.359 0.396 0.0492 0.130 0.196	0.490 0.573 0.596 0.596 0.574 0.544 0.512 0.197 0.311 0.320
			AUXILIARY	INFORMATIC	 DN		
METHOD	/APPARA1	TUS/PROCEDURE:		SOURCE AN	D PURITY	OF MATERIALS:	
stirr liqui press After and l	ter. Te d in gla sure meas equilib iquid sa natograph	itted with mag emperature meas ass thermometer sured with Bour orium establish amples analysed by. Details i	ured with and don gauge. ed vapor by gas	2. Pur	ity bet	given. ter than 99.9	mole per
				ESTIMATEL		$\delta P/bar = \pm 0.1$	•
				1 '		:1% (estimated compile:	by
				and Japa 2. Sara	nishi, Maeda, <i>n</i> , <u>1968</u> shina, <i>J. Chem</i>	G., Arai, Y., S., J. Chem. B., 1, 109. E., Arai, Y. G. Engng. Japa	Saito, S. Engng. and Saito,

COMPONENTS:	ORIGINAL MEASUREMENTS:		
1. Argon; Ar; [7440-37-1]	Graham, E. B.; Weale, K. E., Proyr. Internat. Res. Thermodynamic		
<pre>2. Methane, tetrachloro-, (carbon tetrachloride); CCl<sub>4</sub>; [56-23-5]</pre>	and Transport Properties, Symposium on Thermophysical Properties, Princeton, <u>1962</u> , 153.		
VARIABLES:	PREPARED BY:		
Temperature, pressure	C. L. Young		

EXPERIMENTAL VALUES:

т/к	P/bar	Mole fraction in liquid, <sup>xx</sup> Ar	of argon in gas, <sup>y</sup> Ar		P/bar	Mole fraction in liquid, <sup>x</sup> Ar	
323.15	1.0 76.0 101.3 126.7 152.0	0.0014 0.099 0.130 0.160 0.188		348.15	202.7 228.0 243.2 253.3	0.204 0.227 0.250 0.272	0.9875
348.15	117.2 202.7 228.0 243.2 253.3 278.6 283.7 1.0 50.7 76.0 101.5 121.6 126.7 152.0	0.215 0.241 0.265 0.286 0.304 0.00135 0.067 0.097 0.126 - 0.153 0.180	0.9951  0.9944  0.9929  0.986 	373.15	278.6 1.0 50.7 76.0 101.3 121.6 126.7 152.0 177.3 202.6 228.0 243.2 253.3 278.6	0.292 0.00135 0.066 0.095 0.122 - 0.148 0.174 0.198 0.223 0.246 - 0.268 0.288	- - - 0.974 0.976 0.979 0.978 -
				<u> </u>		<u>-</u>	
			AUXILIARY				
Equilib copper attache Pressur Magneti vessel. equilib admitte analyse	rium ve of 2 × d to sm e measu c stirr Solv rium ve d and e d by gr ric (ga	S/PROCEDURE: ssel made of be 10 <sup>5</sup> mm <sup>3</sup> capacit all sampling ve red with Bourdo er in equilibr: ent introduced ssel, compresse quilibrated. avimetric (liqu s) techniques. . 1.	ty essel. on gauge. ium into ed gas Samples	<ol> <li>Comper</li> <li>Dis</li> <li>ESTIMATEI</li> <li>δT/K =</li> </ol>	mercial cent p stilled D ERROR: ±0.1;	and dried. $\delta^P/\text{bar} = \pm 0.5;$	mole
				$\delta^{x}$ Ar =	±1%; δ	$y_{\rm Ar} \simeq 0.1$ %.	
				REFERENCE	-		
						B., Ph.D. The of London, <u>19</u>	

COMPONENTS:			ORIGINAL MEASUREMENTS:				
<ol> <li>Argon;</li> <li>Tributy1 126-73-8</li> </ol>		•	and Zubchenko <u>73</u> , <i>40</i> , 595.	o, Yu. P.,			
VARIABLES:			PREPARED	BY:			
Temperature,	pressure		C. L. Y	oung			
EXPERIMENTAL VA	LUES:						
T/K P/b	Mole fraction of argon ar in liquid, <sup>x</sup> Ar	α†	т/к	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	α†	
Ť/	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	= 1 atmos	ppears to phere ad	86.84 91.19 95.35 102.54 108.11 112.27 113.79 133.75 45.09 65.53 79.24 97.27 118.25 135.57		14.3 14.4 15.9 17.1 18.1 19.2 18.8 22.6 7.8 10.7 13.2 16.5 19.6 22.6	
01	liquid at room (						
		AUXILIARY	INFORMATI				
Mixture stir autoclave.	ATUS/PROCEDURE: red by ball in ro Samples of liqui volumetric method ef. l.	id	1. Pur		OF MATERIALS: mole per cen given.	t.	
			$\delta T/K = \delta x_{Ar} = REFERENCE \\ 1. Sha and \\ and \\ \end{bmatrix}$	±5% (est CES: Nkhova, S	<pre>P/bar = ±0.1; imated by com . F., Zubchen L. K., Khim. 8.</pre>	ko. Yu. P.,	

COMPONEN							
	TS:			ORIGINAL MEASUREMENTS:			
l. Ar	gon; Ar;	7440-37-1		Shakhova, S. F. and Zubchenko, Yu. P.			
(1)		inone,1,5-dime 2-pyrrolodinon 75-92-3		Khim. Prom	7., <u>197</u>	<u>73</u> , 49, 595.	
VARIABLE	:S :			PREPARED BY:	:		
Tempera	ature, pr	essure		C. L. Your	ng		
EXPERIME	NTAL VALUE	S:					
т/К	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	α† vol/vol	Т/К	P/bar	Mole fraction of argon in liquid, <sup>x</sup> Ar	n a† vol/vol
298.15 323.15	35.36 50.76 82.38 109.33 34.55 51.98 74.07 89.77	0.0132 0.0182 0.0281 0.0362 0.0136 0.0199 0.0281 0.0325	3.1 4.3 6.7 8.7 3.2 4.7 6.7 7.8	343.15	16.22 34.35 50.05 72.14 92.41 05.99 20.48	0.0145 0.0203 0.0285 0.0350 0.0398	9.7 3.4 4.8 6.8 8.4 9.6 10.9
	Τ̈́/K	ted in origina. = 273.15 and i liquid at room	P = 1 atm	osphere ads		lume of gas a by unit volu	
	Τ̈́/K	= 273.15 and $2$	P = 1 atm	osphere ads			
	Τ̈́/K	= 273.15 and $2$	P = 1 atm temperat	osphere ads			
Mixture autocla analyse	T/K of APPARATU stirred ive. Sau ad by vol	= 273.15 and $2$	P = 1 atm temperat AUXILIARY cking d	INFORMATION	PURITY ( 299.9	by unit volu DF MATERIALS; ) mole per ce	me

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	Argon Solubilities above 200 kPa						
COMPONENTS :				ORIGINAL MEASUREMENTS:			
l. Argon; Ar; [7440-37-1]				Miller, R. C.; Kidnay, A. J.;			
2. Metha	ane; CH	4; [74-8	2-8]	Hiza, M	M.J.Am.	Inst. Che	m. Engnrs.
3. Nitro	ogen; N	2; [7727	-37-9]	J. <u>19</u>	<u>73</u> , <i>19</i> , 145	•	
VARIABLES:	<u></u>			PREPARED	BY:		
Pressure	, compos:	ition		C. L. Y	Young		
EXPERIMENTAL	VALUES:						
Т/К	P/bar		in liquid	Mole	e fractions	in vap	or
		<sup>x</sup> Ar	<sup>x</sup> N <sub>2</sub>	<sup><i>x</i></sup> Сн <sub>4</sub>	${}^{y}$ Ar	<sup>y</sup> N <sub>2</sub>	$y_{CH_4}$
			<u>-</u>				
	4.500	-	-	-	0.8535	0.0060	0.1405
	4.452 5.088	0.4946 0.4841	0.0422 (	).5040 ).4738	- 0.7232	0.1531	0.1236
	7.060	0.4181		).3943	0.4548	0.4609	0.0843 0.0594
	9.100 1.100	0.3382 0.2530		).3024 ).2090	0.2950 0.1900	0.6455 0.7691	0.0408
1	3.169	0.1585	0.7234 (	0.1181	0.1077	0.8672	0.0251
	6.880 7.460	0.8837 0.8462		).1151 ).0962	0.9724 0.8522	0.0021 0.1248	0.0255 0.0229
	9.100	0.7031		0.0789	0.6025	0.3802	0.0173
	1.148	0.5094	0.4341 0	0.0566	0.3797	0.6084	0.0119
	3.115 1.752	0.3119 0.0944		0.0334 0.9039	0.2155 0.4297	0.7765 0.0172	0.0080 0.5531
	3.055	0.0831		0.8558	0.2276	0.4590	0.3134
	5.613	0.6895		0.3089	0.9165	0.0052	0.0782
	9.090 1.165	0.4959 0.3578		0.2038 0.1397	0.4260 0.2663	0.5313 0.7040	0.0427 0.0296
1.	3.142	0.2251	0.6916 0	0.0834	0.1520	0.8299	0.0181
	3.209 5.162	0.3081 0.2795		0.6919 0.6061	0.7629 0.4218	0.0002 0.4315	0.2369 0.1466
	7.174	0.2387		0.5071	0.2510	0.6552	0.0937
	9.095	0.1880	0.4156 (	0.3964	0.1644	0.7592	0.0764
1.	1.190	0.1372	0.5960 (	0.2667	0.0998	0.8508 (c	0.0494 cont.)
		<u></u>	AUVIL TADY	TNEODUAR	TON		
			AUXILIARI	INFORMAT		MARRIELLO	
METHOD/APPA	RATUS/PRO	OCEDURE:		SOURCE A	AND PURITY OF	MAIERIALS;	
Temperatu resistano measured and liqu:	ure measing ce thermo with Boi id samplo graphy.	ured with ometer. urdon gau es analys Details	apparatus. platinum Pressure ge. Gas ed by gas in source		No deta	ils given	1
					ED ERROR:		
					±0.05; δP	/bar = ±0	1.02;
				δ <i>x</i> , δy	= ±1%.		
				Hi:	dnay, A. J.	Ind. Eng.	r, R. C.; Chem. Fund
				2. Mil Hi	ller, R. C. za, M. J. namics <u>197</u>	; Kidnay J. Chem.	Thermo-

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COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; [7440-37-1]	Miller, R. C.; Kidnay, A. J.;
2. Methane; CH4; [74-82-8]	Hiza, M. J. Am. Inst. Chem. Engnrs.
3. Nitrogen; N <sub>2</sub> ; [7727-37-9]	J. <u>1973</u> , <i>19</i> , 145.

EXPERIMENTAL VALUES:

T/K P/bar			in liquid	Mole f	Mole fractions in vapor		
		<sup>x</sup> Ar	<sup>x</sup> N <sub>2</sub>	<sup><i>x</i></sup> Сн <sub>4</sub>	· <sup>y</sup> Ar <sup>y</sup> N <sub>2</sub>		<sup>y</sup> CH <sub>4</sub>
112.00	13.140 1.542 1.545 3.135 3.143	0.0878	0.7595 - 0.0003 - 0.0005	0.1527 0.9307 0.7049	0.0384 0.3588 - 0.7377	0.9408 0.0040 _ 0.0029	0.0208 0.6372 - 0.2594

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COMPONENTS:	EVALUATOR:
3	Colin L. Young, School of Chemistry,
	University of Melbourne, Parkville, Victoria 3052, AUSTRALIA. July, 1978

CRITICAL EVALUATION:

This system has been studied in some detail at high pressure, but some of the studies have been undertaken to establish details of gasgas equilibria rather than conventional high pressure solubility. Tsiklis and Vasil'ev (1) have made a detailed study of phase equilibria in this system up to pressures of 10<sup>4</sup> bar, bur report their data only in small graphical form. Their work is not considered further. Kaminishi (2) has reported measurements at 273.15 K to 323.15 K up to 200 bar. Michels *et al.* (3) reported measurements between 298.15 K and 373.15 K at pressures up to 825 bar and Matous *et al.* (4) presented data between 243.15 K and 303.15 K at 277 and 47.1 bar.

There is good agreement in the overlapping ranges of these three latter studies. The limited data of Heise (5) is also in fair agreement with values obtained by extrapolation of the above studies. All four sets of data (2,3,4,5) are classified as tentative. It is not possible to give a stronger recommendation in view of the limited overlap in the ranges of temperature and pressure.

The results of Cseko and Corrides (6,7) have been rejected, since while the quoted reproducibility is better than 1%, their publication omits the temperature to which these data refer, but it may be inferred from the original publication that the measurements were carried out at room temperature. The solubility is constant to within 10% over between 15 °C and 25 °C.

The data of Zeininger (8) is also rejected as the reported solubility is slightly smaller than that of other workers and is presented in graphical form.

#### References

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- Kaminishi, G. Kogyo Kaguka Zasshi <u>1965</u>, 68, 419 (Int. Chem. Eng. <u>1965</u>
   5, 749. English translation).
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	wiscellaneous	is Compounds 315			
COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Argon; Ar; 7440-				ulin, E. and <i>ica</i> , <u>1961</u> , 2	
2. Ammonia; NH <sub>3</sub> ; 7	664-41-7				
VARIABLES:		PREPARED BY	(;		
Temperature, pressure	e	С. L. Yo	oung		
EXPERIMENTAL VALUES :	· · · · · · · · · · · · · · · · · · ·			·······	
Mole T/K P/bar in lia <sup>x</sup> A				le fraction liquid, <sup>x</sup> Ar	of argon in gas, <sup>y</sup> Ar
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	00307         0.5677           0078         0.7555           0119         0.8233           0161         0.8551           0291         0.8941           0391         0.9085           0474         0.9166           0534         0.9205           0569         0.9177           0527         0.9216           0627         0.9254           00146         0.1834           00723         0.5347           0201         0.7217           0427         0.8021           0628         0.8201           0784         0.8239           1079         0.8306	322.93 348.07 373.75	812.401 50.741 76.081 101.396 202.175 304.792 405.377 506.040 608.746 710.464 759.427 812.404 823.861 101.420 202.175 253.678 278.32 288.43 296.51	0.1129 0.00485 0.0138 0.0228 0.0604 0.1002 0.1405 0.1821 0.2753 0.3049 0.3390 0.3418 0.0205 0.0841 0.1312 0.1652 0.1866 0.2144	0.8362 0.2079 0.3994 0.4986 0.6399 0.6606 0.6493 0.6236 0.5892 0.5469 0.5250 0.4950 0.4950 0.4938 0.2497 0.4182 0.4084 0.3859 0.3649 0.3402
	AUXILIARY	INFORMATIO			
METHOD /APPARATUS/PROC			PURITY OF M	ATERIALS -	
Ammonia added to equ argon passed through for several days. and liquid analysed pressure by adsorbin sulphuric acid. De and ref. 1.	ilibrium cell; liquid ammonia Samples of gas at atmospheric g ammonia in		details g		
		δx <sub>Ar</sub> , δ REFERENCES	$\pm 0.1; \delta P/1$ $y_{Ar} = \pm 0.55$ S: nels, A., s oulin, E.,	bar = ±0.00 % (estimate compile Skelton, G. <i>Physica</i> , <u>1</u>	d by er). F. and

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>1. Argon; Ar; [7440-37-1] 2. Ammonia; NH<sub>3</sub>; [7664-41-7]</pre>	Kaminishi, G., <i>Kogyo Kogaku Zaashi</i> , <u>1965</u> , 68, 419.
VARIABLES:	
Temperature, pressure	PREPARED BY: C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argor T/K P/bar in liquid <sup>x</sup> Ar	
273.15 50.8 0.00561 101.8 0.01084 150.9 0.01509 199.9 0.01845	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
AUXILIARY	INFORMATION
METHOD / PROCEDURE / APPARATUS: Static equilibrium cell with agitator. Pressure measured with Bourdon gauge. Liquid ammonia placed in cell and then argon pressurized into cell. After equi- librium established liquid sample removed and analysed by volumetric and gravimetric techniques. Details in source.	<ul> <li>SOURCE AND PURITY OF MATERIALS:</li> <li>1. Tokai Ammonia Sulfate Co. sample purity 99.99 mole per cent.</li> <li>2. Distilled four times, no other details given.</li> </ul>
	ESTIMATED ERROR: $\delta T/K = \pm 0.1;  \delta^P/bar = \pm 0.1;$ $\delta x_{Ar} = \pm 1$ % (estimated by compiler). REFERENCES:

IVIISCEIIANEOUS	ous Compounds			
COMPONENTS:	ORIGINAL MEASUREMENTS:			
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Ammonia; NH<sub>3</sub>; 7664-41-7</li> </ol>	Matous, J., Sobr, J. and Novak, J. P., <i>Coll. Czech. Chem. Comm.</i> , <u>1970</u> , 35, 3757.			
VARIABLES:	PREPARED BY:			
Temperature, pressure	C. L. Young			
EXPERIMENTAL VALUES:				
Mole fraction of arg T/K P/bar in liquid, <sup>x</sup> Ar	gon .			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				
	INFORMATION			
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
Rocking autoclave apparatus. Cell charged with components equilibrated and pressure measured with Bourdon gauge. Liquid phase sample added to sulfate buffer solution and gaseous argon estimated volumetrically.	<ol> <li>MCHZ-Ostrava sample purity better than 99.99 mole per cent.</li> <li>MCHZ-Ostrava sample purity better than 99.99 mole per cent.</li> </ol>			
	ESTIMATED ERROR: $\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.5;$ $\delta x_{Ar} < \pm 2$ %. REFERENCES:			

,

COMPONENTS :	ORIGINAL MEASUREMENTS:
1. Argon; Ar; 7440-37-1	Heise, F., Ber. Bunsenges. Phys.
2. Ammonia; NH <sub>3</sub> ; 7664-41-7	Chem., <u>1972</u> , 76, 936.
2. maionia, mig, 7004 41 7	
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of argon T/K P/bar in liquid, in vapor,	
T/K P/bar in liquid, in vapor, <sup>x</sup> Ar <sup>y</sup> Ar	
298.15 105.05 0.01664 0.9045	
212.05 0.03120 0.8613 313.15 104.55 0.01957 0.7936	
204.1 0.03835 0.8470	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;
Static rocking equilibrium cell. Liquid and gas samples removed after	1. Messer-Griesheim sample, purity better than 99.95 mole per cent.
equilibrium established. Samples	2. Gerling and Holtz sample, purity
analysed by freezing out ammonia in liquid nitrogen trap. Details in	better than 99.8 mole per cent as determined by gas chromato-
source and ref. 1.	graphy and mass spectrometry.
	ESTIMATED ERROR:
	$\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.3 \text{ below } 100$ bar; $\pm 0.6$ above 100 bar; $\delta x_{ar} = \pm 28$
	bar; ±0.6 above 100 bar; $\delta x_{Ar} = \pm 2\%$ (estimated by compiler).
	REFERENCES :
	1. Heise, F., Dissertation,
	Göttingen, <u>1971</u> .

IVIISCE II all'EOUS	s Compounds 319
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Carbon monoxide; CO; 630-08-0</li> </ol>	Christiansen, L. J., Fredenslund, A. and Mollerup, J., <i>Cryogenics</i> , <u>1973</u> , <i>13</i> , 405.
VARIABLES:	PREPARED BY:
Temperature, pressure	C. L. Young
EXPERIMENTAL VALUES:	
Mole fraction of carb T/K P/bar in liquid, i	on monoxide n gas,
<sup>x</sup> co	<sup>y</sup> co
	. 1040
	.2450 .4060
18.89 0.4830 0	.5450
20.61 0.7470 0	.6770 .7810
	.8000 .8980
21.98 0.9380 0	.9470
	.1000 .2150
31.78 0.2460 0	.2690
	.3670
	.5710 .6700
AUXILIARY	INFORMATION
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Recirculating vapor flow apparatus. Temperature measured with platinum resistance thermometer; pressure measured with dead weight piston gauge. Coexisting samples analysed by gas chromatography. Details in ref. 1.	No details given. ESTIMATED ERROR: $\delta T/K = \pm 0.01;  \delta P/bar = \pm 0.01;  \delta x_{CO} = \pm 0.004;  \delta y_{CO} = \pm 0.003$ (estimated by compiler).
	<pre>REFERENCES: 1. Fredenslund, A., Mollerup, J. and Christiansen, L. J., Cryogenics, 1973, 13, 414.</pre>

Argon Solubilities above 200 kPa

COMPONENTS				
COMPONENTS:				ORIGINAL MEASUREMENTS:
l. Arg	on; Ar	; 7440-37-1		Kaminishi, G., Arai, Y., Saito, S.
				and Maeda, S., J. Chem. Engng. Japan,
2. Carbon dioxide; $CO_2$ ; 124-38-9			-38-9	<u>1968</u> , 1, 109.
VARIABLES	:			PREPARED BY:
Temperature, pressure				C. L. Young
iemperature, pressure				
EXPERIMENTAL VALUES:				L
		Mole fraction	n of argo	n
т/к	<i>P/</i> bar	in liquid,	in gas,	
		$x_{Ar}$	${}^{y}$ Ar	
				-
233.15	25.7	_	0.552	
	43.8	-	0.683	
	61.4 98.8	0.120 0.216	0.734 0.754	
	132.3	0.350	0.706	
253.15	43.8 61.4	0.053 0.095	0.454 0.548	
	98.8	0.205	0.613	
	122.6 130.3	0.295	0.582 0.548	
273.15	43.8	-	0.149	
	49.7 61.4	0.033 0.061	0.211 0.301	
	79.2	0.106	0.383	
	98.8 108.6	0.171 0.214	0.411 0.396	
	114.2	0.252	0.378	
	116.3 116.7	0.282 0.310	0.352 0.324	
	110./	0.310	0.324	
			AUXILIARY	INFORMATION
METHOD /A	METHOD /APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:			
			etic	1. Nippon Sanso Industry Co. sample,
stirrer		perature measur s thermometer a		purity 99.99 mole per cent.
		red with Bourdo		2. No details given.
After equilibrium established vapor and liquid samples analysed by a			l vapor	
		hnique. Carbo		
dioxide	was ab	sorbed in potas	sium	
hydroxi	de solu	tion.		
				ESTIMATED ERROR:
				$\delta T/K = \pm 0.1;  \delta P/bar = \pm 0.1;$
				$\delta x_{Ar}$ , $\delta y_{Ar} = \pm 1$ % (estimated by
				compiler).
				REFERENCES :

COMPONENTS:		
	ORIGINAL MEASUREMENTS:	
<ol> <li>Argon; Ar; 7440-37-1</li> <li>Carbon dioxide; CO<sub>2</sub>; 124-38-9</li> </ol>	Sarashina, E., Arai, Y. and Saito, S., <i>J. Chem. Engng. Japan</i> , <u>1971</u> , 4, 379.	
VARIABLES:	PREPARED BY:	
Pressure	C. L. Young	
EXPERIMENTAL VALUES:		
Mole fraction of argo T/K P/bar in liquid, <sup>x</sup> Ar	, ,	
288.15         75.1         0.060           87.5         0.100           94.6         0.134           97.8         0.167		
AUXILIARY	INFORMATION	
AUXILIARY METHOD /APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:	
	SOURCE AND PURITY OF MATERIALS: No details given.	
METHOD /APPARATUS/PROCEDURE: Dew point-bubble point glass cell. Glass capillary cell fitted with magnetic stirrer. Pressure measured with a dead weight gauge. Tempera- ture measured with mercury in glass thermometer. Mixtures of known composition charged into cell. Bubble point determined from plots of volume against pressure. Dew point determined visually. Details in	SOURCE AND PURITY OF MATERIALS: No details given.	

### SYSTEM INDEX

Underlined page numbers refer to evaluation text and those not underlined to compiled tables. The compounds are listed in the order as in the Chemi-cal Abstracts indexes. For example, toluene is listed as benzene, methyl-, and dimethylsulfoxide is listed as methane, sulfinylbis-. Many other names are cross-referenced to the name as used in the Chemical Abstracts Chemical Substance index.

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N,N,N-trimethyl-, bromid	ie comide
potassium, see potassium br sodium, see sodium bromide	
totrabutyl ammonium see l-	butanaminium, N,N,N-tributyl,
bromide	
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bromide	
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bromide	Lauren and mission AT AT AT AT A COMPANY
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magnesium, see magnesium ch	
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