INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

.

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# SOLUBILITY DATA SERIES

Volume 45/46

## **GASES IN MOLTEN SALTS**

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# SOLUBILITY DATA SERIES

Volume 45/46

# **GASES IN MOLTEN SALTS**

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# CONTENTS

Foreword Preface Introduction to the So Acknowledgements	olubility of Gases in Molten Salts	ix xi xii xvii
1. He	Single component nitrates Single component fluorides Binary nitrates Binary fluorides Ternary fluorides	1 1 7 8 9 14
2. Ne	Binary fluorides Ternary fluorides	16 16 18
3. Ar	Single component nitrates Single component chlorides Single component bromides Single component iodides Binary nitrates Binary fluorides Binary oxides Ternary fluorides	19 19 36 43 44 45 46 49 53
4. Xe	Binary fluorides Ternary fluorides	54 54 57
5. H <sub>2</sub>	Single component hydroxides Single component fluorides Binary fluorides Binary nitrates Binary hydroxides Binary carbonates Binary acetates Ternary carbonates	58 58 60 61 62 63 64 65 67
6. D <sub>2</sub>	Single component fluorides	68 68
7. O <sub>2</sub>	Single component nitrates Single component carbonates Single component sulfates Binary nitrates Binary carbonates Binary oxides Mixed carbonate - chloride systems Binary sulfates Ternary carbonates Ternary oxides	69 69 72 74 75 77 84 88 89 90 94

SPS TE/re/to WSIUS

8 N.		95
o. N2	Single component nitrates	95
	Single component chlorides	107
	Binary nitrates	108
	Ternary carbonates	110
9. F2		111
- <b>L</b>	Binary chlorides	111
	·	
10. Cl <sub>2</sub>		114
2	Single component chlorides	114
	Binary chlorides	145
	Ternary chlorides	175
	Multi - component chlorides	177
		170
11. Br <sub>2</sub>		179
	Single component bromides	1/9
	Binary bromides	185
		106
12. I <sub>2</sub>		186
	Single component lodides	100
	Binary nitrates	100
	Binary chlorides	109
	Binary iodides	190
		101
13. CO	at the second shipsides	101
	Single component chlorides	105
	Single component carbonates	195
	Binary nitrates	190
	Binary chlorides	200
	Binary carbonates	200
	Ternary carbonates	205
14 000		205
14. 002	Single component nitrates	205
	Single component chlorides	200
	Single component fluorides	220
	Single component hromides	240
	Single component indide	240
	Single component carbonates	255
	Binary nitrates	256
	Binary fluorides	261
	Binary chlorides	262
	Mixed - oxide chloride systems	266
	Mixed - oxide fluoride systems	270
	Ternary carbonates	273
	Oxide - binary fluoride	275
	•	
15. NO <sub>2</sub>		276
-	Binary nitrates	276
16. SO <sub>2</sub>		277
	Single component sulfates	277
17. HF		279
	Single component fluorides	279
	Binary fluorides	280
	Multi - component fluorides	290
		_
18. DF		291
	Binary fluorides	291

ĸ ,

19. HCI	Single component fluorides Single component bromides Binary chlorides ternary chlorides	293 293 324 325 337
20. HNO3	Binary nitrates	340 340
21. H <sub>2</sub> O	Single component nitrates Single component nitrites Single component chlorides Single component bromides Single component perchlorates Single component hydroxides Binary nitrates Nitrate - nitrite systems	341 352 353 358 362 363 366 384
	Binary chlorides Nitrate - chloride systems Binary hydroxides Nitrate Dichromate systems Binary acetates Ternary nitrates Nitrate - two component nitrites Two component nitrate - chloride systems	386 387 388 389 390 391 400 402
22. D <sub>2</sub> O	Binary nitrates	403 403
23. H <sub>2</sub> S	Binary nitrates	404 404
24. NH3	Single component nitrates Binary nitrates Binary perchlorates Ternary nitrates	405 405 411 416 417
25. SiCl <sub>4</sub>	Single component chlorides Binary chlorides	418 418 420
, 26. TiCl <sub>4</sub>	Single component chloridès Binary chlorides	421 421 435
27. VOCI <sub>3</sub>	Single component chlorides Binary chlorides	442 442 444
28. CH <sub>4</sub>	Binary nitrates	445 445
29. CHCl3, (Cl	H3)2 CO Binary nitrates	446 446
30. BF <sub>3</sub>	Multi - component fluorides	448 448

.

449
449
474
522
524
537

į

ł

System Index	538
Desister Number Index	547
Registry Number much	550
Author Index	556
Solubility Data Series: Published and Forthcoming Volumes	222

## FOREWORD

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

The Solubility Data Series is a project of Commission V.8 (Solubility Data) of the International Union of Pure and Applied Chemistry (IUPAC). The project had its origins in 1973, when the analytical Chemistry Division of IUPAC set up a Subcommission on Solubility Data under the chairmanship of the late Prof. A.S. Kertes. When publication of the Solubility Data Series began in 1979, the Committee became a full commission of IUPAC, again under the chairmanship of Prof. Kertes, who also became *Edutor-In-Chief* of the Series. The Series has as its goal the preparation of a comprehensive and critical compilation of data on solubilities in all physical systems, including gases, liquids and solids.

The motivation for the Series arose from the realization that, while solubility data are of importance in a wide range of fields in science and technology, the existing data had not been summarized in a form that was at the same time comprehensive and complete. Existing compilations of solubility data indeed existed, but they contained many errors, were in general uncritical, and were seriously out-of-date.

It was also realized that a new series of compilations of data gave educational opportunities, in that careful compilations of existing data could be used to demonstrate what constitutes data of high and lasting quality. As well, if the data were summarized in a sufficiently complete form, any individual could prepare his or her own evaluation, independently of the published evaluation. Thus, a special format was established for each volume, consisting of individual data sheets for each separate publication, and critical evaluations for each separate system, provided sufficient data from different sources were available for comparison. The compilations and, especially, the evaluations were to be prepared by active scientists who were either involved in producing new data, or were interested in using data of high quality. With minor modifications in format, this strategy has continued throughout the Series.

In the standard arrangement of each volume, the Critical Evaluation gives the following information:

(i) A text which discusses the numerical solubility information which has been abstracted from the primary sources in the form of compilation sheets. The text concerns primarily the quality of the data, after consideration of the purity of the materials and their characterization, the experimental method used, the uncertainties in the experimental values, the reproducibility, the agreement with accepted test values, and, finally, the fitting of the data to suitable functions, along with statistical tests of the fitted data.

(*ii*) A set of recommended data, whenever possible, including weighted averages and estimated standard deviations. If applicable, one or more smoothing equations which have been computed or verified by the evaluator are also given.

(iii) A graphical plot of the recommended data, in the form of phase diagrams where appropriate.

The Compilation part consists of data sheets which summarize the experimental data from the primary literature. Here much effort is put into obtaining complete coverage; many good data have appeared in publications from the late nineteenth and early twentieth centuries, or in obscure journals. Data of demonstrably low precision are not compiled, but are mentioned in the Critical Evaluation. Similarly, graphical data, given the uncertainty of accurate conversion to numerical values, are compiled only where no better data are available. The documentation of data of low precision can serve to alert researchers to areas where more work is needed. A typical data sheet contains the following information:

- (i) list of components: names, formulas, Chemical Abstracts Registry Numbers;
- (ii) primary source of the data;
- (iii) experimental variables;
- (iv) compiler's name;
- (v) experimental values as they appear in the primary source, in modern units with explanations if appropriate;
- (vi) experimental methods used;
- (vii) apparatus and procedure used;
- (viii) source and purity of materials used;
- (ix) estimated error, either from the primary source or estimated by the compiler;
- (x) references relevant to the generation of the data cited in the primary source.

Each volume also contains a general introduction to the particular type of system, such as solubility of gases, of solids in liquids, etc., which contains a discussion of the nomenclature used, the principle of accurate determination of solubilities, and related thermodynamic principles. This general introduction is followed by a specific introduction to the subject matter of the volume itself.

The Series embodies a new approach to the presentation of numerical data, and the details continue to be influenced strongly by the perceived needs of prospective users. The approach used will, it is hoped, encourage attention to the quality of new published work, as authors become more aware that their work will attain permanence only if it meets the standards set out in these volumes. If the Series succeeds in this respect, even partially, the Solubility Data Commission will have justified the labour expended by many scientists throughout the world in its production.

January, 1989

J.W. Lorimer, London, Canada

## PREFACE

This volume in the Solubility Data Series contains tabulated collections and critical evaluations of original data for the solubility of gases in molten salts. Most of the solubilities were measured as a function of temperature above the melting point of the molten salt system. Some studies were made at different pressures. Where possible data are also reported in terms of a smoothing equation which represents the solubility or the Henry's law constant as a function of temperature. Heats of solution and entropies of solution are also reported where available.

Within the volume, material is arranged according to the individual gas. The gases include hydrogen halides, inert gases, oxygen, nitrogen, hydrogen, carbon dioxide, water vapor and halogens. The molten salt solvents consist of both single salts, binary mixtures and multicomponent systems. A special section on solubilities of gases in molten silicate systems is also included with the focus on slags and fluxes.

The data were gathered from a search of the chemical literature through the end of 1989, and make up a unique and valuable survey of the solubility of gases in molten salts.

The solubility of gases in molten salts has important implications in the various technological applications of molten salts. Some of these applications include high temperature molten salt batteries, extractive metallurgical processes such as the extraction of aluminum by electrolysis of fused chlorides, synthesis using molten salt systems, and energy storage in molten salts.

The editors would like to acknowledge the help and advice from several fellow members of the IUPAC commission on Solubility Data and in particular Professor Larry Clever (Emory University) and Dr. Peter Fogg (U.K).

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September 1990.

## INTRODUCTION TO THE SOLUBILITY OF GASES IN MOLTEN SALTS

R. P. T. TOMKINS and N. P. BANSAL

#### 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 on data sheets set out in a uniform format. The data for each system are evaluated and where data of sufficient accuracy are available, recommended values are advanced 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 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, where as 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 molten salts 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 kelvins. Heats of solution data are given in KJ mol<sup>-1</sup>.

#### 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 for 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.

#### 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 absorbing liquid is probably the most often overlooked serious source of error in gas solubility measurements.

#### APPARATUS AND PROCEDURES

In the compiled tables some key points are made of the apparatus and procedure. There are several reviews on experimental methods of determining gas solubilities in molten salts and these are given in references 1 - 16.

#### 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(1)/M(1)]

where 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 Mass Per Cent Solubility, 100W

For a binary system this is given by
 wt% = 100 W(g)/[W(g) + W(l)]

where W is the weight of the substance. As in the case of mole fraction, the pressure (partial or total) and the temperature must be specified.

#### The Mass Solubility, Cw

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

 $C_W M(1)$ 

x(g) (partial pressure 1 atm)

 $1 + C_W M(1)$ 

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

#### The Amount concentration, 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

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

where v°(1) is the molar volume of the liquid component.

#### The Bunsen Coefficient, a

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

$$a = \frac{V(g) T_0}{V(1) T}$$

where V(g) is the volume of gas absorbed and V(l) is the original (starting) volume of absorbing solvent and  $T_{\odot}$  = 273.15 K. The mole fraction solubility is related to the Bunsen coefficient by

$$x(g, 1 atm) =$$

$$\alpha + T_0 V^0(g)$$

$$T V^0(g)$$

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

$$x(g) = \frac{\alpha}{\alpha + T_0}$$

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 unit mass of gas, reduced to 273.15 K and 1 atmosphere pressure, dissolved at a partial pressure of gas of 1 atmosphere by unit mass of solvent.

#### The Ostwald Coefficient, L

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

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

If the gas is ideal and Henry's law is applicable, the Ostwald coefficient is independent of the partial pressure of the gas. It is necessary, in practice, to state the temperature and the total pressure for which the Ostwald coefficient is measured.

The mole fraction solubility,  $\mathbf{x}$ , is related to the Ostwald coefficient by

$$x(g) = \begin{vmatrix} RT \\ P(g) & L & V^{O}(1) \end{vmatrix}^{-3}$$

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

#### The Absorption Coefficient, B

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

$$\beta = \alpha \left[ 1 - P(1) \right]$$

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

#### The Henry's Law Constant

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

$$P(q) = K_H X(q)$$

where  $K_{\prime\prime}$  is the Henry's law constant and x the mole fraction solubility. The other formulations are

$$P(q) = K_2C(1)$$
 or  $C(q) = K_CC(1)$ 

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

$$N = n(g)/n(1)$$

Table 1 contains a presentation of the most commonly used interconversions 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 densitites or the partial molar volume of gases must be known. Corrections should be made for the possible nonideality of the gas or the non-applicability of Henry's law.

Table 1. Interconversion of parameters used for reporting solubility.

 $L = \alpha (T/T_{0}), \quad T_{0} = 273.15 \text{ K}$   $C_{W} = \alpha / V_{0}p$   $K_{H} / \text{mm Hg} = \frac{17.033 \times 10^{6} \text{p(soln)}}{\alpha M(1)} + 760$ 

 $L = C_w V_{t,gas}p$ 

where  $v_{o}$  is the molal volume of the gas in cm<sup>-3</sup>mol<sup>-1</sup> at 0°C, p the density of the solvent at the temperature of the measurement,  $p_{goln}$  the density of the solution at the tempertature of the measurement, and  $V_{t,gas}$  the molar volume of the gas at the temperature of the measurement.

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Iguchi, Y.; Ban-Ya, S.; Fuwa, T.

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Chem. Met of Iron and Steel, Proc. Intl. Symp. on Met. Cem-Appl. on Ferrous Metallurgy, held at University of Sheffield, U. K., July 1971, The Iron and Steel Inst, London, U. K.; 1973, 28 - 30. Figure. Solubility of H<sub>2</sub>O in various CaO - SiO<sub>2</sub> melts at  $1600^{\circ}$ C. Figure. Solubility of water in CaO - Li<sub>2</sub>O - SiO<sub>2</sub> as a function of CaO/SiO<sub>2</sub> Figure. Solubility of water in CaO - SiO<sub>2</sub> - SrO melts as a function of CaO/SiO<sub>2</sub> 499

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Shimoo, T.; Kimura, H.; Kawai, M. Nippon Kinzoku Gakkaishi. <u>1971</u>, 35, 1103 - 1108. Figure. Slag compositions investigated on solubility of nitrogen in molten CaO - SiO<sub>2</sub> -Al<sub>2</sub>O<sub>3</sub> slag at 1773K 526

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Uys, J. M.; King, T. B;	
Trans. Met. Soc. AIME. 1963, 227, 492 - 500	
Figure. Solubility of $H_2O$ in Li <sub>2</sub> O - SiO <sub>2</sub> melts.	451
Figure. Solubility of H <sub>2</sub> O in FeO - SiO <sub>2</sub> melts.	469
Figure. Solubility of $H_2O$ in CoO - SiO <sub>2</sub> melts.	472
Figures 1-2. Solubility of $H_2O$ in $SiO_2$ - ZnO melts.	473
Figures 1-3. Solubility of water in Li <sub>2</sub> O - CaO - SiO <sub>2</sub> melts	474 - 476

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Kurkjian, C. R.; Russel, L. E;	
J. Soc. Glass Tech. 1958, 42, 130T - 144T	
Figures 1-2. Solubility of H <sub>2</sub> O in Li <sub>2</sub> O - SiO <sub>2</sub> melts.	449, 450
Figures 1-3. Solubility of $H_2O$ in $Na_2O$ - SiO <sub>2</sub> melts	453 - 455
Figures 1-2. Solubility of $H_2O$ in $K_2O$ - SiO <sub>2</sub> melts	458, 459

Tomlinson, L. E. J. Soc. Glass Tech. <u>1956</u>, 40, 25T - 31T Figures 1-2. Solubility of  $H_2O$  in sodium silicate approximately  $Na_2O \cdot 2SiO_2$  at 900, 1000 and  $1100^{\circ}C$  456

535

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Dancy, E. A.; Janssen, D. Can. Metallurgical Quart. <u>1976</u>, 15, 103 - 110 Figure. Nitrogen content of three slags as a function of temperature

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Wahlster, M.; Reichel, H. H. Arch. Eisenhuettenwes. <u>1969</u>, 40, 19 - 25 Figure. The solubility of H<sub>2</sub>O in various CaO - FeO - SiO<sub>2</sub> melts at 1873K 518

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Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. <i>Trans. Iron Steel Inst. Japan</i> <u>1966</u> , 6, 225 - 232 Figures 1-2. Solubility of H <sub>2</sub> O in various CaO - SiO <sub>2</sub> melts Figure. Solubility of water as hydrogen content in CaO - P <sub>2</sub> O <sub>5</sub> - SiO <sub>2</sub> melts	462, 463 506
Iguchi, Y.; Ban-Ya, S.; Fuwa, T. Trans. Iron Steel Inst. Japan. <u>1969</u> , 9, 189 - 195 Figure. Solubility of water in CaO - SiO <sub>2</sub> as a function of temperature Figure. Solubility of H <sub>2</sub> O in Al <sub>2</sub> O <sub>3</sub> - SiO <sub>2</sub> melts Figure. Solubility of H <sub>2</sub> O in CaO - SiO <sub>2</sub> - TiO <sub>2</sub> melts Figure. Iso-water vapor capacity lines in CaO - FeO - SiO <sub>2</sub> melts at 1450 <sup>O</sup> C Figure. Iso-solubility lines of water in CaO - FeO - SiO <sub>2</sub> melts at 1550 <sup>O</sup> C	464 503 510 511 520
Iguchi, Y.; Fuwa, T. Trans Iron Steel Inst. Japan. <u>1970</u> , 10, 29 - 35 Figures. 1-3 Solubility of water in CaO - MgO -SiO <sub>2</sub> melts at 1550 <sup>O</sup> C	490 - 492
Ban-Ya, S.; Iguchi, Y.; Yamamoto, S <i>Tetsu to Hagane</i> . <u>1986</u> , 72, 2210 - 2217 Figure. Iso-water vapor capacity lines in CaO - MgO - SiO <sub>2</sub> melts at 1400 <sup>0</sup> C	493
Ban-Ya, S.; Iguchi, Y.; Nagata, S <i>Tetsu to Hagane</i> . <u>1985</u> , 71, 55 - 62 Figure. Iso-contours of water vapor capacity	504
Imai, M.; Ooi, H.; Emi, T. Tetsu to Hagane. <u>1962</u> , 48, 111 - 117 Figure. Solubility of water in CaO - Fe- SiO <sub>2</sub> melts at 1550 <sup>0</sup> C	515

	1	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Helium; He; [7440-59-7]	Cleaver, B.; Mather, D. E.	
(2) Lithium nitrate; LiNO₃; [7790-69-4]	<b>Trans. Faraday Soc.</b> <u>1970</u> , <b>66</b> , 2469 - 82.	
VARIABLES:	PREPARED BY:	
T/K = 543 P/kPa = 25000 - 10 <sup>5</sup>	N. P. Bansal	
EXPERIMENTAL VALUES:	I	
Solubilities of helium in the mel are presented in graphical form as a range 250 - 1000 bar. The value of H	It at only one temperature, 270°C, a function of the gas pressure in the Henry's law constant, $K_{H}$ , is:	
t/°C 107	′K <sub>#</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>	
270	1.51 ± 0.4	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
High pressure elution method. Diagram and details of the apparatus are given in the original paper. The melt was saturated by stirring it in contact with the gas at high pressure. A sample of the saturated melt was isolated and analyzed by the elution technique.	Helium (99.8%) was used as received from the British Oxygen Company without further purification or drying. LiNO <sub>3</sub> (99.9%) obtained from Johnson Matthey & Co.was recrystallized from distilled water and dried at 120°C. It was stored in an oven at 100°C.	
	ESTIMATED ERROR:	
	$\delta P/bar = \pm 10$	
1	REFERENCES:	

COMPONENTS: (1) Helium; He; [7440-59-7] (2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] EVALUATOR: N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Only three studies (1 - 3) have been reported for the solubility of helium in molten sodium nitrate. Smoothed data from these studies, at different temperatures, are compared below:

107 K<sub>H</sub>/mol cm<sup>-3</sup> atm<sup>-1</sup>

т/к	Field & Green (1)	Cleaver & Mather (2)	Copeland & Zybko (3)
590	0.87	(1.75)	<u> </u>
600	0.91	(1.83)	
620	0.99	1.99	
640	1.07	2.17	22.7*
660	1.16	2.34	
680	(1.25)	2.51	
700	(1.33)	2.69	

At 642 K

Values in ( ) outside temperature interval of experimental measurement.

Copeland and Christie (4) have pointed out that solubility results reported earlier from their laboratory are not reliable. Therefore, the results of Copeland and Zybko (3) are rejected.

Solubility values of Cleaver and Mather (2) are two times larger than those of Field and Green. Although the heats of solution reported by the two groups are in excellent agreement, the entropy values are different. This is because the disagreement between the results lies in the magnitude rather than in the temperature dependence of the solubility.

Additional studies are required in order to evaluate and to advance recommended values for this system.

References:

1. Field, P. E.; Green, W. J. J. Phys. Chem. 1971, 75, 821.

2. Cleaver, B.; Mather, D. E. Trans. Faraday Soc. 1970, 66, 2469.

3. Copeland, J. L.; Zybko, W. C. J. Phys. Chem. 1966, 70, 181.

4. Copeland, J. L.; Christie, J. R. J. Phys. Chem. 1971, 75, 103.

2

	3	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Helium; He; [7440-59-7]	Field, P. E.; Green, W. J.	
<pre>(2) Sodium nitrate; NaNO<sub>3</sub>;     [7631-99-4]</pre>	Green, W. J. <b>Ph.D. Thesis</b> , Virginia Polytechnic Institute 1969.	
VARIABLES:	PREPARED BY:	
T/K = 588 - 675 P/kPa = 126.656 - 130.709	N. P. Bansal	
EXPERIMENTAL VALUES:		
Henry's law is obeyed over the pressure range studied $(1.25 - 1.29 \text{ atm})$ . The values of Henry's law constant, $K_{H}$ , for the solubility of He in molten NaNO <sub>3</sub> at different temperatures are:		
T/K 10 <sup>7</sup>	K <sub>FF</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
588	0.856	
618 643	0.980 1.068	
675	1.223	
Smoothed Data:		
The temperature dependence of $K_{H}$	is expressed by the equation:	
$\log(K_{rr}/mol \ cm^{-3} \ atm^{-1}) = (-5.87)$	± 0.06) - (703.60 ± 0.04)/(T/K)	
std. dev	<i>r</i> . = 0.32%	
The enthalpy of solution, <b>AH</b> , and	the entropy of solution, AS, are:	
∧H/kcal mol-	$= 3.22 \pm 0.18$	
∧S/cal K <sup>-1</sup> mol <sup>-</sup>	$-1 = -5.28 \pm 0.29$ (at 637 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution technique.	Helium and argon obtained from	
Diagram of the gas solubility	Airco were used directly from the cylinder.	
apparatus is given in the original publication.	Baker's reagent grade sodium nitrate was used without further	
The experimental process consisted of three steps:	purification.	
saturation, elution and analysis. After saturating the melt with He		
gas, the gas phase was evacuated. Argon was introduced into the		
system as eluting gas to approx. 1 atm. pressure. The resultant gas	ESTIMATED ERROR:	
mixture was analyzed with an Aerograph Model 90 - P gas	solubility = $\pm 5\%$ (authors)	
chromatograph (Varian). The carrier gas used was also argon.		
Average of four measurements was used for calculation of the gas solubility.	REFERENCES:	
	<u> </u>	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Helium; He; [7440-59-7]	Cleaver, B.; Mather, D. E.
(2) Sodium nitrate; NaNO₃; [7631-99-4]	<b>Trans. Faraday Soc.</b> <u>1970</u> , <b>66</b> , 2469 - 82.
VARIABLES: $T/K = 605 - 714$	PREPARED BY:
$P/kPa = 11000 - 10^{5}$	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of helium in the mel only in the graphical form as a func range 110 - 1000 bar. Values of Henr	It at three temperatures are presented stion of the gas pressure in the cy's law constant, $K_{H}$ are:
t/°C 107	′K <sub>m</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>
332	1.86 + 0.3
391	2.32 ± 0.3
***	2.80 1 0.3
Smoothed Data:	
Temperature dependence of $K_{H}$ is e	expressed by the relation:
log(K./mol ml <sup>-1</sup> bar <sup>-1</sup> ) =	= -5.574 - 701.4/(T/K) (compiler)
	$= 0.6\% \qquad (compiler)$
AH/KJ mol	-+ = 13.4
ΔS°/J K <sup>-1</sup> π	$nol^{-1} = -17.4$
AH is the enthalpy of solution, a solution.	nd AS° is the standard entropy of
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
High pressure elution technique. Diagram and details of the apparatus are given in the original paper. The melt was	Helium (99.8%) was used as received from British Oxygen Company without further purification or drying.
saturated by stirring it in contact with the gas at high pressure. A portion of the	grade from B. D. H. was purified by filtration through Pyrex frits in the molten state. The melt was
saturated melt was isolated and analyzed by the elution technique.	allowed to freeze and stored in vacuo.
	ESTIMATED ERROR:
	$\delta P/bar = \pm 10$
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Helium; He; [7440-59-7]	Copeland, J. L.; Zybko, W. C.
<pre>(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]</pre>	J. Phys. Chem. <u>1966</u> , 70, 181 - 86.
[1007.22.4]	
	DEDADED BY.
one temperature: T/K = 642	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of helium in molt determined up to a saturating gas p obeyed. The value of Henry's law co	en sodium nitrate at 369°C was ressure of 321 atm. Henry's law was nstant, K <sub>H</sub> , is given as:
t/°C 10	$^{7}$ K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
369	22.7 ± 0.7
AUXILIAR	/ INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The method used for the gas solubility measurements in the melt was the same as described elsewhere (1).	Helium (99.99%) from the National Gas Co. was used. Reagent grade sodium nitrate from Baker and Adamson was used without further purification other than drying.
	ESTIMATED ERROR:
	Mothing specified
	REFERENCES :
	1. Copeland, J. L.; Zybko, W. C.
	J. Phys. Chem. <u>1965</u> , <b>69</b> , 3631.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Helium; He; [7440-59-7]	Copeland, J. L.; Radak, S.
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	<b>J. Phys. Chem. <u>1967</u>, 71, 4360 - 65.</b>
VARIABLES: P/kPa = 5167.58 - 25027.28 one temperature: T/K = 523	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of helium in molte determined upto a saturating gas pre obeyed. The value of Henry's law con	en silver nitrate at 250°C was essure of 247 atm. Henry's law was estant, K <sub>H</sub> , is given as:
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
250	3.57 ± 0.48
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The equipment and technique used for gas solubility were exactly the same as described elsewhere (1).	SOURCE AND PURITY OF MATERIALS: Helium (99.98%) gas from National Cylinder Gas Co. was used. Reagent grade silver nitrate obtained from Mallinckrodt, Fisher Scientific and Baker were used. Before each measurement, silver nitrate was fused, allowed to cool and solidify in a porcelain casserole placed in a desiccator and then finely pulverized. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Copeland, J. L.; Zybko, W. C. J. Phys. Chem. <u>1965</u> , <b>69</b> , 3631.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Helium; He; [7440-59-7]	Malinauskas, A. P.; Richardson, D. M.
(2) Dilithium beryllium fluoride; Li₂BeF₄	<b>Ind. Eng. Chem. Fundam. <u>1974</u>, 13,</b> 242 - 45.
VARIABLES:	PREPARED BY:
T/K = 773 - 1073 P/kPa = 101.325 - 202.650	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constan L, for the solubility of helium in r are:	nt, $K_{H}$ , and the Ostwald coefficient, molten Li <sub>2</sub> BeF <sub>4</sub> at various temperatures
T/K 10 <sup>8</sup> K <sub>H</sub> <sup>a</sup> /mol cm	<sup>-3</sup> atm <sup>-1</sup> 10 <sup>3</sup> L
$\begin{array}{cccc} 773 & 6.08 \pm 0 \\ 873 & 8.38 \pm 0 \\ 973 & 11.47 \pm 0 \\ 1073 & 16.47 \pm 0 \end{array}$	.39 $3.86 \pm 0.25$ .15 $6.01 \pm 0.11$ .23 $9.16 \pm 0.18$ .25 $14.51 \pm 0.22$
Calculated by the compiler using	ng the relation $K_{H} = L/RT$ .
Smoothed Data: Temperature dependence of K <sub>H</sub> and	L are expressed by the relations:
$\log(K_{H}/mol \ cm^{-3} \ atm^{-1})$	= -5.7095 - 1177/(T/K)
$\log L = \log(T/K) - 1$	1177/(T/K) - 3.7954
The enthalpy of solution, $\Delta H$ , and	d the standard entropy of solution,
$\Delta S^{\circ}$ , are: $\Delta H/kcal mol^{-1}$	<sup>1</sup> = 5.39 ± 0.49
$\Delta S^{\circ}/eu =$	-3.6 ± 0.6 (at 1000 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method. The diagram and details of the apparatus used and the experimental procedure followed have been described earlier (1). In brief, the melt was saturated with helium and a known volume of	Helium and xenon were 99.9% pure. Helium gas was purified by passing through liquid nitrogen cooled coils of copper tubing.
transferred to the stripper. The dissolved helium was freed by fluching with works and	
analyzed by mass spectroscopy.	ESTIMATED ERROR:
	NOTHING Specified
	REFERENCES:
	<ol> <li>Malinauskas, A. P.; Richardson, D. M.; Savalainen, J. E.; Shaffer, J. H. Ind. Eng. Chem. Fundam. <u>1972</u>, 11, 584.</li> </ol>

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Helium; He; [7440-59-7] (2) Sodium nitrate; NaNO<sub>3</sub>;     [7631-99-4] (3) Potassium nitrate; KNO<sub>3</sub>;     [7757-79-1]</pre>	Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1972</u> , <b>68,</b> 2083 - 89.
VARIABLES:	PREPARED BY:
T/K = 508 - 603	N. P. Bansal
$P/kPa = 10^2$	
EXPERIMENTAL VALUES:	
The solvent used was an equimolar potassium nitrates. The solubilities temperatures are:	r molten mixture of sodium and s of helium in the melt at four
Т/К 108	$K_{H}/mol \ cm^{-3} \ bar^{-1}$
508	2.9
533	3.5
603	5.4
Smoothed Data:	
The temperature dependence of Her	will low constant K is siven by
the relation: log(K <sub>H</sub> /mol cm <sup>-3</sup> bar <sup>-1</sup> ) = std. dev	= -5.834 - 865.7/(T/K) (compiler)
The enthalpy of solution, AH, and AS°, are;	the standard entropy of solution,
∧H/kJ mo]	$-^{-1} = 16.5$
^S°/J K⁻¹ n	$nol^{-1} = -23$ (at 533 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed degassed for a long time. The vacuum was disconnected and helium gas was introduced at about one bar pressure. The melt was vigorously stirred; pressure variations were noted with a manometer with time until the equilibrium was attained. The amount of gas dissolved was calculated from the final pressure variation after a suitable calibration.	Helium (High Purity grade) was purified by keeping in contact with Ascarite. for several hours to remove CO2 and other acidic impurities and molecular sieve 5A at - 80°C to remove water impurities. Reagent grade sodium and potassium nitrates were used to prepare the solvent which was filtered in the molten state. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. L. Electrocord, Chem. 1072, 29
	373.

COMPONENTS:	EVALUATOR:
(1) Helium; He; [7440-59-7]	N. P. Bansal National Aeronautics and Space
<pre>(2) Lithium fluoride; LiF;</pre>	Administration.
[7789-24-4]	Lewis Research Center
(3) Beryllium fluoride; BeF <sub>2</sub> ;	Cleveland, Ohio, 44135. U.S.A.
[7789-49-7]	December, 1989.

CRITICAL EVALUATION:

Three experimental studies are available for the solubility of helium in molten lithium fluoride - beryllium fluoride mixture. One of these studies (1) reported only a single data point at one temperature and this has been included in the later study (2) by the same workers. Values of the Henry's law constant are compared below at different temperatures along with the thermodynamic parameters:

	10 <sup>B</sup> K <sub>H</sub> /mol cm	<sup>-3</sup> atm <sup>-1</sup>
T/K	Malinauskas et al. (1,2)	Watson et al. (3)
773 873 973 1073	$\begin{array}{r} 6.08 \pm 0.39 \\ 8.38 \pm 0.15 \\ 11.47 \pm 0.23 \\ 16.47 \pm 0.25 \end{array}$	$7.49 \pm 0.07 \\11.55 \pm 0.39 \\14.93 \pm 0.42 \\19.48 \pm 0.01$
ΔH/kJ mol <sup>-1</sup>	22.55 ± 2.05	21.76
△S/J K <sup>-1</sup> mol <sup>-1</sup> (at 1000 K)	-15.06 ± 2.5	-14.2

The values of enthalpy of solution and entropy of solution reported by the two groups are in very good agreement, within experimental error. However, the solubility data of Watson et al. are 25 - 30% higher than those of Malinauskas et al.

Tentatively, the solubility values may be taken as the average of the two data sets. However, additional study is required in order to advance recommended values.

#### References:

- Malinauskas, A. P.; Richardson, D. M.; Savolainen, J. E. Shaffer, J. H. Ind. Eng. Chem. Fundam. <u>1972</u>, 11, 584.
- Malinauskas, A. P.; Richardson, D. M. Ind. Eng. Chem. Fundam. <u>1974</u>, 13, 242.
- Watson, G. M.; Evans III, R. B.; Grimes, W. R.; Smith, N. V. J. Chem Eng. Data <u>1962</u>, 7, 285.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Helium; He; [7440-59-7] (2) Lithium fluoride; LiF; </pre>	Malinauskas, A. P.; Richardson, D. M. Savolainen, J. E.; Shaffer, J. H.
<pre>[7789-24-4] (3) Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</pre>	<b>Ind. Eng. Chem. Fundam.</b> <u>1972</u> , <b>11</b> , 584 - 86.
VARIABLES:	PREPARED BY:
one temperature: T/K = 873 P/kPa = 101.325 - 202.650	N. P. Bansal
EXPERIMENTAL VALUES:	
The value of Henry's law constant in the molten LiF - $BeF_2$ eutectic is	, $K_{H}$ , for the solubility of helium
t/°C 105	$K_{H}/mol \ cm^{-3} \ atm^{-1}$
600	8.40 ± 0.16
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method.	Not described.
apparatus used and procedure	
original paper. In brief, the	
apparatus consisted of two parts, the saturation chamber and the	
stripper chamber. The main parts	
of Hastelloy, a nickel based alloy	· · ·
Mo.	ESTIMATED FREOR.
In an experiment, the melt in the saturation chamber was	Nothing specified
saturated with helium. A known amount of the saturated solution	
was transferred into the	REFERENCES
the solvent and collected for measurement.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Helium; He; [7440-59-7] (2) Lithium fluoride; LiF; </pre>	Watson, G. M.; Evans III, R. B.; Grimes, W. R.; Smith, N. V.
<pre>[7789-24-4] (3) Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</pre>	<b>J. Chem. Eng. Data <u>1962</u>, 7,</b> 285 - 87.
VARIABLES: $P/kPa = 101.325 - 202.650$ T/K = 773 - 1073	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant in the melt LiF - BeF <sub>2</sub> (64 - 36 mol <sup>9</sup>	nt, $K_{H}$ , for the solubility of helium 8) at different temperatures are:
t/°C 10	<sup>B</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
500	7 49 + 0 07
600	11.55 ± 0.39
700 800	14.93 ± 0.42 19.48 ± 0.01
Smoothed Data:	
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:
	- $        -$
	-5.656 - 1151.47(17K) (Compiler)
std. dev	v. = 1.2% (compiler)
The enthalpy of solution, AH, and	the standard entropy of solution,
AS°, are:	$nol^{-1} = 5.2$
AS°/Cal K-	$mol^{-1} \approx -3.4$ (at 1000 K)
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Stuinning on clubics mathed	
Stripping or elution method.	was obtained in cylinders from the
The apparatus and procedure	Bureau of Mines, Amarillo, Texas.
measurements were the same as	(99.5% ± 0.05%) used was obtained
described elsewhere (1,2).	from the Beryllium Corp. of America.
	by mixing the two fluorides in proper
	proportions and purified by flushing at 800°C alternately with anhydrous HF and H <sub>2</sub>
	ESTIMATED ERROR:
	solubility = $\pm 5\%$ (authors)
	REFERENCES :
	1. Grimes, W. R.; Smith, N. V.;
	J. Phys. Chem. <u>1958</u> , 62, 862.
	2. Blander, M.; Grimes, W. R.; Smith, N. V.; Watson G M.
	Ibid. <u>1959</u> , <b>63</b> , 1164.
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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Helium; He; [7440-59-7] (2) Sodium fluoride; NaF; [7681-49-4]</pre>	Ward, W. T.; Watson, G. M.; Evans, R. B.; Grimes, W. R.
<pre>(3) Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</pre>	U.S.A.E.C. Rept. O.R.N.L 2931 1960, 29 - 31.
VARIABLES: P/kPa = 101.325 - 202.650 T/K = 773 - 1073	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constar in the melt NaF - BeF <sub>2</sub> (57 - 43 mol	at, $K_{H}$ , for the solubility of helium b) at different temperatures are:
t/°C 107	' K <sub>H</sub> */mol cm <sup>-3</sup> atm <sup>-1</sup>
500	1.29
600 650	1.77
700	2.22
800	2.88
* Values read from the	graph by the compiler.
Smoothed Data:	be everaged by the equation.
Temperature dependence of K <sub>H</sub> Can	be expressed by the equation:
$\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) =$	= -5.671 - 946.4/(T/K) (compiler)
std. dev	y. = 1.1% (compiler)
The heat of solution, AH, and the	standard entropy of solution, AS°,
are: ^H/kcal m	$ol^{-1} = 4.3$ (compiler)
AS°/cal K <sup>-1</sup>	$mol^{-1} = -3.2$ (at 1000 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method.	Not described.
The method used for the determination of gas solubilities in the molten salt solvent was the same as described elsewhere (1).	
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	1. Grimes, W. R.; Smith, N. V.; Watson, G. M.
	J. Phys. Chem. <u>1958</u> , <b>62</b> , 862.
J	]

	13
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Helium; He; [7440-59-7] (2) Sodium fluoride; NaF;</pre>	Grimes, W. R.; Smith, N. V.; Watson, G. M.
[7681-49-4] (3) Zirconium fluoride; ZrF₄; [7783-64-4]	<b>J. Phys. Chem. <u>1958</u>, 62,</b> 862 - 66.
VARIABLES: p/kPa = 50.663 - 202.650 T/K = 873 - 1073	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant the melt NaF - $ZrF_4$ (53 - 47 mol%) a	at, $K_{H}$ , for the solubility of He in at three temperatures are:
t/°C 10 <sup>8</sup>	K <sub>r</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600 700 800	21.6 ± 1.0 29.2 ± 0.7 42.0 ± 1.3
Smoothed Data:	
Temperature dependence of K. can	be expressed by the relation.
$\log(V/mcl~cm^{-3}~ctm^{-1})$	$= -5  125  =  1244/(\pi/\kappa) \qquad (compiler)$
$10G(R_{H})$ more en actin ) -	5.135 - 1344/(1/K) (Compiler)
sta. dev	7. = 2.3% (compiler)
The enthalpy of solution, AH, and AS, with equal concentrations in the	l the entropy of dissolving the gas, gaseous and liquid states, are:
AH/kcal r	$nol^{-1} = 6.2$
	$mol^{-1} = -1.0$ (at 1000 K)
NS/Cal R	MOI1.0 (at 1000 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: Helium gas, (>99.9%) was obtained
Elution or stripping method.	Texas. Reagent grade Sodium fluoride
The diagram and details of the apparatus and procedure are	was obtained from Mallinckrodt Chemical Co. ZrF <sub>4</sub> was prepared by
described in detail in the original paper. In brief, the	hydrofluorination at 500°C in nickel
melt was saturated with helium by	mixing the two components in proper
hours at the desired pressure. Part of the molten salt solution	sparging it alternatively with anhydrous HF and $H_2$ . No oxide was present
was allowed to transfer into the stripping section. The dissolved	in the melt.
helium was stripped from the melt by circulation of argon	ESTIMATED ERROR:
through the system for about 15 minutes. The amount of helium	solubility = ± 10% (author)
mixture was determined by mass	REFERENCES:
spectrometry.	

(1) Holium, Ho. $[7440-59-7]$	ORIGINAL MEASUREMENTS:
(1) Herrun; He; [7440-55-7] (2) Lithium fluoride, LiF,	Blander M · Grimes W R ·
[7789-24-4]	Smith. N. V.: Watson. G. M.
<pre>(3) Sodium fluoride; NaF;</pre>	,,,,
[7681-49-4]	J. Phys. Chem. <u>1959</u> , 63, 1164 - 67.
(4) Potassium fluoride; KF;	
[7789-23-3]	
VADTADIES.	DEDADED BY.
$\dot{T}/K = 873 - 1073$	FREFARED DI:
P/kPa = 121.59	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law consta in the melt LiF - NaF - KF (46.5 - temperatures, and pressures ranging	nt, K <sub>H</sub> , for the solubility of helium 11.5 - 42.0 mol%) at different from 1 - 2 atm, are:
t/°C 10 <sup>E</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600	$11.3 \pm 0.7$
700	$17.5 \pm 0.2$
800	$23.0 \pm 0.7$
Smoothed Data:	
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:
$\log(K/m_{0}) = 0$	$\pi = 5.261 = 1.470.7/(m/r)$ (compiler)
$\log(K_{\rm H}/\rm{mol}~\rm{Cm}^{-}~\rm{atm}^{-})$	= -5.261 - 14/0.7/(T/K) (compiler)
std. de	v. = 1.4% (compiler)
The enthalpy of solution, AH, an	d the standard entropy of solution,
ΔS°, are:	d the standard entropy of solution, $ol^{-1} = 8.0$
ΔS°, are: ΔH/kcal m	d the standard entropy of solution, $ol^{-1} = 8.0$
ΔS°, are: ΔS°, are: ΔS°/cal K <sup>-1</sup>	d the standard entropy of solution, $ol^{-1} = 8.0$ $mol^{-1} = -0.3$ (at 1000 K)
ΔS°, are: ΔS°, are: ΔH/kcal m ΔS°/cal K <sup>-1</sup>	d the standard entropy of solution, $ol^{-1} = 8.0$ $mol^{-1} = -0.3$ (at 1000 K)
ΔS°, are: ΔS°, are: ΔS°/cal K <sup>-1</sup>	d the standard entropy of solution, $ol^{-1} = 8.0$ $mol^{-1} = -0.3$ (at 1000 K)
AUXILIARY	d the standard entropy of solution, ol <sup>-1</sup> = 8.0 mol <sup>-1</sup> = -0.3 (at 1000 K) INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE:	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS;</pre>
METHOD/APPARATUS/PROCEDURE:	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS:</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method.	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS; Helium gas, purity better than 00 0% was abtried from the During</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo Texas</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternated with antworkers UP and</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and Ha. Nickel apparatus was used.</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used.</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used.</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR:</pre>
METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified REFERENCES:</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified REFERENCES:</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M.</pre>
METHOD/APPARATUS/PROCEDURE: AUXILIARY METHOD/APPARATUS/PROCEDURE: Stripping or elution method. The details of the apparatus and procedure used have been described elsewhere (1).	<pre>d the standard entropy of solution, ol<sup>-1</sup> = 8.0 mol<sup>-1</sup> = -0.3 (at 1000 K) INFORMATION SOURCE AND PURITY OF MATERIALS: Helium gas, purity better than 99.9%, was obtained from the Bureau of Mines at Amarillo, Texas. The melt was prepared by mixing Reagent grade LiF, NaF and KF in proper proportions. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H<sub>2</sub>. Nickel apparatus was used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</pre>

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<pre>COMPONENTS: (1) Helium; He; [7440-59-7] (2) Sodium fluoride; NaF; [7681-49-4] (3) Zirconium fluoride; ZrF<sub>4</sub>; [7783-64-4] (4) Uranium tetrafluoride; UF<sub>4</sub>; [10049-14-6]</pre>	ORIGINAL MEASUREMENTS: Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u> ,62, 862 - 66.	
VARIABLES: T/K = 873 - 1073 P/kPa = 50.663 - 202.650	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of helium in the melt NaF - $ZrF_4$ - $UF_4$ (50 - 46 - 4 mol%) at different temperatures, and pressures ranging from 1 - 2 atm, are:		
t/°C 10 <sup>B</sup>	K <sub>#</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
600 700 800	20 27 41	
Smoothed Data:		
Temperature dependence of K <sub>FF</sub> can	be expressed by the relation:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	) = -5.054 - 1447/(T/K) (compiler)	
std. de	v. = 3.4% (compiler)	
The heat of solution, AH, is est.	imated to be:	
∆H/kJ mo	l <sup>-1</sup> = 27.7 (compiler)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus and procedure employed are described in detail in the original paper. In brief, the melt was saturated with helium by sparging it with the gas for 6 hours at the desired gas pressure. Part of the molten salt solution was transferred into the stripping section. The dissolved helium was stripped from the melt by circulation of argon through the system for about 15 minutes. The amount of helium present in the eluted gas mixture was obtained by mass spectrometry.	SOURCE AND PURITY OF MATERIALS: Helium gas, (>99.9%) was obtained from the Bureau of Mines at Amarillo, Texas. Reagent grade NaF and UF4 were obtained from the Mallinckrodt Chemi- cal Co. ZrF4 was prepared by hydrofl- uorination of ZrCl4 at 773K in nickel equipment. The melt was prepared by mixing the three fluorides in proper ratio and purified at 800°C by sparg it alternatively with anhydrous HF an H2. No oxide was present in the melt. ESTIMATED ERROR: solubility = t 10% (authors) REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Neon; Ne; [7440-01-9] (2) Lithium fluoride; LiF;</pre>	Watson, G. M.; Evans III, R. B.; Grimes, W. R.; Smith, N. V.	
[7789-24-4]	T Ohom Eng Data 1962 7 295	
(3) Beryllium fluoride; Ber <sub>2</sub> ; [7789-49-7]	87.	
VARIABLES:	PREPARED BY:	
P/kPa = 101.325 - 202.650	N. D. Bangal	
T/K = 7/3 - 10/3	N. P. Bansal	
EXPERIMENTAL VALUES:		
The Henry's law constant, $K_{H}$ , for the solubility of neon in the melt LiF - BeF <sub>2</sub> (64 - 36 mol%) at different temperatures are:		
t/°C 10	<sup>a</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
500	3,09 + 0,09	
600	4.63 ± 0.01	
800	$9.01 \pm 0.15$	
Smoothed Data		
Shidothed Data:		
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.839 - 1295.8/(T/K) (compiler)	
std. de	v. = 0.9% (compiler)	
The enthalpy of solution, <b>\H</b> , an	d the standard entropy of solution,	
ΔS°, are:	$0^{1-1} = 5.9$	
AS'/Cal K'	mol - = -4.2 (at 1000 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping or elution method.	Neon gas, (>99.9%) was obtained	
The apparatus and procedure	from the Linde Co.	
used for gas solubility	(99.5 $\pm$ 0.5%) was obtained from the	
measurements have been described	Beryllium Corp. of America.	
	the two fluorides in proper	
	proportions. The melt was purified by sparging it alternately with	
	anhydrous HF and H2 at 800°C.	
	ESTIMATED ERROR:	
	Nothing specified	
	REFERENCES:	
	1. Grimes, W. R.; Smith, N. V.;	
	Watson, G. M. J. Phys. Chem. 1958, 62, 862.	
	2. Blander, M.; Grimes, W. R.; Smith,	
	Ibid. <u>1959</u> , <b>63</b> , 1164.	

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Neon; Ne; [7440-01-9] (2) Sodium fluoride; NaF;</pre>	Grimes, W. R.; Smith, N. V.; Watson, G. M.	
[7681-49-4] (3) Zirconium fluoride: ZrF.:	J. Phys. Chem. 1958 62 862 - 66	
[7783-64-4]	<u>1950</u> , 02, 802 - 00.	
VARIABLES: $P/kP_{2} = 101 325 - 202 650$	PREPARED BY:	
T/K = 873 - 1073	N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{\rm H}$ , for the solubility of neon in the melt NaF - $ZrF_4$ (53 - 47 mol%) at three temperatures are:		
t/°C 10 <sup>8</sup>	$K_{H}/mol \ cm^{-3} \ atm^{-1}$	
	11.0.0	
600 700	11.3 $\pm$ 0.3 18.4 $\pm$ 0.5	
800	24.7 ± 0.7	
Smoothed Data:		
Tomporature dependence of K gan	be everygood by the velotion.	
remperature dependence of K <sub>H</sub> can	be expressed by the relation:	
$\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) =$	= -5.109 - 1598.5/(T/K) (compiler)	
std. dev	7. = 2% (compiler)	
The enthalpy of solution, AH, and gas with equal concentrations in the	the entropy, AS, of dissolving the gaseous and liquid states are:	
ΔH/kcal π	$101^{-1} = 7.8$	
AS/cal K <sup>-1</sup>	$mOI^{-1} = -0.4$ (at 1000 K)	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution stripping method.	from Linde Air Products Co.	
	Sodium fluoride of Reagent grade was	
apparatus and procedure are	ZrF <sub>4</sub> was prepared by hydrofluorin-	
described in detail in the	ation of ZrCl <sub>4</sub> at 500°C in nickel	
was saturated with neon by	mixing the two salts in proper propo-	
sparging it with the gas for 6	rtion and purified at 800°C by	
pressure. Part of the molten salt	$HF$ and $H_2$ .	
solution was transferred into the	No oxide was present in the melt.	
neon was stripped from the melt	ESTIMATED ERROR:	
by circulation of helium through the system for about 15 minutes.	solubility = $+10\%$ (authors)	
The amount of neon present in the		
by mass spectrometry.	REFERENCES :	

COMPONENTS :		ORIGINAL MEASUREMENTS:
<ol> <li>Neon; Ne; [7440</li> <li>Lithium fluorid [7789-24-4]</li> <li>Sodium fluoride [7681-49-4]</li> <li>Potassium fluor [7789-23-3]</li> </ol>	-01-9] e; LiF; ; NaF; ide; KF;	Blander, M.; Grimes, W. R.; Smith, N. V.; Watson, G. M. <b>J. Phys. Chem. <u>1959</u>, 63</b> , 1164 - 67.
VARIABLES:		PREPARED BY:
T/K = 873 - 1	073	
P/kPa = 101.325	- 202.650	N. P. Bansal
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of Neon in the molten salt solvent LiF - NaF - KF eutectic (46.5 - 11.5 - 42.0 mol%) at different temperatures, and the pressures ranging from 1 - 2 atm, are:		
t.	/°C 10 <sup>8</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
	500	4 36 + 0 20
	700	7.51 ± 0.22
	800	11.18 ± 0.26
Smoothed Data:	<u></u>	
Temperature depe	ndence of K. can	be expressed by the relation:
Log(K <sub>H</sub> ,	(mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.158 - 1920/(T/K) (compiler)
	std. dev	. = 0.9% (compiler)
The enthalpy of s $\Delta S^\circ$ , are:	solution, $\Delta H$ , and	the standard entropy of solution,
		-1 - 0 0
	AH/KCal mol	- = 8.9
	$\Delta S^{\circ}/cal K^{-1}$ m	$nol^{-1} = -0.1$ (at 1000 K)
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDUR	3:	SOURCE AND PURITY OF MATERIALS:
Stripping or elut	ion method.	Neon gas, purity better than
		99.9%, was obtained from Linde Air
The apparatus and employed have been	i procedure	Products Company.
elsewhere (1).	reactibed	Reagent grade LiF, NaF and KF in the
		proper ratio. The melt was purifed
		at 800°C by flushing it alternately
		apparatus was used.
		ESTIMATED ERROR:
		Nothing anadified
		Moching specified.
		REFERENCES:
		1. Grimes, W. R.; Smith, N. V.;
		Watson, G. M.
		J. Phys. Chem. <u>1958</u> , 62, 862.
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Green, W. J. Ph.D. Thesis, Virginia Polytechnic Institute 1969.
(2) Lithium nitrate; LiNO₃; [7790-69-4]	Green, W. J.; Field, P. E. J. Phys. Chem. <u>1980</u> , 84, 3111 - 3114.
VARIABLES:	PREPARED BY:
T/K = 531 - 595 P/kPa = 50.663 - 151.988	N. P. Bansal
EXPERIMENTAL VALUES: The values of Henry's law constant molten LiNO3, at different temperate	at, $K_{H}$ , for the solubility of Ar in are:
	$K_{H}/mol \ cm^{-3} \ atm^{-1}$
531	0.74
534	0.94
540	1.01
549	1.12
553	1.06
563	1.43
564	1.46
574	1.62
595	1.71
std. dev. = 1. The enthalpy of solution, ^H, and ^H/kcal mol ^S/cal K <sup>-1</sup> mol <sup>-1</sup> =	2% (compiler) entropy of solution, AS, are: <sup>-1</sup> = 8.0 ± 0.89 4.16 ± 1.60 (at 581 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Elution technique. Diagram and details of the gas solubility apparatus are given in the original publication. The experimental process consisted of three steps: saturation, elution and analysis. After saturating the melt with argon, the gas phase was evacuated. Helium gas was introduced into the system as eluting gas to approximately 1 atm. pressure. The resultant gas mixture of argon and helium was analyzed with Aerograph Model 90 - P gas chromatograph (Varian). The carrier gas used was also helium.	SOURCE AND PURITY OF MATERIALS: Argon and helium obtained from Airco were used directly from the cylinder. Reagent grade lithium nitrate from Baker was used without further purification. ESTIMATED ERROR: $\delta C/P = \pm 5\%$ (authors) REFERENCES:

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COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Cleaver, B.; Mather, D. E.
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	Trans. Faraday Soc. <u>1970</u> , <b>66</b> , 2469 - 82.
VARIABLES: T/K = 546 & 580 P/kPa = 25000 - 100000	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of argon in the melt are presented only in graphical form in the range 250 - 1000 bar. Values K <sub>H</sub> , are:	at two experimental temperatures, n as a function of the gas pressure of Henry's law constant,
t/°C 107	K <sub>#</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>
273 307	0.91 ± 0.20 1.09 ± 0.15
Smoothed Data:	
∧H/kJ mo]	$L^{-1} = 14.0$
^ S°/J K <sup>-1</sup> mc	$pl^{-1} = -19.3$
AH is the enthalpy of solution, a	and $AS^{\circ}$ is the standard entropy of
solution.	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
High progrups slution	
technique. Diagram and details of the apparatus are given in the	Argon (99.9%) from British Oxygen Company was used without further purification or drying. Lithium nitrate (99.9%) obtained
saturated by stirring it in	from Johnson Matthey & Co. was recrystallized from distilled water
contact with the gas at high pressure. A sample of the	and dried at 120°C. It was stored in an air oven at 100°C.
saturated melt was isolated and analyzed by the elution technique.	
	ESTIMATED ERROR:
	$\delta P/bar = \pm 10$
	REFERENCES :
	1

<pre>COMPONENTS:   (1) Argon; Ar; [7440-37-1]   (2) Sodium nitrate; NaNO<sub>3</sub>;     [7631-99-4]</pre>	EVALUATOR: N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio, 44135. U.S.A. December 1989
	December, 1989.

CRITICAL EVALUATION:

Five different investigations (1 - 5) are available for the solubility of argon in molten sodium nitrate. Smoothed data from these studies are compared below:

		107 K	K <sub>H</sub> ∕mol cm <sup>-3</sup>	atm <sup>-1</sup>	
T/K	Ref. 1	Ref. 2	Ref.3	Ref. 4	Ref. 5
590	0.57	(0.60)	(22.2)		
600	0.60	(0.64)	(21.7)		
620	0.66	0.70	(20.7)		
640	0.72	0.77	19.9		
642	0.73	0.78	19.8	19.1	17.2
660	0.78	0.84	19.1		
680	(0.85)	0.91	18.4		
700	(0.91)	0.99	17.7		
710	(0.95)	1.03	17.4		

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

According to Copeland and Christie (6), the solubility results reported earlier from their laboratory cannot be considered reliable. Therefore, the values of Copeland **et al.** (3 - 5) are rejected.

The results of Field and Green (1), and of Cleaver and Mather (2) are in very good agreement within the experimental error. The recommended numerical values based on these two data sets are given in Table 1 and Fig. 1.

Table 1 -	Recommended	Numerical	Values
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T/K	107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
	0.59
600	0.62
610	0.65
620	0.68
630	0.72
640	0.75

References:

continued

- 1. Field, P. E.; Green, W. J. J. Phys. Chem. 1971, 75, 821.
- 2. Cleaver, B.; Mather, D. E. Trans. Faraday Soc. 1970, 66, 2469.
- 3. Copeland, J. L.; Seibles, L. J. Phys. Chem. 1968, 72, 603.
- 4. Copeland, J. L.; Zybko, W. C. J. Amer. Chem. Soc. <u>1964</u>, 86, 4734.
- 5. Copeland, J. L.; Zybko, W. C. J. Phys. Chem. 1965, 69, 3631.
- 6. Copeland, J. L.; Christie, J. R. J. Phys. Chem. <u>1971</u>, 75, 103.



COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Field, P. E.; Green, W. J. J. Phys. Chem. 1971. 75. 821 - 25.
(2) Sodium nitrate; $NaNO_3$ ;	Cheen W. T. Dh.D. Mhesis, Ministry
[7631-99-4]	Polytechnic Institute <u>1969</u> .
VARIABLES:	PREPARED BY:
T/K = 588 - 675 P/kPa = 91.193 - 135.776	N. P. Bansal
EXPERIMENTAL VALUES:	
atm.). The values of Henry's law con argon in molten NaNO <sub>3</sub> at different t	stant, $K_{H}$ , for the solubility of emperatures are:
T/K 10° K	M/mol cm <sup>-3</sup> atm <sup>-1</sup>
588	0.540
607	0.555
609 614	0.697 0.555
618	0.768
628 632	0.687 0.658
637	0.775
675	0.870
The temperature dependence of $K_{\rm H}$ is given by the expression: $\log(K_{\rm H}/{\rm mol~cm^{-3}~atm^{-1}}) = (-5.94 \pm 0.28) - (769.15 \pm 0.18)/(T/K)$ Std. dev. 1.1% The enthalpy of solution, $\Delta H$ , and entropy of solution, $\Delta S$ are : $\Delta H/kcal \ {\rm mol^{-1}} = (3.52 \pm 0.81)$ $\Delta S/cal \ {\rm K^{-1}~mol^{-1}} = -(5.58 \pm 1.30)$ (at 637K)	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique.	Argon and helium obtained from
Diagram of the gas solubility	cylinder.
apparatus is given in the original publication.	Baker's reagent grade sodium nitrate was used without further
The experimental process	purification.
saturation, elution and analysis.	
After saturating the melt with argon, the gas phase was evacuated.	
Helium was introduced into the	
approximately 1 atm. pressure.	ESTIMATED ERROR:
The resultant gas mixture of argon and helium was analyzed	solubility = $\pm 5\%$ (authors)
With an Aerograph Model 90 - P	
carrier gas used was also helium.	REFERENCES :
used for calculation of the gas	
solubility.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Cleaver, B.; Mather, D. E.
<pre>(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]</pre>	<b>Trans. Faraday Soc.</b> . <u>1970</u> , <b>66</b> , 2469 - 82.
VARIABLES: T/K = 604 - 713 P/kPa = 9000 - 105000	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of argon in the melt in graphical form as a function of t range 90 - 1050 bar. The gas solubil curvature above 500 bar. Values of F	t at three temperatures are presented the gas pressure in the range lity versus pressure plot showed Henry's law constant, K <sub>H</sub> , are:
t/°C 107	K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>
331 410 440	0.64 ± 0.15 0.90 ± 0.15 1.04 ± 0.15
Smoothed Data: Temperature dependence of K <sub>H</sub> is o	given by the equation:
log(K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup> ) =	= -5.839 - 819/(T/K) (compiler)
std. dev	v. = 0.9% (compiler)
$AH/kJ mol^{-1} = 15.8$	$AS^{J}K^{-1} mol^{-1} = -21.7$
$\overline{v}_a/ml mol^{-1} = 34 \pm 8$	
$^{H}$ is the enthalpy of solution, $^{A}S^{\circ}$ is the standard entropy of	
solution, and $\overline{v}_a$ is the partial mola	r volume of the dissolved gas.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
High pressure elution technique. Diagram and details of the apparatus are given in the original paper. The melt was saturated by stirring it in contact with the gas at high pressure. A portion of the saturated melt was isolated and analyzed by the elution technique.	Argon (99.9%) from British Oxygen Company was used without further purification or drying. Sodium nitrate (>99.5%) A.R. grade from B. D. H. was purified by filtration through Pyrex frits in the molten state. The melt was allowed to freeze and stored in vacuo.
	ESTIMATED ERROR:
	$\delta P/bar = \pm 10$
	REFERENCES :

	25
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Copeland, J. L.; Seibles, L.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>J. Phys. Chem.</b> <u>1968</u> , <b>72</b> , 603 - 07.
VARIABLES: P/kPa = 15288.75 - 40023.38 T/K = 629 - 714	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Henry's law was obeyed for the s nitrate upto a saturing gas pressur law constant, K <sub>H</sub> at different tempe	olubility of argon in molten sodium e of 395 atm. The values of Henry's ratures are:
T/K 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
629 642 663 679.5 701 714	20.2 ± 1.3 19.2 ± 0.9 19.5 ± 1.3 18.6 ± 1.1 17.7 ± 0.9 16.8 ± 1.3
The temperature dependence of $K_{H}$ $\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) = -($ std. de The values of the heat of soluti $\wedge S^{\circ}$ , are: $\wedge H/\text{kcal mol}^{-1} = -1.84 \pm 0.21$	is expressed by the relation: $6.28 \pm 0.02$ ) + $(370 \pm 45)/(T/K)$ v. = 1.1% (compiler) on, ^H, and the entropy of solution, $\Delta S^{\circ}/cal K^{-1} mol^{-1} = -15.4 \pm 0.3$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The experimental arrangement and procedure followed for gas solubility measurements were the same as described earlier (1). Known quantities of the gas and the melt were equilibrated in a heated pressure vessel and the final pressure was measured. The amount of gas dissolved in the melt was determined by subtracting the number of moles of gas present in the gas phase.	Not described.
calculated from the Beattie - Bridgeman equation (2), from the number of moles originally admitted.	Nothing specified
	<pre>REFERENCES: 1. Copeland, J. L.; Zybko, W. C. J. Phys. Chem. <u>1965</u>, 69, 3631. 2. Beattie, J. A.; Bridgeman, O. C.</pre>
	J. Amer. Chem. Soc. <u>1928</u> , 50, 3133.

20	
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Copeland, J. L.; Zybko, W. C.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>J. Phys. Chem.</b> <u>1965</u> , <b>69</b> , 3631 - 33.
VARIABLES: P/kPa = 7092.75 - 45697.58 one temperature: T/K = 642	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of argon in molter upto a saturating gas pressure of 4, variation of gas solubility in the pressure, P, could be expressed by $C_1/mol \ cm^{-3} = (17.2 \ x \ 10)$	n sodium nitrate at 369°C was measured 51 atm. Henry's law was obeyed. The melt, $C_1$ , with the saturating gas the equation: $D^{-7}$ )P/atm $\pm (0.41 \times 10^{-4})$
The Henry's law constant, $K_{H}$ , is	given as:
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
369	17.2 ± 1.7
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the procedure followed for gas solubility measurements have been given in the original paper. Briefly, dry sodium nitrate was placed in the bomb which was then sealed and evacuated. Argon was admitted at room temperature to some desired pressure. The bomb was then heated to a temperature of 642K. Equilibrium was supposed to have	Argon (99.999%) supplied by the National Cylinder Gas Co. was used without further purification. Reagent grade NaNO <sub>3</sub> was obtained from Baker and Adamson and also from Fisher. The Baker and Adamson sample was used without treatment other than drying. The Fisher salt was dried, melted and the pure melt was decanted off.
change was observed for at least 24 h. The number of moles of Ar dissolved in the melt was calculated from the initial and final equilibrium gas pressures.	ESTIMATED ERROR: solubility = ± 10% (authors)
volume and temperature with the aid of detailed plots of P - V - T data compiled by Din (1)	REFERENCES: 1. Din, F. Thermodynamic Functions of Gases, Vol. 2 Butterworth and Co., London <u>1962</u> , 192, 193.
	I

COMPONENTE -		ODICINAL MEACUDENTING
COMPONENTS:		OUTOTINT MEADUREMENTS:
(1) Argon; Ar; [7440-37-1]		Copeland, J. L.; Zybko, W. C.
(2) Sodium nitrate; NaNO <sub>3</sub> ;		J. Amer. Chem. Soc. <u>1964</u> , 86,
[7631-99-4]		4/34 - 35.
VARIABLES: P/kPa = 36679 6	5	PREPARED BY:
one temperature: T/K	= 642	N. P. Bansal
EXPERIMENTAL VALUES:		
The solubility of arg determined upto a satura was obeyed. The value of	on in molter ting gas pre Henry's law	n sodium nitrate at 369°C was essure of 362 atm. Henry's law v constant, K <sub>H</sub> , is given as:
t/°C	107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
369		19.15 ± 0.45
		·····
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Known quantities of th	ne gas	Not described.
and the melt were equilib	orated in	
final pressure was measure	red. The	
amount of gas dissolved : melt was determined by	in the	
subtracting the number of	E moles	
from the number of moles	s phase	
originally admitted.		
}		ESTIMATED ERROR:
		Nothing specified
		REFERENCES :
		1

COMPONENTS:	EVALUATOR:
(1) Argon; Ar; [7440-37-1]	N. P. Bansal National Aeronautics and Space
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	Administration. Lewis Research Center. Cleveland, Ohio, 44135. U.S.A. December, 1989.

## CRITICAL EVALUATION:

Two studies (1,2) are available for the solubility of argon in molten KNO<sub>3</sub>. However, the temperature intervals of the two studies are different with some overlapping range. The solubility values of Green (1) are much higher than those of Woelk (2). Further experimental studies are needed before recommended values

can be advanced for this system.

References:

1. Green, W. J. Ph.D. Thesis, Virginia Polytechnic Institute 1968.

2. Woelk, H. U. Nukleonik 1960, 2, 278.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Argon; Ar; [7440-37-1]	Green, W. J. Ph.D. Thesis, Virginia Polytechnic Institute 1969.	
(2) Potassium nitrate; KNO₃; [7757-79-1]	Green, W. J.; Field, P. E. J. Phys. Chem. <u>1980</u> , 84, 3111 - 3114.	
VARIABLES:	PREPARED BY:	
T/K = 608 - 678	N. P. Bansal	
P/kPa = 50.663 - 151.988		
EXPERIMENTAL VALUES:		
The values of Henry's law constant molten $KNO_3$ at different temperature	nt, K <sub>H</sub> , for the solubility of Ar in es are:	
Т/К 107 н	$x_{ss}/mol \ cm^{-3} \ atm^{-1}$	
608	1 61	
611	1.58	
618	1.81	
624	1.65	
643	1.65	
648	1.83	
650	1.60	
679	2.07	
The enthalpy of solution, AH, and AH/kcal mol <sup>-1</sup> = 2.53 ± 0.67 AS/cal	<pre>5.889 - 553.07(T/K) 7. = 0.87% 1 the entropy of solution, ^S, are: . K<sup>-1</sup> mol<sup>-1</sup> = -5.26 ± 1.05 (at 668 K)</pre>	
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution technique	Argon and belium obtained from	
Diagram and details of the gas solubility apparatus are given in the original publication.	Airco were used directly from the tank. Reagent grade potassium nitrate from Baker was used without further	
The experimental process consisted of three steps: saturation, elution and analysis. After saturating the melt with argon, the gas phase was	purification.	
introduced into the system as		
eluting gas to approximately 1	ESTIMATED ERROR:	
atm. gas pressure. The resultant gas mixture of argon and helium was analyzed with an Aerograph Model 90 - P gas chromategraph	$\delta c/P = \pm 5\%$ (authors)	
(Varian). The carrier gas used was also helium.	REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Norman New (2440-27-1)	··
(1) Argon; Ar; $[7440-37-1]$	Wellsonth 1000 2 270 70
[7757-79-1]	Nukleonik <u>1960</u> , 2, 278 - 79.
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 652 - 1000	N. P. Bansal
EVDERIMENTAL VALUES.	
The solubilities of argon in molt reported in the temperature interval only. The values of solubilities der	en potassium nitrate have been 650 - 1000K in graphical form vived from this graph, by the
compiler, are given below in the for	cm of Henry's law constants, K <sub>H</sub> :
T/K 10 <sup>8</sup>	K <sub>#</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
652	3.8
726	7.1
910	15.8
	21.6
Smoothed Data:	
Temperature dependence of $K_{H}$ is e	expressed by the equation:
$\log(K_{H}/mol ml^{-1} atm^{-1}) =$	= -5.284 - 1380.4/(T/K) (compiler)
std. dev	7. = 2.5% (compiler)
The heat of solution, $\Delta H$ , is est	imated to be:
∆H/kJ mo	$1^{-1} = 26.4$ (compiler)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The methods used for solubility measurements was the same as described elsewhere (1).	Not described.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	1. Woelk, H. U. Chem Ing Techn. <u>32</u> , 765(1960).

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Argon; Ar; [7440-37-1]	Cleaver, B.; Mather, D. E.	
(2) Rubidium nitrate; RbNO <sub>3</sub> ; [13126-12-0]	<b>Trans. Faraday Soc.</b> <u>1970</u> , <b>66</b> , 2469 - 82.	
VARIABLES:	PREPARED BY:	
T/K = 604 & 713	······································	
P/kPa = 24000 - 100000	N. P. Bansal	
EXPERIMENTAL VALUES:	<u> </u>	
Solubilities of argon in the mel- temperatures, only in the graphical pressure in the range 240 - 1000 bas K <sub>H</sub> , are:	t are presented at two experimental form as a function of the gas r. Values of Henry's law constant,	
t/°C 107	K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>	
331 440	1.30 ± 0.2 2.40 ± 0.2	
Smoothed Data:		
AH/kJ mo	$1^{-1} = 20.1$	
6570 K 1		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
High pressure elution technique. Diagram and details of the apparatus are given in the original paper. The melt was saturated by stirring it in contact with the gas at high pressure. A sample of the saturated melt was removed and analyzed by the elution technique.	Argon (99.9%) from British Oxygen Company was used without further purification or drying. Rubidium nitrate (99.9%) from Johnson - Matthey & Co. was purified by filtration through Pyrex frits in the fused state. The melt was allowed to freeze and stored <b>in vacuo</b> .	
_	ESTIMATED ERROR:	
	$\delta P/bar = \pm 10$	
	REFERENCES :	

ORIGINAL MEASUREMENTS:
Cleaver, B.; Williams, J. F.
<b>J. Phys. Chem. Solids</b> <u>1968</u> , <b>29</b> , 877 - 880.
PREPARED BY:
N. P. Bansal
n rubidium nitrate is:
ubility/mol ml <sup>-1</sup> atm <sup>-1</sup>
2.0 X 10 <sup>-7</sup>
INFORMATION
SOURCE AND PURITY OF MATERIALS:
Rubidium nitrate (99.9%) from Johnson, Matthey and Co. was recrystallized from distilled water. Source and purity of argon not given.
ESTIMATED ERROR:
Nothing specified
REFERENCES :

	•	
OMPONENTS:		EVALUATOR:
(1) Argon; Ar; [744	0-37-1]	N. P. Bansal
(2) Silver nitrate:	AgNO.	Administration
[7761-88-8]	11911037	Lewis Research Center
••••••••		Cleveland, Ohio, 44135, U.S.A.
		December, 1989.
RITICAL EVALUATION:		
Only two studies argon in molten sil investigations are	(1 - 2) have be ver nitrate. The compared below:	en reported for the solubility of solubility values from these
	107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
T/K	Cleaver & Mathe	r Copeland & Radak
507	0.19 ± 0.05	
523		33.5 ± 5.5
reported earlier fr The value of Cleave at least tentativel More detailed in Can be advanced.	vestigations are	needed before recommended values
reported earlier fr The value of Cleave at least tentativel More detailed in can be advanced.	vestigations are	needed before recommended values

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Cleaver, B.; Mather, D. E.
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	<b>Trans. Faraday Soc.</b> <u>1970</u> , <b>66</b> , 2469 - 82.
VARIABLES: P/kPa = 33000 - 95000 one temperature: T/K = 507	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of argon in the melt temperature, in the graphical form a pressure in the range $330 - 950$ bar. K <sub>H</sub> , at the experimental temperature	: are presented at only one as a function of the gas The value of Henry's law constant, is:
t/°C 107	K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>
234	0.19 ± 0.05
AUXILIARY	INFORMATION
High pressure elution technique. Diagram and details of the apparatus are given in the original paper. The melt was saturated by stirring it in contact with the gas at high pressure. A sample of the saturated melt was isolated and analyzed by the elution technique.	SOURCE AND PURITY OF MATERIALS: Argon (99.9%) from British Oxygen Company was used without further purification or drying. Silver nitrate (99.9%) obtained from Johnson - Matthey & Co. was recrystallized from distilled water.
	ESTIMATED ERROR:
	$\delta P/bar = \pm 10$
	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Copeland, J. L.; Radak, S.
(2) Silver nitrate; $AgNO_3$ ;	<b>J. Phys. Chem.</b> <u>1967</u> , <b>71</b> , 4360 - 65.
VARIABLES:	PREPARED BY:
P/kPa = 4762.275 - 37996.875	
one temperature: T/K = 523	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of argon in molter determined upto a saturating gas pre obeyed. The value of Henry's law cor	n silver nitrate at 523K was essure of 375 atm. Henry's law was estant, K <sub>H</sub> , is given as:
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
250	3.35 ± 0.55
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The equipment and technique used for gas solubility measurements were exactly the same as described elsewhere (1).	Argon (99.98%) was obtained from the National Cylinder Gas Co. Reagent grade silver nitrate obtained from Mallinckrodt, Fisher Scientific and Baker were used. Before each measurement, silver nitrate was fused, allowed to cool and solidify in a porcelain casserole placed in a desiccator, and then finely pulverized.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	1. Copeland, J. L.; Zybko, W. C.
	J. Phys. Chem. <u>1965</u> , <b>69</b> , 3631.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1] (2) Sodium chloride; NaCl;	Novozhilov, A. L.; Devyatkin, V. N.; Pchelina, E. I. Abstracts of Repts. V All Union Conf. Phys. Chem. Electrochem. of Fused
[/64/-14-5]	Electrolytes, Sverdlovsk, <u>1973</u> , Part 1, 118.
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1123 - 1223	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law consta in molten NaCl at different tempera	nt , $K_{H}$ , for the solubility of argon tures are:
T/K 107	K <sub>rt</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1123	1.28
1173 1223	1.54 2.02
Smoothed Data:	
The temperature dependence of $K_{H}$	could be expressed by the relation:
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -4.484 - 2712.1/(T/K) (compiler)
std. de	v. = 1.9% (compiler)
The enthalpy of solution, $\Delta H$ , is	5:
∆H/kJ mo	$pl^{-1} = 51.9$ (compiler)
$\Delta m/\kappa 0 m O I = 51.5 (Complied)$	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not available.	Not available.
	Not available.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Argon; Ar; [7440-37-1]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

The solubility of argon in molten potassium chloride has been studied by two different groups (1 - 2). Smoothed data from the two studies are compared below at different temperatures:

	107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
т/к	Novozhilov et al. (1)	Waelk (2)
1100	(3.08)	4.78
1140	3.53	5.47
1180	4.01	6.21
1220	4.51	6.98
1260	(5.05)	7.80
1300	_	8.65
1400	-	10.91
1500	-	(13.36)

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

The results of Woelk are about 55% higher compared to those of Novozhilov et al. The enthalpies of solution in the two studies are in excellent agreement. This indicates that the disagreement between the results lies in magnitude rather than in the temperature dependence of the solubility.

Further investigations are needed before this system can be properly evaluated and recommended values can be advanced.

References:

- Novozhilov, A. L.; Devyatkin, V. N.; Pchelina, E. I. Abstracts of Repts. V All Union Conf. Phys. Chem. Electrochem of Fused Salts, Oxide Melts, Solid Electrolytes, Sverdlovsk <u>1973</u>, Part 1, 118.
- 2. Woelk, H. U. Nukleonik 1960, 2, 278.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Argon; Ar; [7440-37-1]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Novozhilov, A. L.; Devyatkin, V. N.; Pchelina, E. I. Abstracts of Repts. V All Union Conf. Phys. Chem. Electrochem. of Fused Salts, Oxide Melts, Solid Electrolytes, Svedlovsk, <u>1973</u> , Part 1, 118.
VARIABLES: P/kPa: 101.325 (compiler) T/K = 1123 - 1223	PREFARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constar in molten KCl at different temperatu	at, $K_{H}$ , for the solubility of argon ares are:
T/K 10 <sup>7</sup> F	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1123 1173 1223	3.32 3.96 4.53
Smoothed Data:	
The temperature dependence of K <sub>H</sub>	could be expressed by the equation:
$log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -4.822 - 1859.7/(T/K)  (compiler)$ std. dev. = 0.6% (compiler) The enthalpy of solution, $\Delta H$ , is: $\Delta H/kJ \ mol^{-1} = 35.6$	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not available.	No details given.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

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COMPONENTS:	UKIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Woelk, H. Ú.
(2) Potassium chloride; KCl; [7447-40-7]	Nukleonik <u>1960</u> , 2, 278 - 79.
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1088 - 1495	N. P. Bansal
·	
EXPERIMENTAL VALUES:	
Solubilities of argon in molten H been reported only in graphical form The values of solubilities derive in the form of Henry's law constants	KCl at different temperatures have n. ed from this graph are given below s, K <sub>H</sub> :
T/K 10 <sup>7</sup>	K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
1088	4.39
1140	5.73
1286	8.51
1495	13.02
Smoothed Data:	
Temperature dependence of $K_{H}$ is g	jiven by the equation:
$\log(K_{tr}/mol ml^{-1} atm^{-1}) =$	= -4.647 - 1841/(T/K) (compiler)
std. dev	x = 1.7% (compiler)
The best of colution AH is cale	wisted to be
The heat of solution, wh, is call	diated to be:
∆H/kJ mo]	= 35.2 (compiler)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The procedure employed for solubility was the same as described elsewhere (1).	Not described.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES :
	1. Woelk, H. U. Chem Ing Techn. <u>32</u> , 765(1960).

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Argon; Ar; [7440-37-1]</li> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> </ul>	Novozhilov, A. L.; Devyatkin, V. N.; Pchelina, E. I. Abstracts of Repts. V All Union Conf Phys. Chem. Electrochem. of Fused Salts, Oxide Melts, Solid Electrolytes, Sverdlovsk, <u>1973</u> , Part
	1, 118.
VARIABLES: P/kPa: 101.325 (comp. T/K = 1073 - 1173	iler) N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law in molten RbCl at different	, constant, $K_{H}$ , for the solubility of argon temperatures are:
т/к	$10^7 \text{ K}_{\text{M}}/\text{mol cm}^{-3} \text{ atm}^{-1}$
1073 1123 1173	3.28 3.72 4.38
Smoothed Data:	
The temperature dependence	e of K could be expressed by the relation.
 log(K /mol gm <sup>-3</sup>	$2^{+m-1}$ = 5 015 - 1570 2/( $\pi/r$ ) (compiler)
	acm = 5.015 - 15/9.2/(1/K) (complet)
	std. dev. = 0.9% (compiler)
The enthalpy of solution,	$\Delta H$ , is:
۵	$M/kJ mol^{-1} = 30.2$ (compiler)
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Not available.	No details given.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES ;

	41
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Argon; Ar; [7440-37-1]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> </ul>	Novozhilov, A. L.; Devyatkin, V. N.; Pchelina, E. I. Vth All-Union Conf. Phys. Chem. Electrochem. of Fused Salts, Oxide Melts, Solid Electrolytes, Sverdlovsk, Part1, <u>1973</u> , 118.
VARIABLES: P/kPa: 101.325 (compiler) T/K = 1073 - 1173	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law con in molten CsCl at different temp	stant, $K_{H}$ , for the solubility of argon eratures are:
T/K 1	07 $K_{H}$ /mol cm <sup>-3</sup> atm <sup>-1</sup>
1073 1123 1173	4.10 4.66 5.14
Smoothed Data:	
The temperature dependence of	K could be expressed by the equation.
$\log(K/mo) \text{ cm}^{-3} \text{ atm}^{-1}$	$r_{\rm H}$ could be expressed by the equation:
	= -5.231 - 1238.67(T/K) (compiler)
sta.	dev. = 0.4% (Compiler)
The enthalpy of solution, $\Delta H$ ,	is:
ΔH/kJ	$mol^{-1} = 23.7$ (compiler)
AUXIL	IARY INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Not susilable	
NOU AVAILADIE.	No detalis given.
	ESTIMATED ERROR:
	Std. Dev. = ± 0.4% (compiler)
	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Argon; Ar; [7440-37-1]	Borodzinski, A.; Sokolowski, A.; Suski, L.
(2) Zinc chloride; ZnCl <sub>2</sub> ; [7646-85-7]	<b>J. Chem. Thermodyn.</b> <u>1975</u> , <b>7</b> , 655 - 60.
VARIABLES:	PREPARED BY:
one temperature: $T/K = 720$ P/kPa = 20 - 100	N. P. Bansal
EXPERIMENTAL VALUES:	
For the solubility of argon in this:	he melt the Henry's law constant, $K_{H}$ ,
T/K $10^{10} x_1$ /mol fraction 1	$P_a^{-1}$ 107 K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
720 4.77 ± 0.03	8.23 <del>°</del>
* Value calculated by the compiler Janz, G. J. "Molten Salts HandBoo Month Salts HandBoo	using density of ZnCl <sub>2</sub> from ok" Academic Press, <u>1967</u> .
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The experimental arrangement used is described in detail in the original paper. The melt was saturated with argon. The process of saturation was enhanced by a magnetic stirrer. The change in volume of the gas caused by its dissolution in the melt was determined. Temperature was	Argon was 99.99% pure. Zinc chloride p. a. was distilled under vacuum prior to its distillation directly into the apparatus.
controlled within f ik.	ESTIMATED ERROR:
	solubility = $\pm$ 5% (authors)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Argon; Ar; [7440-37-1]	Woelk, H. U.		
(2) Potassium bromide; KBr;	Nukleonik <u>1960</u> , <b>2</b> , 278 - 79.		
[//58-02-3]			
VARIABLES:	PREPARED BY:		
P/kPa: 101.325 (compiler)	N. P. Bansai		
EXPERIMENTAL VALUES:			
Solubilities of argon in molten KBr at different temperatures have been reported in graphical form only. The values of solubilities derived from this graph by the compiler are given below in the form of Henry's law constants, K <sub>H</sub> :			
T/K K <sub>H</sub> 2	< 107/mol ml <sup>-1</sup> atm <sup>-1</sup>		
1017	6.43		
1083 1151	7.76 9.12		
Smoothed Data:			
Temperature dependence of K <sub>H</sub> is e	expressed by the relation:		
$\log(K_{H}/mol ml^{-1} atm^{-1}) =$	= -4.887 - 1326/(T/K) (compiler)		
std. dev	r. = 0.2% (compiler)		
The heat of solution, AH, is calc	ulated to be:		
∧H/kJ mol	. <sup>-1</sup> = 25.4 (compiler)		
	THEODIATION		
	SOURCE AND PUDITY OF MATERIALS.		
······································	SOURCE AND FURTH OF FATERIALS;		
The procedure employed for solubility measurements has been described elsewhere (1).	Not described.		
	ESTIMATED ERROR:		
	Nothing specified		
	REFERENCES:		
	1. Woelk, H. U. <u>Chem Ing Techn.</u> <u>32</u> , 765(1960)		

COMPONENTS :		ORIGINAL MEASUREMENTS:	
(1) Argon; Ar; [7440-37-1]		Woelk, H. U.	
(2) Potassium iodide; KI; [7681-11-0]		Nukleonik <u>1960</u> , 2, 278 - 79.	
VARTABLES		PDEDADED BV.	
T/K =	101.325 (compiler) 985 - 1263	N. P. Bansal	
EXPERIMENTAL VALUES:			
Solubilities of argon in molten F been reported only in graphical form The values of solubilities derive given below in the form of Henry's I		KI at different temperatures have n. ed from this graph by the compiler are law constants, $K_{H}$ :	
	т/к 10	<sup>7</sup> K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>	
	985 1053 1125 1184 1263	8.0 9.9 11.8 14.3 16.6	
Smoothed Data:			
Temperature	dependence of $K_{H}$ is e	expressed by the relation:	
lo	g(K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup> ) =	= -4.642 - 1434.5/(T/K) (compiler)	
std. dev. = 0.8% (compiler)		7. = 0.8% (compiler)	
The heat of solution, AH, is calculated to be:		ulated to be:	
	∧H/kJ mo]	$L^{-1} = 27.5$ (compiler)	
AUXILIARY I		INFORMATION	
METHOD/APPARATUS/PRO	DCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The procedu solubility mea same as descri	re used for the surements was the bed elsewhere (1).	Not described.	
		ESTIMATED ERROR:	
		Nothing specified	
		REFERENCES :	
		1. Woelk, H. U. Chem Ing Techn. <u>32</u> , 765(1960).	

	ODTOTIVIT AND A CHARLEN THE C	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Argon; Ar; [7440-37-1]	Paniccia, F; Zambonin, P. G.	
[7631-99-4]	J. Chem. Soc. Faraday Trans. I	
<pre>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<u>1972</u> , <b>68</b> , 2083 - 89.	
VADTADTEC.	DREDARED DV.	
m/v = 500 = 603	PREPARED BI:	
T/K = 508 - 603	N. P. Bansal	
EVERTIONTAL VALUES.	1	
CAFERIMENTAL VALUES:		
The solvent was an equimolar mix nitrate. The solubilities of argon are:	ture of sodium nitrate and potassium in the melt at different temperatures	
Т/К 10 <sup>в</sup>	$K_{H}/mol cm^{-3} bar^{-1}$	
	1.0	
508	1.3	
573	1.7	
	± • • •	
Smoothed Data:		
The temperature dependence of He	arvia law constant V is siven by	
the relation:	iry's raw constant, A <sub>H</sub> , is given by	
$\log(K_{H}/mol \ cm^{-3} \ bar^{-1})$	= -5.99 - 1017.4/(T/K) (compiler)	
std. de	v. = 1.1% (compiler)	
The enthalpy, $\wedge H$ , and the standa	rd entropy, AS°, of solution are:	
AH/kJ mo	$1^{-1} = 18.5$	
	$nO1^{-1} = -28$ (at 533 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Non-model by the damage		
Manometric technique.		
	Argon (High Purity Grade) was purified by keeping it in contact	
The details of the apparatus	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,)	
The details of the apparatus and procedure employed for solubility measurements are	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - decassed for	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was disconnected and argon gas introduced at about one bar	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and potassium nitrates were used to prepare the melt which was filtered	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was disconnected and argon gas introduced at about one bar pressure. The melt was vigorously stirred and argon gas	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and potassium nitrates were used to prepare the melt which was filtered in the molten state.	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was disconnected and argon gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and potassium nitrates were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR:	
The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was disconnected and argon gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the eguilibrium was reached	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and potassium nitrates were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified	
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The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum - degassed for a few hours. The vacuum was disconnected and argon gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final variation after a suitable calibration.	Argon (High Purity Grade) was purified by keeping it in contact with Ascarite (A. H. Thomas Co.,) for several hours to remove CO <sub>2</sub> and other acidic impurities and molecular sieve 5A (Carlo Erlie, Milano) at -80°C to remove water. Reagent grade sodium and potassium nitrates were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G.	
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COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Argon; Ar; [7440-37-1] (2) Lithium fluoride; LiF; [7789-24-4]</pre>	Watson, G. M.; Evans III, R. B.; Grimes, W. R.; Smith, N. V.		
<pre>(3) Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</pre>	<b>J. Chem. Eng. Data <u>1962</u>, 7,</b> 285 - 87.		
VARIABLES:	PREPARED BY:		
P/kPa = 101.325 - 202.650			
T/K = 773 - 1073	N. P. Bansal		
EVPERTMENTAL VALUES.			
The values of Henry's law constant, $K_{H}$ , for the solubility of argon in the melt LiF - BeF <sub>2</sub> (64 - 36 mol%) at different temperatures are:			
t/°C 10 <sup>B</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
500	$0.54 \pm 0.02$		
600	0.98 ± 0.02		
700	$1.69 \pm 0.10$ 2 66 ± 0.15		
Smoothed Data:			
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:		
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	) = -5.797 - 1918/(T/K) (compiler)		
std. dev	v. = 1.5% (compiler)		
The enthalput of colution AH on	d the standard aptropy of colution		
$\Delta S^{\circ}$ , are:	d the standard entropy of solution,		
$\Delta H/kcal mol^{-1} = 8.6$			
$\Delta S^{\circ}/cal K^{-1}$	$\Delta S^{\circ}/cal K^{-1} mol^{-1} = -4.2$ (at 1000 K)		
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Stripping or elution method.	Argon gas, (> 99.9%), was		
The apparatus and procedure	obtained from the Linde Co.		
used for gas solubility	$(99.5 \pm 0.5\%)$ was obtained from the		
measurements have been described	Beryllium Corp. of America.		
	the two fluorides in proper		
	proportions. The melt was purified		
	anhydrous HF and F <sub>2</sub> at 800°C		
	ESTIMATED ERROR:		
	solubility = ± 10%		
	REFERENCES :		
	1. Grimes, W. R.; Smith, N. V.;		
	Watson, G. M.		
	J. Phys. Chem. <u>1958</u> , <b>62</b> , 862.		
	2. Blander, M.; Grimes, W. R.; Smith, N. V.; Watson, G. M. Tbid. 1959. 63. 1164.		

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Argon; Ar; [7440-37-1] (2) Sodium fluoride; NaF; [7681-49-4] (3) Beryllium fluoride; BeF<sub>2</sub>;</pre>	Ward, W. T.; Watson, G. M.; Evans, R. B.; Grimes, W. R. U.S.A.E.C. Rept. O.R.N.L 2931	
[7789-49-7]	<u>1960</u> , 29 - 31.	
VARIABLES: P/kPa = 101.325 - 202.650 T/K = 773 - 1073	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of argon in the molten salt solvent NaF - BeF <sub>2</sub> (57 - 43 mol%) at different temperatures are:		
t/°C 10	07 K <sub>H</sub> */mol cm <sup>-3</sup> atm <sup>-1</sup>	
500	1.16	
600 700	1.92 2.97	
800	4.55	
* Values read from g	raph.	
Smoothed Data:		
Temperature dependence of $K_{H}$ ca	an be expressed by the equation:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	) = -5.839 - 1629.2/(T/K) (compiler)	
std. d	lev. = 1.8 %	
The heat of solution, $\Lambda$ H, and the standard entropy of solution, $\Lambda$ S°, are:		
$\Lambda H/kcal mol^{-1} = 7.5$ (compiler) $\Lambda S^{\circ}/cal K^{-1} mol^{-1} = -3.1$ (at 1000 K)		
AUXILIA	ARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method.	Not described.	
The method used for the determination of gas solubilities in the molten salt solvent was the same as described elsewhere (1).		
	ESTIMATED ERROR:	
	Nothing specified	
	REFERENCES:	
	1. Grimes, W. R.; Smith, N. V.; Watson, G. M.	
	J. Phys. Chem. <u>1958</u> , 62, 862.	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Argon; Ar; [7440-37-1] (2) Sodium fluoride; NaF; [7681-49-4]</pre>	Grimes, W. R.; Smith, N. V.; Watson, G. M.	
<pre>(3) Zirconium fluoride; ZrF<sub>4</sub>; [7783-64-4]</pre>	<b>J. Phys. Chem.</b> <u>1958</u> , <b>62</b> , 862 - 66.	
VARIABLES: P/kPa = 50.663 - 202.650	PREPARED BY:	
T/K = 873 - 1073	N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant in the melt NaF - $ZrF_4$ (53 - 47 mol	at, $K_{H}$ , for the solubility of argon b) at different temperatures are:	
t/°C 10 <sup>8</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
600	5.06 ± 0.15	
700	8.07 ± 0.08	
800	12.0 £ 0.6	
Smoothed Data:		
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> ) =	= -5.286 - 1755.8/(T/K) (compiler)	
std. dev	7. = 0.4% (compiler)	
the gas with equal concentrations in	the entropy, AS, of dissolving the gaseous and liquid states are:	
∆H/kcal n	$nol^{-1} = 8.2$	
$\Delta S/cal K^{-1} mol^{-1} = -1.5$ (at 1000 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution or stringing method	Argon gas, (>99.9%) was obtained	
Election of scripping method.	Sodium fluoride of reagent grade	
The diagram and details of the	was obtained from Mallinckrodt	
described in detail in the	ZrF <sub>4</sub> was prepared by hydrofluorin	
original publication. In brief,	-ation of ZrCl <sub>4</sub> at 500°C in nickel	
argon by sparging it with the gas	mixing the two salts in proper ratio	
for 6 hours at the desired gas	and purified at 800°C by sparging it	
solution was transferred into the	No oxide was present in the melt.	
stripping section. The dissolved	ESTIMATED ERROR:	
by circulation of helium		
through the system for about 15 minutes. The amount of argon	solubility = ± 10% (author)	
present in the eluted gas		
mixture was determined by mass spectrometry.	REFERENCES:	
- *		
	1	

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COMPONENTS	•		ORIGINAL MEAS	UREMENTS :	
(1) Ar (2) Sc [1 (3) Va [1	gon; Ar; [7440-37-1] dium oxide; Na <sub>2</sub> O; 313-59-3] nadium oxide; V <sub>2</sub> O <sub>5</sub> ; 314-62-1]		Nalimova, Ponomarev, Zhur. Fiz. Russ. J. P <u>1983,</u> 57,	E. G.; Fedorov V. E. Khim. <u>1983</u> , 5 hys. Chem. (Er 478 - 479. (*)	7, A. A.; 57, 779-780; ng. Transl.)
VARIABLES	: T/K = 808 - 951 V <sub>2</sub> O <sub>5</sub> / mole % = 61 - /kPa: 101.325 (1 atm.	70 )	PREPARED BY:	N. P. Bansal	
EXPERIMENT	TAL VALUES:				
Henry's Law Constants, $K_p$ (mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility of argon in Na <sub>2</sub> O - V <sub>2</sub> O <sub>5</sub> melts of various compositions were determined at different temperatures. Coefficients of the equation log $K_p = A+B/T \pm \Delta$ , where $\Delta$ is the error obtained by linear least squares fit of the data are given below:					
	Melt composition/ mole % $V_2O_5$	Temp. ra (K)	inge -A	-в	Δ
	61.0 70.0	808 - 9 848 - 9	03 2.50 51 2.65	6 3583 2 3304	0.027 0.010
The effrom the $K_{\odot} = C_{m}$ gas in	nthalpies ( $\Delta$ H°) and e e temperature depende /C <sub>a</sub> , where C <sub>m</sub> and C <sub>a</sub> the liquid and the ga Melt composition/ mole % V <sub>2</sub> O <sub>2</sub>	entropies ince of th are the v s phase r 	(ΔS°) of the solubility olume concer respectively mol <sup>-1</sup>	ne solution we y constants ex ntrations of t , are given be 	re evaluated pressed as the dissolved elow:
	61.0	75.55	ی بر بر بر مربق میں اور میں مربق میں اور میں ا اور اور اور اور اور اور اور اور اور اور	50.06	
			<u></u>		
		AUXILIARY	INFORMATION		
METHOD/AP	PARATUS/PROCEDURE:		SOURCE AND PU	RITY OF MATERIAL	S:
Gas solubilities were determined by desorption of the dissolved gas from the melt by an inert gas (helium) as well as by a gas - volumetric method. The discrepancy between the results of the two methods was 10 - 20 %. The $V_2O_5$ content in the melt was determined by an amperometric titration.		Not spe	ecified.		
			ESTIMATED ERF Not spe	ROR: ecified.	
			REFERENCES:		

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<ul> <li>(1)Argon; Ar; [7440-37-1]</li> <li>(2)Potassium Oxide; K<sub>2</sub>O; [12136-45-7]</li> <li>(3)Vanadium Oxide; V<sub>2</sub>O<sub>5</sub>; [1314-62-1]</li> </ul>	Nalimova, E.G; Fedorov, A. A.; Ponomarev, V. E.;Ketov, A. N. Zhur. Fiz. Khim. <u>1982</u> , 56, 474 - 475; Russ. J. Phys. Chem. <u>1982</u> , 56, 292 - 293.		
VARIABLES: T/K = 773 - 909	PREPARED BY:		
$V_2 U_5 / MOI = 55.5 - 66.5$ P/kPa: 101.325 (1 atm.)	N. P. Bansal		
EXPERIMENTAL VALUES: Solubilities of argon in $K_2O - V$ were determined at various temperatu: The average gas solubilities obtained temperature are given below :	$V_2O_5$ melts of various compositions res at an initial pressure of 1 atm. I from five measurements at each		
55.5 mole % V <sub>2</sub> O <sub>5</sub> 61.0 mo	le % V <sub>2</sub> O <sub>5</sub> 66.5 mole % V <sub>2</sub> O <sub>5</sub>		
$\frac{T/K}{cm^{-3}} \frac{10^7 \text{ cm/mol}}{atm^{-1}} T/K$	10 <sup>7</sup> cm/mol T/K 10 <sup>7</sup> cm/mol cm <sup>-3</sup> atm <sup>-1</sup> cm <sup>-3</sup> atm <sup>-1</sup>		
816 0.89 773 858 1.55 813	1.20 783 $3.472.04 810 3.63$		
876 1.78 828	2.04         810         3.63           2.34         837         4.57		
898 1.95 853 893	2.69         873         7.08           4.37         909         7.76		
the gas in the melt and $C_{\sigma}$ is the comphase in mole cm <sup>-3</sup> . Thermodyanamic parameters $\Delta H^{\circ}/kJ$ Mole % $V_2O_5$ $\Delta H^{\circ}/kJ$ 55.5 65.83 61.0 64.43 66.5 53.72	Incentration of the gas in the gas arameters at 855K are give below : $mol^{-1}$ $\Delta S^{\circ}/J mol^{-1}K^{-1}$ $3$ $57.42$ $42.83$ $35.96$		
AUXILIARY INFORMATION			
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Desorption Method : Gas solubilities were determined by desorption of the dissolved gas from the melt by an inert gas using a standard method. The argon content in the gas mixture was estimated by analysis based on thermal conductivity. <u>Volumetric Method</u> : Recrystallized potassium metavanadate and vanadium pentoxide were fused together. The possible reducing impurities present	Potassium metavanadate of "chemica- lly pure" grade was recrystallized. Vanadium pentoxide of "specially pure" grade was used.		
ling oxygen for 3h. at 550°C. The	ESTIMATED ERROR:		
bubbling helium through the melt	Solubility - 1 10% (authors)		
The discrepancy between the solub- ilities determined by the two meth- ods was ± 10%	REFERENCES :		

	51		
COMPONENTS:	ORIGINAL MEASUREMENTS:		
<ol> <li>Argon; Ar; [7440-37-1]</li> <li>Potassium oxide; K<sub>2</sub>O; [12136-45-7]</li> <li>Vanadium oxide; V<sub>2</sub>O<sub>5</sub>; [1314-62-1]</li> </ol>	Nalimova, E. G.; Fedorov, A. A.; Ponomarev, V. E. Zhur. Fiz. Khim. <u>1983</u> , <b>57</b> , 779-780; Russ. J. Phys. Chem. (Eng. Transl.) <u>1983, </u> 57, 478 - 479. (*).		
VARIABLES:	PREPARED BY:		
T/K = 773 - 909 $V_2O_5 / mole \% = 55 - 66.5$ P/kPa: 101.325 (compiler)	N. P. Bansal		
EXPERIMENTAL VALUES: Henry's Law Constants, $K_{p}$ (mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility of argon in $K_{2}O - V_{2}O_{5}$ melts of various compositions were determined at different temperatures. Coefficients of the equation log $K_{p} = A+B/T \pm \Delta$ , where $\Delta$ is the error obtained by linear least squares fit of the data are given below:			
Melt composition/ Temp. r mole $% V_2O_5$ (K)	ange -A -B $\Delta$		
55.0 800 - 61.0 773 - 66.5 783 -	898         3.027         3067         0.014           893         3.164         1863         0.038           909         3.392         2434         0.011		
The enthalpies ( $\Delta H^\circ$ ) and entropies ( $\Delta S^\circ$ ) of the solution were evaluated from the temperature dependence of the solubility constants expressed as $K_{\circ} = C_m/C_{\sigma}$ , where $C_m$ and $C_{\sigma}$ are the volume concentrations of the dissolved gas in the liquid and the gas phase respectively, are given below:			
mole $% V_2 O_5$	(at 855K)		
55.0 65.8 61.0 64.4 66.5 53.7	3 57.42 0 42.83 2 35.96		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Gas solubilities were determined by desorption of the dissolved gas from the melt by an inert gas (helium) as well as by a gas - volumetric method. The discrepancy between the results of the two methods was 10 - 20 %. The V <sub>2</sub> O <sub>5</sub> content in the melt was determined by an amperometric titration.	Not specified.		
	ESTIMATED ERROR: Not specified.		
	REFERENCES:		

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Argon; Ar; [7440-37-1] Nalimova, E. G.; Fedorov, A. A.; Ponomarev, V. E. Zhur. Fiz. Khim. <u>1983</u>, **57**, 779-780; Russ. J. Phys. Chem. (Eng. Transl.) <u>1983</u>, **57**, 478 - 479. (\*). (2) Cesium Oxide; Cs<sub>2</sub>O; [20281-00-9] (3) Vanadium oxide;  $V_2O_5$ ; [1314-62-1] VARIABLES: PREPARED BY: T/K = 673 - 922 $V_2O_5$  / mole % = 55 - 61 N. P. Bansal P/kPa: 101.325 (compiler) **EXPERIMENTAL VALUES:** Henry's Law Constants,  $K_p$ (mol cm<sup>-3</sup> atm<sup>-1</sup>), for the solubility of argon in  $Cs_2O - V_2O_5$  melts of various compositions were determined at different temperatures. Coefficients of the equation log  $K_p = A+B/T \pm \Delta$ , where  $\Delta$  is the error obtained by linear least squares fit of the data are given below: Melt composition/ Temp. range -A -B Λ mole % V<sub>2</sub>O<sub>5</sub> (K) 50.0 0.009 832 - 922 3000 3.030 673 - 825 61.0 4.328 1863 0.028 The enthalpies ( $\Delta$ H°) and entropies ( $\Delta$ S°) of the solution were evaluated from the temperature dependence of the solubility constants expressed as  $K_{o} = C_m/C_g$ , where  $C_m$  and  $C_g$  are the volume concentrations of the dissolved gas in the liquid and the gas phase respectively, are given below: Melt composition/ ∆H°/kJ mol<sup>-1</sup> ∆S°/JK<sup>-1</sup>mol<sup>-1</sup> mole % V<sub>2</sub>O<sub>5</sub> (at 855K) 50.0 64.55 43.07 61.0 53.06 32.68 AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Gas solubilities were determined Not specified. by desorption of the dissolved gas from the melt by an inert gas (helium) as well as by a gas - volumetric method. The discrepancy between the results of the two methods was 10 - 20 %. The  $V_20_5$  content in the melt was determined by an amperometric titration. ESTIMATED ERROR: Not specified. **REFERENCES:** 

COMPONENTS: (1) Argon; Ar; [7440-37-1] (2) Lithium fluoride; LiF; [7789-24-4] (3) Sodium fluoride; NaF; [7681-49-4] (4) Potassium fluoride; KF; [7789-23-3] VARIABLES: T/K = 873 - 1073 P/kPa = 101.325 - 202.650	ORIGINAL MEASUREMENTS: Blander, M.; Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1959</u> , 63, 1164 - 67. PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The values of Henry's law constant, K <sub>H</sub> , for the solubility of argon in the molten eutectic LiF - NaF - KF (46.5 - 11.5 - 42.0 mol%) at different temperatures, and pressures ranging from 1 - 2 atm, are:	
t/°C 10 <sup>B</sup>	$K_{H}/mol \ cm^{-3} \ atm^{-1}$
700 800	1.80 ± 0.04 3.40 ± 0.03
Smoothed Data: Temperature dependence of K <sub>H</sub> can log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> ) std. def The enthalpy of solution, AH, and AS°, are: AH/kcal mod AS°/cal K <sup>-1</sup> p	be expressed by the relation: = -4.959 - 2699.8/(T/K) (compiler) v. = 1.4% (compiler) d the standard entropy of solution, $1^{-1} = 12.4$ mol <sup>-1</sup> = -0.1 (at 1000 K)
AUXILIARY INFORMATION	
METHOD ADDA DA THE ADDOCEDUDE -	
Elution or stripping method. The apparatus and procedure employed have been described elsewhere (1).	Argon gas, purity better than 99.9%, was obtained from Linde Air Products Company. The melt was prepared by mixing Reagent grade LiF, NaF and KF in appropriate amounts. The melt was purified at 800°C by flushing it alternately with anhydrous HF and H <sub>2</sub> . Nickel apparatus was used.
	ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u> , <b>62</b> , 862.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Xenon; Xe; [7440-63-3] (2) Lithium fluoride; LiF;</pre>	Watson, G. M.; Evans III, R. B.; Grimes, W. R.; Smith, N. V.
<pre>(3) Beryllium fluoride; BeF<sub>2</sub>;</pre>	J. Chem. Eng. Data <u>1962</u> , 7, 285 -
[//89-49-/]	87.
VARIABLES: $P/kPa = 101,325$	PREPARED BY:
T/K = 873 - 1073	N. P. Bansal
EVDEDTMENTAT VALUES.	
EAFERIMENTAL VALUES:	
The values of Henry's law constants, $K_{H}$ , for the solubility of xenon in the melt LiF - BeF <sub>2</sub> (64 - 36 mol%) at different temperatures are:	
t/°C 10 <sup>B</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600	0.233 ± 0.004
650 700	0.333 ± 0.015 0.505 ± 0.020
800	0.863 ± 0.020
Smoothed Data:	
Temperature dependence of $K_{H}$ can be expressed by the relation:	
$\log(K_{H}/mol\ cm^{-3}\ atm^{-1}) = -5.543 - 2698/(T/K)$ (compiler)	
std. dev. = 1.6% (compiler)	
The enthalpy of solution, $\Delta H$ , and the standard entropy of solution,	
$\Delta S^{\circ}$ , are: $\Delta H/kcal mol^{-1} = 12.1$	
$\Delta S^{\circ}/cal K^{-1} mol^{-1} = -3.1$ (at 1000 K)	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping or elution method.	Xenon gas, (>99.9%) was obtained form the Linde Co.
The apparatus and procedure used for gas solubility	LiF was of reagent grade. BeF <sub>2</sub> (99.5 $\pm$ 0.5%) was obtained from the
measurements was the same as described elsewhere (1.2).	Beryllium Corp. of America.
	the two fluorides in proper
	by sparging it alternately with anhydrous HF and $F_2$ at 800°C.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	<pre>1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</pre>
	2. Blander, M.; Grimes, W. R.;
	Smith, N. V.; Watson, G. M. Ibid. 1959. 63. 1164.
COMPONENTS:	ORIGINAL MEASUREMENTS:
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<pre>(1) Xenon; Xe; [7440-63-3] (2) Sodium fluoride; NaF;</pre>	Ward, W. Ţ.; Watson, G. M.; Evans, R. B.; Grimes, W. R.
[7681-49-4] (3) Beryllium fluoride; BeF <sub>2</sub> ; [7789-49-7]	U.S.A.E.C. Rept. O.R.N.L2931 1960,
[//09-49-/]	29 - 31.
VARIABLES: $P/kPa = 101, 325 - 202, 650$	PREPARED BY:
T/K = 773 - 1073	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant in the molten solvent NaF - BeF <sub>2</sub> (5 are:	ht, $K_{H}$ , for the solubility of xenon 7 - 43 mol%) at different temperatures
t/°C 10 <sup>9</sup>	$K_{H}^{*}/mol \ cm^{-3} \ atm^{-1}$
	2.10
600	3.84
700	8.60
800	15:57
* Values read from the	graph by the compiler.
Smoothed Data: Temperature dependence of K., can	be expressed by the equation:
$\log(K_{H}/\text{mol Cm}^2 \text{ atm}^2)$	= -5.529 - 2464/(T/K) (compiler)
std. dev	7. = 5.7% (compiler)
The heat of solution, $AH$ , and the standard entropy of solution, $AS^\circ$ , are:	
$h/kcal mol^{-1} = 11.28$ (compiler)	$\Delta S^{\circ}/cal K^{-1} mol^{-1} = -2.3$ (at 1000 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method.	Not described.
The method used for the determination of gas solubilities in the molten salt solvent was the same as described elsewhere (1).	
	ESTIMATED ERROR:
	Nothing specified
4	REFERENCES
	1. Grimes, W. R.; Smith, N. V.;
	Watson, G. M. J. Phys. Chem. 1958 62 862

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Xenon; Xe; [7440-63-3] (2) Sodium fluoride; NaF; [7681-40-4]</pre>	Grimes, W. R.; Smith, N. V.; Watson, G. M.
<pre>(3) Zirconium fluoride; ZrF<sub>4</sub>; [7783-64-4]</pre>	<b>J. Phys. Chem.</b> <u>1958</u> , <b>62</b> , 862 - 66.
VARIABLES: P/kPa = 101.325 - 202.650	PREPARED BY:
T/K = 873 - 1073	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant, $K_{H}$ , for the solubility of xenon in the melt NaF - $ZrF_4$ (53 - 47 mol%) at different temperatures are:	
t/°C 10 <sup>8</sup>	K <sub>FI</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600	1.94
700 800	3.56 6.32
Smoothed Data:	
Temperature dependence of K <sub>17</sub> can h	be expressed by the relation:
$- \frac{1}{2} \log(K_{m}/mol \ cm^{-3} \ mol^{-1})$	= -4.972 - 2397 3/(TT/K) (compiler)
sta. dev	7. = 1.6% (compiler)
The enthalpy of solution, ^H, and gas with equal concentrations in the	the entropy, AS, of dissolving the gaseous and liquid states are:
gas with equal concentrations in the gaseous and liquid states are:	
$^{\text{AH/kcal mol}^{-+}} = 11.1$	
$\Lambda S/cal K^{-1} mol^{-1} = -0.1$ (at 1000 K)	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution or stripping method. The diagram and details of the apparatus and procedure used are described in detail in the original paper. Briefly, the melt	<pre>Xenon gas, (&gt;99.9%) was obtained from Linde Air Products Company. Sodium fluoride of reagent grade was obtained from Mallinckrodt Chemical Co. ZrF<sub>4</sub> was prepared by hydrofluorin -ation of ZrCl<sub>4</sub> at 773K in nickel</pre>
was saturated with xenon by sparging it with the gas for 6 hours at the desired gas pressure. Part of the molten salt was	apparatus. The melt was prepared by mixing the two salts in proper amounts and purified at 800°C by sparging it alternately with anhydrous HF and
section. The dissolved xenon was	H <sub>2</sub> . NO OXIGE Was present in the meit.
stripped from the melt by circulation of helium through the	DITIBILD DANOA.
system for about 15 minutes. The amount of xenon present in the eluted gas mixture was determined	solubility: <u>+</u> 20% (authors)
by mass spectrometry.	REFERENCES:
	1

	57
<pre>COMPONENTS: (1) Xenon; Xe; [7440-63-3] (2) Sodium fluoride; NaF; [7681-49-4] (3) Zirconium fluoride; ZrF<sub>4</sub> [7783-64-4] (4) Uranium tetrafluoride; UF<sub>4</sub>; [10049-14-6]</pre>	ORIGINAL MEASUREMENTS: Grimes; W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u> , 62, 862 - 66.
VARIABLES: T/K = 873 - 1073 P/kPa = 50.663 - 202.650	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The values of Henry's law consta in the melt NaF - ZrF <sub>4</sub> - UF <sub>4</sub> (50 - 0.5 - 2 atm. and at three temperatu	nt, K <sub>H</sub> , for the solubility of xenon 46 - 4 mol%) at pressures ranging from res are:
t/°C 10 <sup>8</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
873 973 1073	2.0 4.0 6.5
Smoothed Data:	
The heat of solution, AH, is est AH/kJ mo	-4.939 - 2404.37(T/K) (Compiler) v. = 1.5% (compiler) imated to be: 1 <sup>-1</sup> = 46.0 (compiler)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus and procedure used are described in detail in the original paper. Briefly, the melt was saturated with xenon by sparging it with the gas for 6 hours at the desired gas pressure. Part of the molten salt solution was transferred into the stripping section. The dissolved xenon was stripped from the melt by circulation of helium through the system for about 15 minutes. The amount of xenon present in the eluted gas mixture was determined by mass spectrometry.	SOURCE AND PURITY OF MATERIALS: Xenon gas, (>99.9%) was obtained from Linde Air Products Co. Reagent grade NaF and UF4 were obtained from Mallinckrodt Chemical Co. ZrF4 was prepared by hydrofluorination of ZrCl4 at 773K in nickel apparatus. The melt was prepared by mixing the three salts in proper amounts and purified at 800°C by sparging it alternately with anhydrous HF and H2 No oxide was present in the melt. ESTIMATED ERROR: solubility: ± 20% (authors) REFERENCES:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Hydrogen; H<sub>2</sub>; [1333-74-0]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> </ul>	Sullivan, E. A.; Johnson, S.; Banus, M. D. J. Amer. Chem. Soc. 1955, <b>77</b> , 2023 -
	24.
VARIABLES:	PREPARED BY:
one temperature: T/K = 773	N. P. Bansal
P/kPa = 689.286 - 5514.286	
EVDEDTMENTAL VALUES.	
The solubility of hydrogen in mol less than 60 mg of H <sub>2</sub> /100 g of melt present. Presence of corrosion produ hydrogen. The solubility of H <sub>2</sub> in th of temperature and pressure.	ten NaOH at 500°C was found to be unless corrosion products are acts increase the solubility of he melt was found to be independent
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Solubility measurements were carried out by introducing a known amount of hydrogen into the system above the melt and allowed to attain equilibrium. The fall in pressure was recorded with a pressure gauge and the solubility calculated.	NaOH contained 0.07% sodium carbonate and other trace impurities. It was specially dehydrated. The container for molten hydroxide was made from INCO Grade "L" nickel. It was pretreated at 400°C with alter -nate 30 minute cycles of hydrogen and vacuum for four hours to free it from any surface oxidation and adsorbed gases.
	Nothing specified.
	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen; H <sub>2</sub> ; [1333-74-0]	Sullivan, E. A.; Johnson, S.; Banus, M. D.
<pre>(2) Potassium hydroxide; KOH; [1310-58-3]</pre>	J. Amer. Chem. Soc. <u>1955</u> , 77, 2023 - 24.
VARIABLES: m/v = 692 = 772	PREPARED BY:
P/kPa = 689.286 - 5514.286	N. P. Bansar
EXPERIMENTAL VALUES:	1
The solubility of hydrogen in mo 500°C. It was found to be less than absence of corrosion products. Prese the solubility of hydrogen. The solu to be independent of temperature and	lten KOH was determined at 410 and 60 mg of $H_2/100$ g of melt in the ence of corrosion products increase ability of $H_2$ in the melt was found 1 pressure.
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Solubility measurements were carried out by introducing a known quantity of hydrogen into the system above the melt and allowing it to equilibrate. The gas solubility was calculated from the drop in pressure which was measured with a pressure gauge.	KOH contained 0.12% potassium carbonate and other trace impurities. It was specially dehydrated. The container for molten hydro- xide was made from INCO Grade "L" nickel. It was pretreated at 400°C with alternate 30 minute cycles of hydrogen and vacuum for four hours to free it from any surface oxidat- ion and adsorbed gases.
1	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Hydrogen; H<sub>2</sub>; [1333-74-0] Malinauskas, A. P.; Richardson, D. M. (2) Dilithium beryllium fluoride; Ind. Eng. Chem. Fundam. 1974, 13, 242 - 245. Li<sub>2</sub>BeF<sub>4</sub> VARIABLES: PREPARED BY: P/kPa = 101.325 - 202.650T/K = .73 - 973N. P. Bansal EXPERIMENTAL VALUES: The values of Henry's law constant, K<sub>H</sub>, and the Ostwald coefficient, K<sub>c</sub>, for the solubility of hydrogen in molten Li<sub>2</sub>BeF<sub>4</sub> at different temperatures are:  $10^{8} K_{H}^{a}/mol cm^{-3} atm^{-1}$ T/K 10<sup>3</sup> K<sub>c</sub> 773  $1.78 \pm 0.13$  $1.13 \pm 0.08$ 873 4.42 ± 0.12 3.17 ± 0.09 973 4.84 ± 0.46 3.87 ± 0.37 <sup>a</sup> Calculated by the compiler using the relation  $K_{H} = K_{C}/RT$ . Smoothed Data: Temperature dependence of  $K_{H}$  and  $K_{c}$  are expressed by the equations:  $\log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -5.535 - 1677.5/(T/K)$  (compiler) std. dev. = 12.5% (compiler)  $\log K_c = \log(T/K) - 1535/(T/K) - 3.7684$ The enthalpy of solution, AH, is calculated to be:  $h/kJ \mod^{-1} = 32.1$  (compiler) AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Hydrogen and xenon were at least Stripping method. 99.9% pure. Hydrogen gas was purified by passing through liquid nitrogen The diagram and details of the cooled coils of copper tubing. apparatus and the experimental procedure are described in (1). In brief, the melt was saturated with hydrogen and a known volume of the saturated solution was transferred to the stripper. The dissolved hydrogen was freed by sparging with xenon and analyzing by mass spectroscopy. ESTIMATED ERROR: Nothing specified. **REFERENCES:** 1. Malinauskas, A. P., Richardson, D. M.; Savolainen, J. E.; Shaffer, J. H. Ind. Eng. Chem. Fundam. 1972, 11, 584.

	01
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen; H<sub>2</sub>; [1333-74-0] (2) Lithium fluoride; LiF;     [7789-24-4] (3) Beryllium fluoride; BeF<sub>2</sub>;     [7789-49-7]</pre>	Malinauskas, A. P.; Richardson, D. M.; Savolainen, J. E.; Shaffer, J. H. Ind. Eng. Chem. Fundam. <u>1972</u> , <b>11</b> , 584 - 86.
VARIABLES:	PREPARED BY:
one temperature: T/K = 873 P/kPa = 101.325 - 202.650	N. P. Bansal
EXPERIMENTAL VALUES:	
The value of the Henry's law cons hydrogen in the molten eutectic LiF	stant, $K_{H}$ , for the solubility of - BeF <sub>2</sub> (66 -34 mol%) is:
t/°C 10 <sup>5</sup>	<sup>3</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600	4.34 ± 0.20
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Stripping method.	Not described.
The diagram and details of the	
followed are given in the original	
paper. The main parts of the apparatus were constructed of	
Hastelloy, a nickel base alloy	
Mo. In an experiment the melt	
saturated with hydrogen by	
bubbling the gas through it. A known quantity of saturated	Nothing specified.
solution was transferred into the stripping chamber where the	
dissolved gas was stripped from the solvent and collected for	DE DE DENCHE .
measurement.	ALFERENCES ;
	1

COMPONENTS .	OPICINAL MEASUPENENTS.	
COMPONENTS:	Desimoni E Denissio D	
(1) $Hvdrogen \cdot H_{-} \cdot [1333-74-0]$	Zambonin P G	
(2) Sodium nitrate: NaNO <sub>3</sub> :	J. Chem. Soc. Faraday Trans I	
[7631-99-4]	<u>1973, 69, 2014 - 18.</u>	
(3) Potassium nitrate; KNO <sub>3</sub> ;	Proc. Int. Symp. Molten salts(Pem-	
[7757-79-1]	sler, J. P Ed); The Electrochem	
	Soc., Princeton $1976$ , 584 - 602	
VARIABLES:	PREPARED BY:	
T/K = 508 - 603	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The melt used was an equimolar mixture of sodium nitrate - potassium nitrate. The solubilities of $H_2$ in the melt at various temperatures are:		
T/K 107 H	K <sub>H</sub> /mol cm <sup>-3</sup> bar <sup>-1</sup>	
508	1.26	
533	1.48	
603	2.19	
Creathed Data		
Smoothed Data:		
The temperature dependence of the by the relation:	Henry's law constant, $K_{H}$ , is given	
log(K <sub>H</sub> /mol cm <sup>-3</sup> bar <sup>-</sup>	(-1) = -5.38 - 772/(T/K) (compiler)	
et bta	r = 0.2 (compiler)	
	· - 0.28 (COMPILEI)	
The heat of solution, AH, and the	e standard entropy of solution, AS°,	
are:	1-1 44	
AH/KJ mo	$51^{-1} = 14$	
∆S°/J K <sup>-1</sup> r	$nol^{-1} = -22$ (at 533 K)	
- ,	(,	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
High sensitivity pressure	High purity H <sub>e</sub> was used. It was	
measuring technique.	freed from carbon dioxide impurities	
The diagram and details of the	by keeping it in contact with Ascar-	
apparatus have been described	ite. The last traces of water were	
elsewnere (1). A typical	removed by adsorption on molecular	
performed as follows. The melt	-80°C. The final water content was	
was evacuated at $10^{-5}$ bar for	<10 ppm. Reagent grade sodium and	
several hours for degassing. The	potassium nitrates were from Carlo	
vacuum was disconnected and	Erba, Milano. The mixture was filt-	
one atm. The melt was vigorously	Fortharen Enpon	
stirred with a magnetic stirrer.	ESTIMATED ERKOK:	
The pressure variations were	Nothing specified.	
measured, with a high precision		
function of time until the		
equilibrium was attained. The	REFERENCES:	
amount of dissolved gas was		
calculated from the rapid initial	1. Desimoni, E.; Paniccia, F.;	
pressure changes after a suitable calibration.	Zamponin, P. G.	
CallDiacton.	J. Electroanal. Chem. 1972. 38.	
	373.	

<pre>COMPONENTS: (1) Hydrogen; H<sub>2</sub>; [1333-74-0] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Potassium hydroxide; KOH; [1310-58-3] VARIABLES: one temperature: T/K = 500 P/kPa: 101.325 (compiler)</pre>	ORIGINAL MEASUREMENTS: Eluard, A. Ph. D. Thesis, University of Paris <u>1970</u> . Cited in: Zambonin, P. G.; Desimoni, E.; Palmisano, F.; Sabbatini, L. in Ionic Liquids (Lovering, D.; Inman, D.; Eds.) Plenum <u>1980</u> , 249 - 89. PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The solubility of hydrogen in mol been reported at one temperature:	ten NaOH - KOH (51 - 49 mol%) has
T/K 10 <sup>ª</sup> Solub	ility/mol cm <sup>-3</sup> atm <sup>-1</sup>
500	2.24
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Coulometric method.	Not available.
The coulometric method used was developed by Vogel and Smith (1).	
	ESTIMATED ERROR: Nothing specified
	REFERENCES: 1. Vogel, W. M.; Smith, S. W. J. Electroanal. Chem. <u>1968</u> , 18, 215.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Hydrogen; H<sub>2</sub>; [1333-74-0] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</pre>	Volgin, M. A.; L'vov, A. L.; Loskutkin, V. A.	
<pre>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</pre>	Elektrokhim. <u>1973</u> , 9, 368 - 71. Sov. Electrochem. <u>1973</u> , 9, 353 - 55.	
VARIABLES:	PREPARED BY:	
P/kPa = 86.126		
T/K = 783 - 973	N. P. Bansal	
EXPERIMENTAL VALUES:		
The Values of Henry's law constant in the molten binary eutectic Li <sub>2</sub> CO <sub>3</sub> are:	t, $K_{H}$ , and the solubility of hydrogen - $Na_2CO_3$ at different temperatures	
t/°C 10 <sup>7</sup> Solubility <sup>#</sup> /g-mol	$e cm^{-3}$ 10 <sup>7</sup> K <sub>H</sub> <sup>b</sup> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
510 1.7	2.0	
600 2.1	2.5 3.3	
650 3.6	4.2	
700 5.3	6.2	
$P_{H} = 0.85$ atm. <sup>b</sup> Calculated by the compiler.		
Smoothed Data.		
Temperature dependence of $K_{H}$ is e	xpressed by the relation:	
<pre>log(K<sub>H</sub>/mol cm<sup>-3</sup> atm<sup>-1</sup>)</pre>	= -4.278 - 1909.5/(T/K) (compiler)	
std. dev	. = 2.9% (compiler)	
The enthalpy of solution, $\Delta H$ , is: $\Delta H/kJ \mod^{-1} = 36.6$ (compiler)		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Displacement method.	A mixture of $H_2 + CO_2$ (17 : 3)	
The melt was saturated with	containing 2 vol.% water vapor was	
the gas by passing a mixture of	chromatographically pure.	
$H_2 + CO_2$ (17 : 3) containing 2 volumes water. The dissolved		
hydrogen was displaced with		
chromatographically pure $CO_2$ . The liberated $H_2$ was collected in a		
buret over alkali solution.		
	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES :	
	1	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen; $H_2$ ; [1333-74-0] (2) Sodium acetate; $CH_3COONa$ ; [127-09-3]	Marassi, R.; Bartocci, V.; Gusteri, M.; Cescon, P.	
<pre>(3) Potassium acetate; CH<sub>3</sub>COOK; [127-08-2]</pre>	<b>J. Appl. Electrochem.</b> <u>1978</u> , <b>9</b> , 81 - 87.	
VARIABLES: D/kDo = 102	PREPARED BY:	
$F/KPA = 10^{-1}$	N. D. Dengel	
1/K = 525.6 = 575.3	N. P. Bansar	
EXPERIMENTAL VALUES:	<b>.</b>	
The values of Henry's law constant molten eutectic mixture CH <sub>3</sub> COONa - C temperatures are:	t, $K_{H}$ , for the solubility of $H_2$ in $H_3COOK$ (46.3 - 53.7 mol%) at different	
T/K 10 <sup>7</sup> K <sub>H</sub> <sup>a</sup> /mol cm <sup>-3</sup> atm	10 <sup>6</sup> K <sub>H</sub> /mol m <sup>-3</sup> Pa <sup>-1</sup>	
529.6 3.29	3, 25	
547.6 3.43	3.39	
565.9 3.74 573.3 3.76	3.69 3.71	
Calculated by the compiler.		
Smoothed Data: Temperature dependence of K <sub>H</sub> is g	iven by the expression:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.659 - 437.6/(T/K) (compiler)	
std. dev	= 0.6% (compiler)	
The enthelpu of colution All and	the entropy of colution 10 and	
The enthalpy of solution, wh, and	the entropy of solution, AS, are:	
$h/kJ mol^{-1} = 8.2 $ $hS/J$	$K^{-1} \text{ mol}^{-1} = -19.8  (at 523 \text{ K})$	
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Manometric method. The apparatus used for gas	Reagent grade CH <sub>3</sub> COONa and CH <sub>3</sub> COOK supplied by Carlo Erba (Milan) were used without further	
essentially the same as described	High purity hydrogen and nitrogen	
earlier (1). A modified form of	were dried with type 5A molecular	
employed. The method of	Sieves.	
Calibration of the apparatus and		
pressure readings was the same		
as reported in (2).	ESTIMATED ERROR:	
	$\mathbf{r}$	
	SOTUDITITY = 2 - 1%	
	REFERENCES:	
	1. Marassi, R.; Bartocci,V.;	
	J. Electroanal. Chem. 1973. 47 509	
	2. Desimoni, E.; Paniccia, F.;	
	J. Chem. Soc. Faraday Trans. I 1973.	
l	<b>69</b> , 2014.	

Components :	ORIGINAL MEASUREMENTS:	
<ol> <li>(1) Hydrogen; H<sub>2</sub>; [1333-74-0]</li> <li>(2) Deuterium; D<sub>2</sub>; [7782-39-0]</li> <li>(3) Dilithium beryllium fluoride; Li BeF.</li> </ol>	Malinauskas, A. P.; Richardson, D. M. Ind. Eng. Chem. Fundam. <u>1974</u> , 13, 242 - 245.	
VARIABLES: $P/kPa = 101.325 - 202.650$	PREPARED BY:	
T/K = 773 - 973	N. P. Bansal	
EXPERIMENTAL VALUES: Solubilities of hydrogen and deuterium were determined at different temperatures. Considering the results for $H_2$ and $D_2$ solubilities to be identical, the values of Henry's law constant, $K_H$ , and Ostwald coefficient, $K_c$ , are:		
T/K 10 <sup>B</sup> K <sub>H</sub> <sup>A, D</sup> /mol	$cm^{-3} atm^{-1}$ 10 <sup>3</sup> K <sub>c</sub> <sup>a</sup>	
773       2.02 ± 0         873       4.17 ± 0         973       5.08 ± 0	.24       1.28 ± 0.15         .29       2.99 ± 0.21         .56       4.06 ± 0.45	
<sup>a</sup> H <sub>2</sub> and D <sub>2</sub> results considered identical. <sup>b</sup> Calculated by the compiler using the relation $K_{\rm H} = K_{\rm C}/RT$ . Smoothed Data: Temperature dependence of $K_{\rm H}$ and $K_{\rm C}$ are expressed by the equations: $\log(K_{\rm H}/mol\ cm^{-3}\ atm^{-1}) = -5.6825 - 1535/(T/K)$		
log K <sub>c</sub> = -0.3948 - 1910.7/(T/K) (compiler) std. dev. = 7.5% (compiler)		
The enthalpy of solution, $h$ , and the standard entropy of solution, hS°, are: h/kcal mol <sup>-1</sup> = 7.02 ± 1.80 $h$ S°/eu = -3.5 ± 2.1 (at 1000 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method. The diagram and details of the apparatus and the experimental procedure are described in (1). In brief, the melt was saturated with the gas and a known volume of the saturated melt was transferred to the stripper. The dissolved gas was freed by sparging with xenon and analyzed by mass spectroscopy.	Hydrogen and xenon were at least 99.9% pure. Deuterium was 99.7% pure. Hydrogen and deuterium were purified by passing through coils of copper tubing cooled in liquid nitrogen.	
	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	
	<ol> <li>Malinauskas, A. P.; Richardson, D. M.; Savolainen, J. E.; Shaffer, J. H. Ind. Eng. Chem. Fundam. <u>1972</u>, 11, 584.</li> </ol>	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Hydrogen; H<sub>2</sub>; [1333-74-0]</li> <li>(2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</li> <li>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>;</li> </ul>	Volgin, M. A.; L'vov, A. L. Issled. Obl. Khim. Istochnikov Toka <u>1971</u> , 2, 26 - 31.
(4) Potassium carbonate; [584-08-7]	Chem. Abstr. <u>1973</u> , <b>78</b> , 487.
VARIABLES:	PREPARED BY:
T/K = 873 P/kPa = 101.325 (1 atm)	N. P. Bansal
EXPERIMENTAL VALUES:	
The value of Henry's law constant molten eutectic Li <sub>2</sub> CO <sub>3</sub> - Na <sub>2</sub> CO <sub>3</sub> - K <sub>2</sub>	:, $K_{H}$ , for the solubility of $H_2$ in $_2CO_3$ is:
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
600	18
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Electrochemical method.	Not available.
1	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
L	1

	OPTCINAL MEASUPEMENTS .	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Deuterium, D <sub>2</sub> , [7782-39-0]	Malinauskas, A. P.; Richardson, D. M.	
(2) Dilithium beryllium fluoride; Li₂BeF₄	<b>Ind. Eng. Chem. Fundam.</b> <u>1974</u> , <b>13</b> , 242 - 245.	
VARIABLES: $p/kpa = 101 325 - 202 650$	PREPARED BY:	
T/K = 773 - 973	N D Bancal	
17 775 - 575	N. F. Jansai	
EXPERIMENTAL VALUES:		
The values of Henry's law constan K <sub>c</sub> , for the solubility of deuterium temperatures are:	t, $K_{H}$ , and the Ostwald coefficient, in molten $Li_2BeF_4$ at different	
T/K 10 <sup>8</sup> K <sub>H</sub> <sup>a,b</sup> /mol c	m <sup>-3</sup> atm <sup>-1</sup> 10 <sup>3</sup> K <sub>c</sub> <sup>a</sup>	
773 2.22 + 0.	13 1.41 + 0.08	
873 2.82 ± 0.	22 2.74 ± 0.16	
973 5.33 <u>t</u> 0.	55 4.26 ± 0.44	
<sup>a</sup> Includes H <sub>2</sub> and HD also collected. <sup>b</sup> Calculated by the compiler using the relation $K_{H} = K_{C}/RT$ . Smoothed Data: Temperature dependence of $K_{H}$ and $K_{C}$ are expressed by the equations: $log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -5.875 - 1399.4/(T/K)$ (compiler) std. dev. = 8.8% (compiler) $log K_{C} = -0.5008 - 1811.8/(T/K)$ (compiler) std. dev. = 1.7% (compiler) The enthalpy of solution, AH, is calculated to be: $AH/kJ \ mol^{-1} = 34.7$ (compiler)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method. The diagram and details of the apparatus and the experimental procedure are described in (1). In brief, the melt was saturated with deuterium and a known volume of the saturated melt was transferred to the stripper. The dissolved deuterium was freed by sparging with xenon and analyzed	Deuterium was 99.7% pure and xenon was at least 99.9% pure. Deuterium was purified by passing through coils of copper tubing cooled in liquid nitrogen.	
by mass spectroscopy.	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	
	<pre>1. Malinauskas, A. P.; Richardson, D. M.; Savolainen, J. E.; Shaffer, J. H. Ind. Eng. Chem. Fundam. <u>1972</u>, 11 584.</pre>	

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-44-7]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES:	PREPARED BY:
	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
No depression in freezing point of solubility of oxygen at atmospheric solubility in molten sodium nitrate	of the solvent was observed from the pressure. This indicated that oxygen was less than 10 <sup>-4</sup> mole/mole of salt.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopy.	Oxygen from commercial cylinder (B.O.C.) was dried by passing through a liquid air trap. Sodium nitrate containing less than 0.0003% cation and less than 0.001% of anion impurities was dried for several days at 240°C followed by the thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.
	ESTIMATED ERROR: Freezing point was measured within ± 0.02°C
	REFERENCES:
	1. Rhodes, E.; Ubbelohde, A. R.
	<b>Proc. Royal Soc. A</b> <u>1959</u> , <b>251A</b> 156.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-44-7]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
	DDEDADED BY.
VARIABLES :	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
No depression in freezing point of solubility of oxygen at atmospheric solubility in molten potassium nitra of salt.	of the solvent was observed from the pressure. This indicated that oxygen ate was less than 10 <sup>-4</sup> mole/mole
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopy.	Oxygen from commercial cylinder (B.O.C.) was dried by passing through a liquid air trap. Potassium nitrate containg less than 0.0003% of cation and less than 0.001% of anion impurities was dried for several days at 240°C followed by the thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.
	ESTIMATED ERROR: Freezing point was measured within ± 0.02°C
	REFERENCES:
	1. Rhodes, E.; Ubbelohde, A. R.
	<b>Proc. Royal Soc. A</b> <u>1959</u> , <b>251A</b> , 156.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-44-7]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
(2) Cesium nitrate; CsNO <sub>3</sub> ; [7789-18-6]	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES:	PREPARED BY:
	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
No depression in freezing point of solubility of oxygen at atmospheric solubility in molten cesium nitrate	of the solvent was observed from the pressure. This indicated that oxygen was less than 10 <sup>-4</sup> mole/mole fraction.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopy.	Oxygen from commercial cylinder (B.O.C.) was dried by passing through a liquid air trap. Cesium nitrate containing less than 0.1% of all impurities was dried at 240°C for many days followed by the thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.
	ESTIMATED ERROR: Freezing point was measured within ± 0.02°C
	REFERENCES :
	1. Rhodes, E.; Ubbelohde, A. R.
	<b>Proc. Royal Soc. A</b> <u>1959</u> , <b>251A</b> , 156.
1	

	ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> , [7782-44-7]	Appleby, A. J.; Van Drunen, C.
(2) Lithium carbonate; Li <sub>2</sub> CO <sub>3</sub> ; [554-13-2]	<b>J. Electrochem. Soc.</b> <u>1980</u> , <b>127</b> , 1655 - 59.
VARIABLES:	PREPARED BY:
T/K = 1048 - 1098	N. P. Bansal
P/kPa = 10.133 - 40.530	
The values of Henry's law constant in molten Li2CO3 at different temper	nt, $K_{H}$ , for the solubility of oxygen ratures are:
t/°C Pco <sub>2</sub> /atm	$10^4 \text{ K}_{H}^{a}/\text{mol cm}^{-3} \text{ atm}^{-1}$
775 0.10	1.68 ± 0.18
800 0.20 825 0.40	10.30 ± 0.38
Data refer to both physical oxygen in the melt.	ally and chemically dissolved
The heat of solution, AH, for the	e solubility of oxygen in the melt is
The heat of solution, AH, for the AH/kJ mo	e solubility of oxygen in the melt is ol <sup>-1</sup> = 206
The heat of solution, AH, for the AH/kJ me	e solubility of oxygen in the melt is pl <sup>-1</sup> = 206
The heat of solution, AH, for the AH/kJ me AUXILIARY METHOD/APPARATUS/PROCEDURE:	e solubility of oxygen in the melt is pl <sup>-1</sup> = 206 INFORMATION SOURCE AND PURITY OF MATERIALS:
The heat of solution, AH, for the AH/kJ mo AUXILIARY METHOD/APPARATUS/PROCEDURE: Quenching or chilling method. The diagram and details of the apparatus used and procedure followed are described in the original paper. In brief, the melt was saturated by bubbling the gas for 2 - 3 hr. A portion of the saturated melt was transferred into the chilling compartment where it was slowly quenched to allow all the gases to escape. The liberated gas was flushed with a stream of helium into a	e solubility of oxygen in the melt is pl <sup>-1</sup> = 206 INFORMATION SOURCE AND PURITY OF MATERIALS: Not described. ESTIMATED ERROR:
The heat of solution, AH, for the AH/kJ mo AUXILIARY METHOD/APPARATUS/PROCEDURE: Quenching or chilling method. The diagram and details of the apparatus used and procedure followed are described in the original paper. In brief, the melt was saturated by bubbling the gas for 2 - 3 hr. A portion of the saturated melt was transferred into the chilling compartment where it was slowly quenched to allow all the gases to escape. The liberated gas was flushed with a stream of helium into a U - tube containing activated Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature were flushed with a	e solubility of oxygen in the melt is pl <sup>-1</sup> = 206 INFORMATION SOURCE AND PURITY OF MATERIALS: Not described. ESTIMATED ERROR: Nothing specified. REFERENCES:

COMPONENTS :		ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-4	4-7]	Andresen, R. E.
(2) Sodium carbonate; Na [497-19-8]	a <sub>2</sub> CO <sub>3</sub> ;	<b>J. Electrochem. Soc.</b> . <u>1979</u> , <b>126</b> , 328 - 34.
onc temperature: T/K = P/kPa = 93.459	= 1045	N. P. Bansal
EXPERIMENTAL VALUES:		
The solubility, $C_1$ , $c_2$	of $O_2$ in mol	ten $Na_2CO_3$ is reported to be:
t/°C	Po₂/torr	10 <sup>6</sup> C <sub>1</sub> /mol cm <sup>-3</sup>
872	701	2.35 ± 0.40
	AUXILIARY	INFORMATION
METHOD / APP ARATUS / PROCEDURE :	AUXILIARY	INFORMATION SOURCE AND PURITY OF MATERIALS:
METHOD/APPARATUS/PROCEDURE: Manometric technique. The diagram and detai apparatus used are giver original publication. Th procedure followed has 1 described in detail else In brief, the apparatus evacuated and then fille oxygen to a pressure of atm. Due to gas dissolut gas pressure dropped. Equ	AUXILIARY ils of the in the le been where (1). was first with about 1 ion, the fuilibrium	INFORMATION SOURCE AND PURITY OF MATERIALS: Extra dry O <sub>2</sub> (99.6%) was used directly from the cylinder. Reagent grade Na <sub>2</sub> CO <sub>3</sub> supplied by Baker was dried at about 200°C in an oven, and then in the furnace at about 400°C under CO <sub>2</sub> pressure of 100 torr for about a day.
METHOD/APPARATUS/PROCEDURE: Manometric technique. The diagram and detai apparatus used are giver original publication. Th procedure followed has h described in detail else In brief, the apparatus evacuated and then fille oxygen to a pressure of atm. Due to gas dissolut gas pressure dropped. Eq was attained when the pr did not alter for about volume of gas dissolved determined from the init	AUXILIARY ils of the h in the be where (1). was first ed with about 1 tion, the fuilibrium ressure 1 hr. The was tial and	INFORMATION SOURCE AND PURITY OF MATERIALS: Extra dry O <sub>2</sub> (99.6%) was used directly from the cylinder. Reagent grade Na <sub>2</sub> CO <sub>3</sub> supplied by Baker was dried at about 200°C in an oven, and then in the furnace at about 400°C under CO <sub>2</sub> pressure of 100 torr for about a day. ESTIMATED ERROR: solubility: ± 20 - 30%
METHOD/APPARATUS/PROCEDURE: Manometric technique. The diagram and detai apparatus used are giver original publication. Th procedure followed has h described in detail else In brief, the apparatus evacuated and then fille oxygen to a pressure of atm. Due to gas dissolut gas pressure dropped. Eq was attained when the pr did not alter for about volume of gas dissolved determined from the init final positions of the m	AUXILIARY ils of the in the le been where (1). was first id with about 1 ion, the fuilibrium cessure 1 hr. The was ial and mercury br. The	INFORMATION SOURCE AND PURITY OF MATERIALS: Extra dry O <sub>2</sub> (99.6%) was used directly from the cylinder. Reagent grade Na <sub>2</sub> CO <sub>3</sub> supplied by Baker was dried at about 200°C in an oven, and then in the furnace at about 400°C under CO <sub>2</sub> pressure of 100 torr for about a day. ESTIMATED ERROR: solubility: ± 20 - 30%

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Oxygen; O₂; [7782-44-7]	Andresen, R. E.	
<pre>(2) Sodium sulfate; Na₂SO₄; [7757-82-6]</pre>	<b>J. Electrochem. Soc.</b> <u>1979</u> , <b>126</b> , 328 - 34.	
VARIABLES:	PREPARED BY:	
T/K = 1173 - 1359	N. P. Bansal	
P/kPa = 53.329 - 101.325		
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of oxygen in molten sodium sulfate at different temperatures are:		
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
903	1.90 ± 0.20	
964 1015	$2.63 \pm 0.08$ 3.0 $\pm 0.7$	
1075	5.42 ± 0.03	
Na <sub>2</sub> SO <sub>4</sub> is given by the relation: $\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) = -4.093 - 3088.2/(T/K)$ The standard enthalpy, $\wedge H^{\circ}$ , and standard entropy, $\wedge S^{\circ}$ , of solution are: $\wedge H^{\circ}/\text{kJ} \text{ mol}^{-1} = 59.1$ $\wedge S^{\circ}/\text{J} K^{-1} \text{ mol}^{-1} = 17.0$ (at 1173 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique. The diagram and details of the apparatus used are given in the original paper. The procedure followed has been described in detail elsewhere (1). Briefly, the apparatus was first evacuated and then filled with the gas to a pressure of about 1 atm. Due to gas dissolution, the gas pressure dropped. Equilibrium was	Extra dry oxygen (99.6%) was used directly from the cylinder. Reagent grade Na <sub>2</sub> SO <sub>4</sub> supplied by Matheson, Coleman and Bell was dried in an oven at about 200°C, then in the furnace at about 400°C under vacuum.	
attained when the pressure did not change for about 1 hr. The volume of the gas dissolved was determined from the initial and final positions of the mercury meniscus in the manemator The	ESTIMATED ERROR: solubility: ± 20 - 30%	
apparatus was earlier calibrated using argon. With a cathetometer, pressure changes as small as 0.05 torr could be read.	<pre>REFERENCES: 1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H.A. Proceedings of the 4th Nordic High Temperature Symposium, Vol. 1, (Tilli, M.; Editor), Helsinki 1975 127.</pre>	

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Oxygen; $O_2$ ; [7782-44-7]	Yurkinskii, V. P.; Aganesova, S. B.; Morachevskii, A. G.; Zagrivnyi, V. N.
<pre>(2) Lithium hitrate; LiNO<sub>3</sub> [7790-69-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<pre>Zh. Prikl. Khim. 1974, 47, 1527 - 31; J. Appl. Chem. U.S.S.R.(Eng. Transl.) 1974, 47, 1569 - 72.</pre>
VARIABLES:	PREPARED BY:
P/kPa: 101.325 (1 atm.)	
T/K = 428 - 583	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of oxygen in t 1 atm. oxygen partial pressure at	the molten eutectic LiNO3 - KNO3 at various temperatures are reported to be:
t/°C	10 <sup>4</sup> C <sub>1</sub> /mol liter <sup>-1</sup>
155	1,90
190	3.74
210	4.05 7.89
310	13.60
Smoothed Data:	
Temperature dependence of solur	bility is expressed by the relation:
$\log(C_1/mol m I^2)$	= -3.540 - 1351.6/(T/K) (compiler)
std.	dev. = 2.4% (compiler)
The heat of solution, $\Delta H$ , is g	iven as:
∆H/kJ	$mol^{-1} = 26.0$
ATTUTT 7 4	
METHOD /ADD AD ATHS /DOCEDHIDE -	
TE INOD/APPAKATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Oscillographic voltammetry.	Lithium nitrate (cp) was dehydrated by heating in air for 8 - 10 hr. while the temperature was raised slowly to 300 - 350 °C. It was kept at 350°C till the evolution of water stopped and then kept in a dessicator over $P_2O_5$ . The LiNO <sub>3</sub> - KNO <sub>3</sub> mixture was dried by purging the melt with dried argon at 400°C and finally by addition of metallic sodium.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:	
	1. Desimoni, E.; Paniccia, F.;	
(1) Oxygen; $O_2$ ; [7782-44-7]	Zambonin, P. G.	
(2) Solium Hitrate; NaNO <sub>3</sub> ; (7631-99-4)	373 - 79.	
<pre>(3) Potassium nitrate; KNO<sub>3</sub>;</pre>	2. Paniccia, F.; Zambonin, P. G.	
[7757-79-1]	J. Chem. Soc. Faraday Trans. I	
	<u>1372</u> , <b>0</b> 8, 2003 - 89.	
VARIABLES:	PREPARED BY:	
T/K = 511 - 603	N. P. Bansal	
$P/kPa = 10^2$		
EXPERIMENTAL VALUES:		
The solvent employed was an equimolar molten mixture of sodium nitrate - potassium nitrate. The solubilities of oxygen in the melt at various temperatures are:		
T/K $10^8 K_{H}/mol \ cm^{-3} \ atm^{-3}$	1 10 <sup>6</sup> C <sub>1</sub> /mol kg <sup>-1</sup> atm <sup>-1</sup>	
511 0.9	4.6	
533 1.0	5.3	
	6.4 8 1	
603 1.6	8.4	
$log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -6.286 - 904.6/(T/K) \ (compiler) log(C_{1}/mol \ kg^{-1} \ atm^{-1}) = -3.528 - 925.9/(T/K) \ (compiler) std. \ dev. = 1.6% \ (compiler) The enthalpy of solution, ^H, and the standard entropy of solution, ^S°, are:                                    $		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
High sensitivity pressure measuring technique. The diagram and details of the apparatus and procedure employed for solubility measurements are described in the original paper. Briefly, the melt was evacuated at $10^{-5}$ bar for several hours for degassing. The vacuum was disconnected and oxygen gas was introduced at one atm. The melt was vigorously stirred with a magnetic stirrer. The pressure variations were noted, using a mercury manometer, as a function of time until the equilibrium pressure was reached. The amount of gas dissolved was calculated from the rapid initial pressure changes after a suitable calibration.	Oxygen (High Purity grade) was purified by keeping it in contact for several hours with Ascarite to remove CO <sub>2</sub> and other acidic impurities and with molecular sieves at -80°C to to remove moisture. Reagent grade sodium and potassium nitrates were used. The solvent was purified and filtered in the molten state. ESTIMATED ERROR: Nothing specified. REFERENCES:	

COMPONENTS:	EVALUATOR:
<ol> <li>(1) Oxygen; O<sub>2</sub>; [7782-44-7]</li> <li>(2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</li> <li>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</li> </ol>	N. P. Bànsal National Aeronautics snd Space Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

Two independent studies (1,2) have been reported for the solubility of oxygen in molten  $\text{Li}_2\text{CO}_3 - \text{Na}_2\text{CO}_3$  (53.3 - 46.7 mol%). Results of the two investigations are compared in Fig. 1, below. It is interesting to note, from Fig. 1, that results obtained by Schenke et al. (2) using an amperometric titration technique are in good agreement (within experimental precision) with the data of Appleby and Van Drunen (1) who employed a melt chilling method.



The recommended numerical values, obtained by least-squares fitting of the two data sets (1,2), are given in Table 1.

continued

78

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COMPONENTS:
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    (1) Oxygen; O<sub>2</sub>; [7782-44-7]
    (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>;
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[554-13-2]
(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>;
[497-19-8]

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EVALUATOR:
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N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

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CRITICAL EVALUATION:
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## continued

Table 1

Recommended Solubilities as a Function of Temperature

T/K	107 $K_{H}$ /mol cm <sup>-3</sup> atm <sup>-1</sup>
860	1.05
880	1.27
900	1.52
920	1.81
940	2.14
960	2.52
980	2.94
1000	3.40
1020	3.92
1040	4.49
1060	5.12
1080	5.82
1100	6.57
1120	7.39

References:

- 1. Appleby, A. J.; Van Drunen, C. J. Electrochem. Soc. <u>1980</u>, 127, 1655.
- Schenke, M.; Broers, G. H. J.; Ketelaar, J. A. A. J. Electrochem. Soc. <u>1966</u>, **113**, 404.

COMPONENTS :			ORIGINAL MEASUREMENTS:
<ul> <li>(1) Oxygen; O<sub>2</sub>; [7782-44-7]</li> <li>(2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</li> <li>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</li> </ul>		82-44-7] te; Li <sub>2</sub> CO <sub>3</sub> ; e; Na <sub>2</sub> CO <sub>3</sub> ;	Appleby, A. J.; Van Drunen, C. J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655 - 59.
VARIABLES:			PREPARED BY:
T/K P/kP	K = 1023 - a: 101.32	- 1123 5 (compiler)	N. P. Bansal
EXPERIMENTAL VAL	LUES:		
The valu in the melt are:	les of Her Li2CO3 -	nry's law constar Na <sub>2</sub> CO <sub>3</sub> (53.3 -	at, $K_{H}$ , for the solubility of oxygen 46.7 mol%) at different temperatures
	t/°C	Pco <sub>2</sub> /atm	10 <sup>4</sup> K <sub>H</sub> <sup>a</sup> /mol dm <sup>-3</sup> atm <sup>-1</sup>
	750 800	0.026	3.57 ± 0.61 5.57 ± 0.27
ļ	850	0.10	8.36 ± 0.46
a D	ata refer of oxygen	to both physica in the melt.	al and chemical solubilities
Smoothed Da Temperat	ta: ure depen	dence of K <sub>H</sub> can	be expressed by the relation:
c.	log(K <sub>H</sub> /	mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -2.296 - 4247.8/(T/K) (compiler)
std. dev. = 0.04% (compiler)		v. = 0.04% (compiler)	
The heat of solution, $\wedge H$ , for the solubility of ox-		solubility of oxygen in the melt is:	
		AH/kJ mo	$J^{-1} = 83$
		AUXILIARY	INFORMATION
METHOD / APPARATU	S/PROCEDURE	:	SOURCE AND PURITY OF MATERIALS:
Quenching The diag apparatus u employed are original pay Was saturate for 2 - 3 h saturated me	g or chil ram and d sed and p e describ per. Brie ed by bub r. A part elt was t	ling method. etails of the rocedure ed in the fly, the melt bling the gas of the ransferred	Not described.
into the chi where it was allow all th	illing com s slowly o he gases	mpartment quenched to to escape.	
The liberate with a stream	ed gas wa am of hel:	s flushed ium into a	ESTIMATED ERROR:
U - tube con Linde 5A mo Contents of	ntaining a lecular s the tube	activated ieve. The , after being	Nothing specified.
temperature,	come to ro , were flu	oom ushed with a	REFERENCES:
stream of ca Fisher - Han	arrier gas milton gas	s into a s partitioner	
With Linde S Katharometer	5A column detector	and r for	
analysis. At measurements	s were car	10 independent rried out.	
L			l

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Oxygen; O<sub>2</sub>; [7782-44-7] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</pre>	Schenke, M.; Broers, G. H. J.; Ketelaar, J. A. A.	
<pre>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</pre>	J. Electrochem. Soc. <u>1966</u> , 113, 404.	
VARIABLES:	PREPARED BY:	
T/K = 860 - 1060 P/kPa: 101.325 (compiler)	N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law consta the melt Li <sub>2</sub> CO <sub>3</sub> - Na <sub>2</sub> CO <sub>3</sub> (53.3 - 46 given only in graphical form. The v different temperatures are:	nt, $K_{H}$ , for the solubility of $O_2$ in .7 mol%) at various temperatures are alues of $K_{H}$ derived from the plot at	
T/K 10 <sup>7</sup>	K <sub>H</sub> <sup>a</sup> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
860	1.1	
910 957	1.5 2.7	
990	3.4	
• Values derived from	the graph by the compiler.	
Smoothed Data:		
The temperature dependence of $K_{H}$	can be expressed by the relation:	
log(K <sub>ff</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	) = -3.461 - 3014/(T/K) (compiler)	
std. dev. = 4.7% (compiler) The heat of solution, $\Delta H$ , for the solubility of O <sub>2</sub> in the melt is:		
$\Delta H/kJ mol^{-1} = 62.3$		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Amperometric titration method. The melt was saturated with	Not described.	
oxygen by bubbling an $O_2 - CO_2$ gas mixture of known composition		
The dissolved oxygen was titrated		
Na <sub>2</sub> SO <sub>3</sub> as reducing agent. During		
titration a cover of $N_2$ - $CO_2$ mixture was maintained while the		
partial pressure of CO <sub>2</sub> was kept		
platinum wire electrodes with a	ESTIMATED ERROR:	
maintained between them was used	Nothing specified.	
as an indicator. The current flowing through the system was		
the measure of the amount of oxygen dissolved in the melt	REFERENCES:	
and an an an an an and the mett.		
	L	

				81
COMPONENTS:			ORIGINAL MEASUREMENTS:	
(1) Oxygen; $O_2$ ; [7782-44-7] (2) Lithium carbonate; $Li_2CO_3$ ;		Smith, S.`W.; Vogel, W. M.; Kapelner, S.		
<pre>[554-13-2] (3) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>; [584-08-7]</pre>		<b>J. Electrochem. Soc.</b> <u>1982</u> , 1668 - 70.	129,	
VARIABLES:			PREPARED BY:	
one te melt	mperature: T/K comp./mol% K <sub>2</sub> CC	$= 923 \pm 5$ $y_3 = 38.0$	N. P. Bansal	
EXPERIMENTAL Oxyge superoxi chemical found to at diffe	VALUES: n reacts with t de and peroxide reaction. The be negligible. rent partial pr	the carbonate ions. Henry concentration The total ec ressures of Co	melt resulting in the format's law was not applicable due of molecular oxygen in the muilibrium oxygen content in $D_2$ , were:	tion of to the melt was the melt,
	Po₂/atm	Pco <sub>2</sub> /atm	$10^6 C_1^{e}$ /mol fraction	
	0.5	0.5	5.6	-
	0.5 0.5	0.5 0.1	5.0 17.3	
	0.5	0.1	21.2	
	0.5	0.1	13.2	
	0.5	0.02	52.6 27.0	
	0.5	0.02	19.1	
	0.5	0.02 0.02	50.5 43.1	
	Experimental	value.		·
		AUXILIARY	INFORMATION	
METHOD/APPAR	ATUS/PROCEDURE:	<u></u>	SOURCE AND PURITY OF MATERIALS:	
A dia	gram of the app	aratus is	Analytical grade melt c	omponents
known am	ount of the mel	aper. A .t was	The gas mixtures were p	repared
allowed mixture	to equilibrate	with a gas	by mixing "high purity" gra	de gases gas flow
was then	flushed with C	$O_2 + N_2$	controller.	yas 110w
mixture pressure	of the same CO <sub>2</sub> . An excess of	partial finely		
powdered	$Cr_2(SO_4)_3$ was	then added		
all form	elt which react s of oxygen com	ed with pletely		
and rapid	dly. After 2 hr	., the melt	·····	
estimate	d by spectrophe	tometric	ESTIMATED ERROR: Nothing specifi	ed.
technique carbazide	e using s-diphe e.	nyl-		
			REFERENCES :	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Oxygen; O<sub>2</sub>; [7782-44-7] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>;     [554-13-2] (3) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>;     [584-08-7]</pre>	Appleby, A. J.; Van Drunen; C. J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655 - 59.
VARIABLES:	PREPARED BY:
T/K = 973 - 1023 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant the melt $Li_2CO_3 - K_2CO_3$ (42.7 - 57.3	nt, $K_{H}$ , for the solubility of oxygen in 3 mol%) at different temperatures are:
t/°C Pco <sub>2</sub> /atm	$10^4 \text{ K}_{H}^{a}/\text{mol dm}^{-3} \text{ atm}^{-1}$
700 0.026	4.18 ± 0.35
750 0.026	$6.16 \pm 0.19$
850 0.10	25.90 ± 1.60
<ul> <li>Data refer to both physical oxygen in the melt.</li> <li>Smoothed Data: Temperature dependence of K<sub>H</sub> can log(K<sub>H</sub>/mol cm<sup>-3</sup> atm<sup>-1</sup>) std. dev</li> <li>The heat of solution, ^H, for the ^H/kJ mol</li> </ul>	ally and chemically dissolved be expressed by the relation: = -0.319 - 5945.4/(T/K) (compiler) v. = 6.9% (compiler) e solubility of oxygen in the melt is: 1 <sup>-1</sup> = 120.0
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Quenching or chilling method. The diagram and details of the apparatus used and procedure followed are described in the original paper. Briefly, the melt was saturated by bubbling the gas for 2 - 3 hr. A part of the saturated melt was transferred into the quenching compartment where it was slowly chilled to allow all the gases to escape. The liberated gas was flushed with a stream of helium into a U - tube containing activated Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner with Linde 5A column and Katharometer detector for analysis. About 8 - 10 independent measurements were carried out.	Not described. ESTIMATED ERROR: Nothing specified. REFERENCES:

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COMPONENTS:			URIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-44-7]			Appleby, A. J.; Van Drunen, C.
(2) Sodium carbonate; $Na_2CO_3$ ; [497-19-8]			J. Electrochem. Soc. 1980. 127
(3) Potas	sium carbon	ate; K <sub>2</sub> CO <sub>3</sub> ;	1655 - 59.
[584-	-08-7]		
VARIABLES:			PREPARED BY:
	T/K = 1048 -	1123	N. P. Bansal
P/	KPa: 101.32	5 (compiler)	
EXPERIMENTAL	VALUES:		
The va the melt -	lues of Hen Na <sub>2</sub> CO <sub>3</sub> - K <sub>2</sub>	ry's law constan CO <sub>3</sub> (58 - 42 mol	t, $K_{H}$ , for the solubility of oxygen in $\mathfrak{E}$ ) at different temperatures are:
_	t/°C	Pco <sub>2</sub> /atm	10 <sup>4</sup> $K_{H}^{\alpha}$ /mol dm <sup>-3</sup> atm <sup>-1</sup>
	775	0.10	13.11 ± 0.60
	800 850	0.10	$14.15 \pm 0.88$ 23.53 + 1.88
_		~	
	Data refer of oxygen	to both physica in the melt.	l and chemical solubilities
Smoothed	Data:		
Temper	ature depen	dence of K <sub>H</sub> can	be expressed by the relation:
	log(K <sub>H</sub> /	mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -1.935 - 4161.3/(T/K) (compiler)
		std. dev	. = 4.5% (compiler)
The he		ion AU for the	colubility of owners in the well is
ine ne	at of soldt	ION, OR, LOT THE	souther of oxygen in the melt 12:
		∆H/kJ mo	$1^{-1} = 79$
1			
		AUXILIARY	INFORMATION
METHOD/APPARA	ATUS/PROCEDURE	:	SOURCE AND PURITY OF MATERIALS:
Quench	ing or chill	ling method.	Not described.
The di	agram and d	etails of the	
employed	are describe	ed in the	
original melt was	publication	. Briefly, the	
gas for 2	-3 hr. A	portion of the	
saturated into the	melt was to chilling cor	ransferred	
where it	was slowly (	uenched to	1
liberated	the gases flue gas was flue	to escape. The ished with a	ESTIMATED ERROR.
stream of	helium into	o a U - tube	Nothing and Stat
molecular	sieve. The	contents of	Nothing specified.
the tube,	after being	g allowed to	
flushed w	ith a stream	n of carrier	REFERENCES :
gas into			1
partition	a Fisher - I er with Lind	Hamilton gas	
partition and Katha	a Fisher - H er with Lind rometer dete	Hamilton gas le 5A column ector for	
partition and Katha analysis. Measurement	a Fisher - H er with Lind rometer dete About 8 - 1 nts were car	Hamilton gas de 5A column ector for 10 independent rried out.	
partition and Katha analysis. measurement	a Fisher - H er with Lind rometer dete About 8 - 1 nts were can	Hamilton gas de 5A column ector for 10 independent rried out.	

IGINAL MEASUREMENTS:
Nalimova, E. G.; Fedorov, A. A.; Ponomarev, V. E. Zhur. Fiz. Khim. <u>1983</u> , <b>57</b> , 779-780; Russ. J. Phys. Chem. (Eng. Transl.) <u>1983</u> , 57, 478 - 479. (*). EPARED BY: N. P. Bansal $tm^{-1}$ ), for the solubility of oxygen tions were determined at different $K_p$ (mol cm <sup>-3</sup> atm <sup>-1</sup> ), obtained by w as the coefficients of the equat- he error
-A -B Δ
1.590 4348 0.039 3.017 2857 0.026 3.482 2273 0.041
$\Delta S^{\circ}$ ) of the solution were evaluated solubility constants expressed as ume concentrations of the dissolved pectively, are given below: $\Delta S^{\circ}/JK^{-1}mol^{-1}$ (at 855K)
70.38 43.30 34.45
FORMATION
URCE AND PURITY OF MATERIALS:
Not specified.
STIMATED ERROR:
STIMATED ERROR: Not specified.
STIMATED ERROR: Not specified. EFERENCES:

		85
COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1)Oxygen; O <sub>2</sub> ; [7782-44-7]	Nalimova, E.G; Fedo Ponomarev; V. E.;Ke	rov, A. A.; tov, A. N.
<pre>(2)Potassium Oxide; K<sub>2</sub>O; [12136-45-7] (3)Vanadium Oxide; V<sub>2</sub>O<sub>5</sub>; [1314-62-1]</pre>	Zhur. Fiz. Khim. <u>19</u> Russ. J. Phys. Chem <u>1982</u> , <b>56</b> , 292 - 293	<u>82</u> , <b>56</b> , 474 - 475; . (Eng.Transl.) . (*).
[1314-02-1]		
VARIABLES:	PREPARED BY:	
$V_2 0_5 / \text{mol}_8 = 50 - 66.5$ P/kPa: 101.325 (1 atm.)	N. P. Bans	al
EXPERIMENTAL VALUES:		
Solubilities of oxygen in K <sub>2</sub> O - were determined at various temperatur The average solubilities obtained fro ture are given below :	$V_2O_5$ melts of varion res at an initial pre- om five measurements of	us compositions ssure of 1 atm. at each tempera-
$\frac{50.0 \text{ mole } \$ \ V_2O_5}{55.5 \text{ mole } \$ \ V_2O_5}$	61.0 mole % V <sub>2</sub> O <sub>5</sub>	66.5 mole % V <sub>2</sub> O <sub>5</sub>
T/K 10 <sup>7</sup> c <sub>m</sub> /mol T/K 10 <sup>7</sup> c <sub>m</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> cm <sup>-3</sup> atm <sup>-1</sup>	T/K 10 <sup>7</sup> c <sub>m</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	T/K 10 <sup>7</sup> c <sub>m</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
798 1.05 778 1.54	773 3.13	783 7.41
818         1.41         799         1.70           848         2.04         816         2.34	813 3.72	810 8.91 837 8.71
893 3.39 858 3.16	853 5.37	873 12.30
		(Cont.)
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MAT	ERIALS:
Desorption Method : Gas solubilities were determined by desorption of the dissolved gas from the melt by an inert gas using a standard method. The oxygen content in the gas mixture was estimated by analysis based on thermal conductivity. <u>Volumetric Method</u> : Recrystallized Potassium metavanadate and vanadium pentoxide were fused together. The possible reducing impurities present in the melt were oxidized for 3h. at 550°C. The dissolved	Potassium metavanada lly pure" grade was Vanadium pentoxide o pure" grade was used ESTIMATED ERROR:	ate of "chemica- recrystallized. of "specially 1.
oxygen was removed by bubbling helium through the melt for 30 min. The discrepancy between the solubilities determined by the two	Solubility :	= ± 10% (authors)
methods was ±10 %.	REFERENCES :	

86			-			
COMPONENTS	5:		ORIGINAL ME	EASUREME	NTS:	
(1) 03 (2) Pc [3] (3) Va [1]	<pre>kygen; O<sub>2</sub>;[7782-44- ctassium Oxide; K<sub>2</sub>( 12136-45-7] anadium oxide; V<sub>2</sub>O. 1314-62-1}</pre>	-7] D; 5;	Nalimova Ponomare Zhur. Fi Russ. J. 1983, 57	, E. G ev, V. z. Khi Phys. 7, 478	.; Fedorov E. m. <u>1983</u> , 5 Chem. (En - 479. (*)	, A. A.; 7, 779-780; g. Transl.)
VARIABLES	: T/K = 773 - 90 V <sub>2</sub> O <sub>5</sub> / mole % = 50 P/kPa: 101.325 (1	)9 ) - 66.5 atm.)	PREPARED BY	Y: N.	P. Bansal	
EXPERIMEN	TAL VALUES:					
Henn in K <sub>2</sub> O tempera the ern	ry's Law Constants, $_5 - V_2O_5$ melts of v atures. Coefficient ror obtained by lir	, K <sub>P</sub> (mol cm <sup>-3</sup> various compo s of the equ hear least so	atm <sup>-1</sup> ), ositions w ation log uares fit	for the vere de $K_{p} =$ tof the	e solubili termined a $A+B/T \pm \Delta$ , e data are	ty of oxygen t different where $\Delta$ is given below:
	mole % V <sub>2</sub> O <sub>5</sub>	Temp. rar (K)	ige -	·A	-B	Δ
	50.0 55.5 61.0 66.5	798 - 8 778 - 8 773 - 8 783 - 9	893       2.         898       3.         893       3.         893       3.         909       4.	341 251 496 345	3689 2783 2214 1393	0.043 0.026 0.015 0.021
The e from th K <sub>c</sub> = C <sub>n</sub> gas in	enthalpies ( $\Delta H^{\circ}$ ) as the temperature dependence of the second seco	nd entropies endence of th $C_{\sigma}$ are the v gas phase r	(AS°) of ne solubil volume con respective	the so ity co centra ly, ar	olution wer nstants ex tions of t e given be	re evaluated pressed as he dissolved low:
	mole % V <sub>2</sub> O <sub>5</sub>	∆H°/kJ ı	mol-1	ΔS°/	JK <sup>-1</sup> mol <sup>-1</sup>	(at 855K)
	50.0 55.0 61.0 66.5	77.76 60.41 49.51 34.76	;		57.10 38.81 31.03 19.13	
		AUXILIARY	INFORMATION			
METHOD/AP	PARATUS/PROCEDURE:		SOURCE AND	PURITY	OF MATERIALS	:
Gas sol by desc from th (helium gas - v The dis of the The was det titrati	Lubilities were det prption of the diss ne melt by an inert n) as well as by a volumetric method. screpancy between t two methods was 10 $v_2O_5$ content in t cermined by an ampe con.	ermined solved gas gas the results - 20 %. the melt erometric	Not	specif	ied.	
			ESTIMATED	ERROR:		
			Not	specif	ied.	
			REFERENCES	5:		
1						

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Oxygen; O <sub>2</sub> ; [7782-44-7]	Nalimova, E. G.; Federov, A. A.; Ponomarev, V. E.
(2) Cesium oxide; C5 <sub>2</sub> O;[20281-00-9]	Zhur. Fiz. Khim. <u>1983</u> , 57, 779-780;
(3) Vanadium oxide; V <sub>2</sub> O <sub>5</sub> ; [1314-62-1]	1983, 57, 478 - 479. (*).
VARIABLES:	PREPARED BY:
T/K = 673 - 922	N. D. Bangal
$V_2O_5$ / more $= 55 - 70$ P/kPa: 101.325 (1 atm.)	N. F. Ballsai
EXPERIMENTAL VALUES:	
Henry Constants, $K_p$ (mol cm <sup>-3</sup> atm <sup>-1</sup> Cs <sub>2</sub> O - V <sub>2</sub> O <sub>5</sub> melts of various composit temperatures. Coefficients of the equ $\Delta$ is the error, obtained by linear lebelow:	), for the solubility of oxygen in tions were determined at different nation log $K_p = A + B/T + \Delta$ , where east squares fit of the data are given
Melt composition Temp. ra mole % V <sub>2</sub> O <sub>5</sub> (K)	inge -A -B △
55 0 832 - 822	3 402 2539 0 049
61.0 673 - 825	3.703 1800 0.011
70.0 770 - 879	4.209 1300 0.009
gas in the liquid and the gas phase r Melt composition/mole % V <sub>2</sub> O <sub>5</sub> 4	respectively, are given below: ΔH°/kJ mol <sup>-1</sup> ΔS°/JK <sup>-1</sup> mol <sup>-1</sup> . (at 855K)
55.0	55.72 35.98
70.0	46.34         30.20           32.00         20.32
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Gas solubilities were determined by desorption of the dissolved gas from the melt by an inert gas (helium) as well as by a gas - volumetric method. The discrepancy between the results of the two methods was 10 - 20 %. The V <sub>2</sub> O <sub>5</sub> content in the melt was determined by an amperometric titration.	Not specified.
	ESTIMATED ERROR:
	Not specified.
	REFERENCES :

COMPONENTS	ORTGINAL MEASUREMENTS .
COTFORENTS.	ORIGINAL ALASORIAND.
(1) Oxygen; $O_2$ ; [7782-44-7]	Appleby, A. J.; Van Drunen, C.
(2) Sodium carbonate; $Na_2CO_3$ ; [497-19-8]	J. Electrochem. Soc. 1980, 127,
(3) Sodium chloride; NaCl;	1655 - 59.
[7647-14-5]	
VARIABLES:	PREPARED BY:
T/K = 1073 - 1123	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The values of Henry's law constant in the melt $Na_2CO_3$ - NaCl (60 - 40	ant, $K_{H}$ , for the solubility of oxygen mol%) at different temperatures are:
t/°C 104	K <sub>H</sub> */mol dm <sup>-3</sup> atm <sup>-1</sup>
800	20.64 ± 1.31
850	29.15 ± 1.70
<sup>a</sup> Data refer to both ph	ysically and chemically
Smoothed Data:	
The heat of solution, AH, for th	ne solubility of oxygen in the melt is:
AH/kJ n	$101^{-1} = 70$
·	
AUXILIAR	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Quenching or chilling method.	Not described.
apparatus used and procedure	
followed are described in the	
melt was saturated by bubbling the	
gas for 2 - 3 hr. A portion of the	
into the chilling compartment	
where it was slowly quenched to	
liberated gas was flushed with a	ESTIMATED ERROR:
stream of helium into a U - tube	
molecular sieve. The contents of	solubility: ± 20%
the tube, after being allowed to	
flushed with a stream of carrier	REFERENCES:
gas into a Fisher - Hamilton gas partitioner with Linde 54 column	
and Katharometer detector for	
analysis. About 8 - 10 independent determinations were carried out	
	1

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	89
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Oxygen; O<sub>2</sub>; [7782-44-7]</li> <li>(2) Potassium sulfate; K<sub>2</sub>SO<sub>4</sub>; [7778-80-5]</li> <li>(3) Potassium bisulfate; K<sub>2</sub>S<sub>2</sub>O<sub>7</sub>; [7646-93-7]</li> </ul>	Comtat, M.; Vothi, N. D. J. Chim. Phys. <u>1976</u> , <b>73</b> , 109 - 12.
VADTADIEC.	BEFLADED BV.
one temperature: $T/K = 698$	N. P. Bansal
EXPERIMENTAL VALUES:	I
The solubility of oxygen in the r sulfate) mixture at 1 atmosphere gas	molten $K_2SO_4$ - $K_2S_2O_7$ (saturated by s pressure is:
t/°C	$10^{7} C_{1}/mol cm^{-3}$
425	4.4 ± 0.2
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Constant potential electrolysis.	Not described.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

•

COMPONENTS:	EVALUATOR:
<ol> <li>(1) Oxygen; O<sub>2</sub>; [7782-44-7]</li> <li>(2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</li> <li>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</li> <li>(4) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>; [584-08-7]</li> </ol>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989

## CRITICAL EVALUATION:

Two independent investigations (1,2) are available for the solubility of oxygen in molten  $\text{Li}_2\text{CO}_3 - \text{Na}_2\text{CO}_3 - \text{K}_2\text{CO}_3$  (43.5 - 31.5 - 25.0 mol%). Results of these two studies are compared in Fig. 1. It is interesting to note that results of Schenke et al. (2), obtained by using an amperometric titration method, are in good agreement (within experimental precision) with the data of Appleby and Van Drunen (1) who employed the melt chilling technique.





continued
COMPONENTS:	EVALUATOR:
<ol> <li>Oxygen; O<sub>2</sub>; [7782-44-7]</li> <li>Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</li> <li>Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</li> <li>Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>; [584-08-7]</li> </ol>	N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.
CRITICAL EVALUATION:	
Tabl	le 1
Recommended Solubilities as	a Function of Temperature
	······································
T/K 107 K	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
860 880	1.11 1.40
900	1.75
940	2.6
960 980	3.24 3.91
1000	4.69 5.58
1040	6.59
1060 1080	9.04
1100	10.49
· · · · · · · · · · · · · · · · · · ·	
References:	
1. Appleby, A. J.; Van Drunen, C. J.	Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655.
<ol> <li>Schenke, M.; Broers, G. H. J.; Ke 1966. 113. 404.</li> </ol>	telaar, J. A. A. J. Electrochem. Soc.

COMPONENTS .	ORTGINAL MEASUREMENTS .			
<pre>(1) Oxygen; O<sub>2</sub>; [7782-44-7] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2] (3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8] (4) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>; [584-08-7]</pre>	ORIGINAL MEASUREMENTS: Schenke, M.; Broers, G. H. J.; Ketelaar, J. A. A. J. Electrochem. Soc. <u>1966</u> , 113, 404.			
VARIABLES:	PREPARED BY:			
T/K = 850 - 1069	N. P. Bansal			
P/kPa: 101.325 (compiler)				
EXPERIMENTAL VALUES:				
The values of Henry's law constant the melt $\text{Li}_2\text{CO}_3$ - $\text{Na}_2\text{CO}_3$ - $\text{K}_2\text{CO}_3$ (4) temperatures are given only in graph from the plot at different temperatures	At, $K_{H}$ , for the solubility of $O_2$ in 3.5 - 31.5 - 25.0 mol%) at different bical form. The values of $K_{H}$ derived ares are:			
T/K 107 H	S <sub>rr</sub> <sup>•</sup> /mol cm <sup>-3</sup> atm <sup>-1</sup>			
852	1.25			
886	1.60			
913 945	1.86 2.81			
972	3.95			
1002	4.25 5.22			
1069	10.40			
The temperature dependence of $K_{H}$ log( $K_{H}$ /mol cm <sup>-3</sup> atm <sup>-1</sup> )	can be expressed by the relation: = -2.602 - 3716.8/(T/K) (compiler)			
std. dev. = 6.2% (compiler) The heat of solution, $^{H}$ , for the solubility of $O_2$ in the melt is: $^{H/kJ}$ mol <sup>-1</sup> = 74.1				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Amperometric titration method. The melt was saturated with oxygen by bubbling an $O_2 - CO_2$ gas mixture of known composition. The dissolved oxygen was titrated by adding stepwise solid Na <sub>2</sub> SO <sub>3</sub> as reducing agent. During titration a cover of N <sub>2</sub> - CO <sub>2</sub> mixture was maintained while the partial pressure of CO <sub>2</sub> was kept constant. A pair of rotating	Not described.			
platinum wire electrodes with a fixed potential difference maintained between them was used as an indicator. The current flowing through the system was the measure of the amount of	ESTIMATED ERROR: Nothing specified.			
oxygen dissolved in the melt.	REFERENCES :			

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Oxygen; O<sub>2</sub>; [7782-44-7] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</pre>	Appleby, A. J.; Van Drunen, C.
(3) Sodium carbonate; $Na_2CO_3$ ; [497-19-8]	J. Electrochem. Soc. <u>1980</u> , 127, 1655 - 59.
(4) Potassium carbonate; $K_2CO_3$ ; [584-08-7]	
VARIABLES:	PREPARED BY:
m/r = 0.72 = 11.22	N. D. Densel
P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constar the melt $\text{Li}_2\text{CO}_3$ - $\text{Na}_2\text{CO}_3$ - $\text{K}_2\text{CO}_3$ (43) temperatures are:	nt, $K_{H}$ , for the solubility of $O_2$ in 3.5 - 31.5 - 25.0 mol%) at different
t/°C P <sub>co2</sub> /atm	10 <sup>4</sup> $K_{H}^{a}$ /mol dm <sup>-3</sup> atm <sup>-1</sup>
700 0.026	2.52 + 0.24
750 0.026	5.10 ± 0.08
	$8.47 \pm 0.22$ 15.10 + 0.53
Data refer to both physica oxygen in the melt.	ally and chemically dissolved
Smoothed Data: Temperature dependence of K <sub>H</sub> for can be expressed by the relation:	the solubility of oxygen in the melt
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -0.851 - 5586.8/(T/K) (compiler)
std. dev The heat of solution, AH, for the	y. = 1.8% (compiler)
AH/kJ mol	-1 = 106.3
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Quenching or chilling method.	Not described.
The diagram and details of the	
apparatus used and procedure	
the original publication. Briefly,	
the melt was saturated by bubbling	
the saturated melt was transferred	
into the chilling compartment	
allow all the gases to escape.	
The liberated gas was flushed with	ESTIMATED ERROR:
Containing activated Linde 5A	Nothing specified.
molecular sieve. The contents of	
come to room temperature, were	
flushed with a stream of carrier	REFERENCES :
Partitioner with Linde 54 column	
I CACADICI WACH DINGC DA COIDNI	
and Katharometer detector for	
and Katharometer detector for analysis. About 8 - 10 independent measurements were carried out.	
and Katharometer detector for analysis. About 8 - 10 independent measurements were carried out.	

COMPONENTS: ORIGINAL MEASUREMENTS: (1) Oxygen; O<sub>2</sub>; [7782-44-7] Sasabe, M; Kinoshita, Y. (2) Calcium oxide; CaO; [1305-78-8] J. Iron Steel Inst. Jpn. 1978, 64, (3) Silicon dioxide; SiO<sub>2</sub>; 1313 - 1322.[7631-86-9] (4) Alumina;  $Al_2O_3$ ; [1344-28-1] VARIABLES: PREPARED BY: T/K = 1600 - 1785N. P. Bansal P/kPa = 20.265 - 101.325EXPERIMENTAL VALUES: The temperature dependence of the oxygen gas solubility, C(mol  $cm^{-3}atm^{-1}$ ), in CaO - SiO<sub>2</sub> - Al<sub>2</sub>O<sub>3</sub> melts of three different compositions are given by the following expressions.  $25CaO - 65SiO_2 - 10Al_2O_3$  (wt%) 40CaO - 40SiO<sub>2</sub> - 20Al<sub>2</sub>O<sub>3</sub> (wt%) - 10000 C/ mol cm<sup>-3</sup> atm<sup>-1</sup> =  $2.9 \times 10^{-13} \exp$ 45CaO - 40SiO<sub>2</sub> - 15Al<sub>2</sub>O<sub>3</sub> (wt%) 6000  $C/mol cm^{-3} atm^{-1} = 1.3 \times 10^{-13} exp$ AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Oxygen solubilities in the melt were estimated from the permeability and diffusivity of the gas. ESTIMATED ERROR: Not specified. **REFERENCES:** 

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Green, W. J. Ph. D. Thesis, Virginia Polytechnic Institute <u>1969</u> .
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	Green, W. J.; Field, P. E. J. Phys. Chem. <u>1980</u> , <b>84</b> , 3111 - 3114.
VARIABLES:	PREPARED BY:
T/K = 536 - 611	N. P. Bansal
P/kPa = 50.663 - 151.988	
	I
The values of Henry's law constant Molten LiNO <sub>3</sub> , at different temperatu	ht, $K_{H}$ , for the solubility of $N_2$ in are:
T/K 107 H	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
536	1.66
541	1.73
553 554	1.68
565	1.76
567	1.87
586	1.91
589	1.89
	2.2.5
std. dev The enthalpy of solution, ^H, and ^H/kcal mol <sup>-1</sup> ^S/cal K <sup>-1</sup> mol- <sup>3</sup>	<pre>/. = 0.27% (authors) d entropy of solution, AS, are: = 1.82 ± 0.18 d = -6.23 ± 0.32 (at 581 K)</pre>
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique. Diagram and details of the gas solubility apparatus are given in the original publication. After saturating the melt with nitrogen gas, the gas phase was evacuated. Helium gas was introduced into the system as eluting gas to approximately 1 atm. The resultant gas mixture of nitrogen and helium was analyzed with an Aerograph 90 - P	Dry nitrogen and helium obtained from Airco were used directly from the tanks. Reagent grade lithium nitrate from Baker was used without further purification.
gas chromatograph (Varian).	ESTIMATED ERROR:
	$\delta C/P = \pm 5\%$ (authors)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Nitrogen, N $(7727-27-0)$	Closuor B . Mathem D		
(1) NILLOYEN; $N_2$ ; $[//2/-3/-9]$	Cleaver, D.; Matner, D. E.		
<pre>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</pre>	Trans. Faraday Soc. <u>1970</u> , <b>66</b> , 2469 - 82.		
VADTABIEC -	DEFLAPED BY.		
one temperature: $T/K = 550$	N D Bangal		
P/RPA = 25000 - 98000	N. F. Ballsal		
EXPERIMENTAL VALUES:			
Solubilities of nitrogen in the r temperature, in the graphical form a pressure in the range 250 - 980 bar constant, $K_{\rm H}$ , at the experimental te	melt are presented at only one as a function of the gas . The value of the Henry's law emperature is:		
t/°C 10	$^{7}$ K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>		
277	0.73 ± 0.10		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
High pressure elution technique. Diagram and details of the apparatus are given in the original paper. The melt was saturated by stirring it in contact with the gas at high pressure. A sample of the saturated melt was isolated and analyzed by the elution technique.	Nitrogen (99.9%) from British Oxygen Company was used without further purification or drying. Lithium nitrate (99.9%) obtained from Johnson - Matthey & Co. was recrystallized from distilled water and dried at 120°C. It was stored in an air oven at 100°C.		
	ESTIMATED ERROR:		
	$\delta P/bar = \pm 10$		
	REFERENCES :		

COMPONENTS:	EVALUATOR:
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	N. P. Bansal National Aeronautics and Space
(2) Sodium nitrate; NaNO₃; [7631-99-4]	Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

Four investigations have been reported for the solubility of nitrogen in molten sodium nitrate. One of these studies (1) which uses a cryometric method is only of preliminary nature. Copeland and Seibles (2) use a manometric technique whereas Field and Green (3) and Cleaver and Mather (4) employ an elution process.

Results of the three different studies have been compared below:

T/K	107 $K_{H}$ /mol cm <sup>-3</sup> atm <sup>-1</sup>				
	Field & Green	Cleaver & Mather	Copeland & Seibles		
600	2.0	(0.48)	(23)		
640	2.3	0.59	20		
680	(2.6)	0.70	17		
720	(2.9)	0.82	15		

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

The solubility results of Field and Green (3) are about an order of magnitude smaller than those reported by Copeland and Seibles (2) and about four - five times larger than those of Cleaver and Mather (4). The heat of solution reported by Copeland and Seibles is negative in contrast to the other two studies which report positive values. It has been Pointed out by Copeland and Christie (5) that solubility results reported earlier from their laboratory are not reliable.

Further studies are needed in order to make a reliable evaluation of this system.

- 1. Frame, J. P.; Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. 1961, 57, 1075.

- Copeland, J. L.; Seibles, L. J. Phys. Chem. <u>1966</u>, 70, 1811.
   Field, P. E.; Green, W. J. J. Phys. Chem. <u>1971</u>, 75, 821.
   Cleaver, B.; Mather, D. E. Trans. Faraday Soc. <u>1970</u>, 66, 2469.
   Copeland, J. L.; Christie, J. R. J. Phys. Chem. <u>1971</u>, 75, 103.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Field, P. E.; Green, W. J. J. Phys. Chem. 1971, 75, 821 - 5	
(2) Sodium nitrate; $NaNO_3$ ;		
[/031-99-4]	Green, W. J. Pn. D. Thesis, Virginia Polytechnic Institute 1969.	
VARIABLES:	PREPARED BY:	
T/K = 586 - 639	N. P. Bancal	
P/KPa = 95.246 - 125.643		
EXPERIMENTAL VALUES:		
Henry's law was obeyed over the path). The values of Henry's law constare:	ressure range studied (0.94 - 1.24 stant, $K_{H}$ , at different temperatures	
T/K 10 <sup>7</sup> H	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
586	1.886	
587	1.853	
601 605	2.096	
615	2.024	
623	2.210	
625 639	2.190 2.096	
Smoothed Data:		
Temperature dependence of V is i	woressed by the relation.	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.71 - 599.2/(T/K)	
std. dev	/. = U.83%	
The enthalpy of solution, AH, and	1 entropy of solution, $\Lambda S$ , are: mol <sup>-1</sup> = 2.74 + 0.83	
	$-4.54 \pm 1.36$ (at 637 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;	
Elution technique. Diagram of the gas solubility	Dry nitrogen obtained from Airco	
apparatus is given in the original	Baker's reagent grade sodium	
After saturating the melt with	nitrate was used without further purification.	
nitrogen gas, the gas phase was		
evacuated. Hellum was introduced into the system as eluting das		
to approximately 1 atm. pressure.		
nitrogen and helium was analyzed		
with an Aerograph Model 90-P gas chromatograph (Varian) Average	ESTIMATED ERROR:	
of four measurements was used for		
calculation of the gas solubility.	$\delta C/P = \pm 0.05  (authors)$	
	REFERENCES:	
	}	
	1	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Cleaver, B.; Mather, D. E.		
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>Trans. Faraday Soc.</b> <u>1970</u> , <b>66</b> , 2469 - 82.		
VARIABLES: $T/K = 604 - 722$ P/kPa = 0 - 10 <sup>5</sup>	PREPARED BY: N. P. Bansal		
EXPERIMENTAL VALUES:			
Gas solubilities in the melt at function of gas pressure in the ra only. The values of the Henry's la are given as:	three temperatures are presented as a nge 280 - 1000 bar in graphical form w constant, $K_{H}$ , at three temperatures		
t/°C 10 <sup>7</sup>	K <sub>H</sub> /mol ml <sup>-1</sup> bar <sup>-1</sup>		
331 390 449	0.50 ± 0.15 0.64 ± 0.15 0.84 ± 0.15		
Smoothed Data: Temperature dependence of K., is	expressed by the relation:		
log(K <sub>H</sub> /mol ml <sup>-+</sup> bar <sup>-+</sup> std. d	) = -5.931 - 829.8/(T/K) (compiler) ev. = 1.3% (compiler)		
The enthalpy of solution. AH. a	nd the standard entropy of solution.		
AS <sup>9</sup> and the neuticl polar volume	W of the discolved set over		
AH/kJ m AH/kJ m AS°/J K <sup>-1</sup>	$v_a$ , of the dissolved gas are: $ol^{-1} = 16.0$ $mol^{-1} = -23.6$		
1			
	40 I 40		
AUXILIA	RY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
High pressure elution technique. Diagram and details of the apparatus are given in the original publication. The melt was saturated by stirring it in Contact with the gas at high pressure. A part of the saturated melt was isolated and analyzed by the elution technique.	Nitrogen (99.9%) from British Oxygen Company was used without further purification. Sodium nitrate (B. D. H.) A. R. grade was purified by filtration through Pyrex frits in the molten state. The melt was allowed to freeze and stored under vacuum.		
	ESTIMATED ERROR:		
	$\delta P/bar = \pm 10$		
	REFERENCES:		

OMPONENTS	;		ORIGINAL M	EASUREMENTS:	
(1) Ni	trogen; N <sub>2</sub> ; [7727-	-37-9]	Copeland, J. L.; Seibles, L.		
(2) So [7	dium nitrate; NaNC 631-99-4]	)3;	<b>J. Phys. Chem.</b> <u>1966</u> , <b>70</b> , 1811 - 15		
ARIABLES:	т/к = 628 - 727		PREPARED I	3Y:	
	P/kPa = 14185.5 -	43164.5		N. P. Bansal	
XPERIMENT The differ	TAL VALUES: value of Henry's ent temperatures a	law constan and gas pres	t, K <sub>H</sub> , an sures are	d gas solubilitie :	s, C <sub>1</sub> , at
P atm	107 K <sub>H</sub> mol cm <sup>-3</sup> atm <sup>-1</sup>	104 C1 mol cm <sup>-3</sup>	P atm	10 <sup>7</sup> K <sub>H</sub> mol cm <sup>-3</sup> atm <sup>-1</sup>	104 C <sub>1</sub> mol cm <sup>-</sup>
	т = 727 к		<u>, , , , , , , , , , , , , , , , , , , </u>	T = 696 K	<u></u>
364	16.5	6.00	349	16.0	5.57
227	13.7	4.00	212	14.9	4.34
ΤΡ /	16.4 T = 718 K	2.13	T28	1/.9 T = 686.5 K	2.85
357	16.7	5.97	426	17.4	7.40
281	15.0	4.21	341	17.4	5.93
163	18.3	2.98	200 213 155	17.5 15.5 18.8	4.88 3.31 2.91
					continued
- 			<del></del>		
		AUXILIARY	INFORMATION		
METHOD/AP	ometric method.		Bond	D PURITY OF MATERIAL	gen, at
The apparatus and technique were the same as described by		Cylinder Gas Co. was used.			
0	Copeland and Zybko (1). Known guantities of the gas and the melt		• <u>,</u> <u>-</u>		
Copelar quantit	ties of the gas an	Known d the melt	from Bal	gent grade sodium ker and Adamson w	nitrate as employe
Copelar quantit were ec pressur	na and Zypko (1). ties of the gas an quilibrated in a h re vessel and the	Known d the melt leated final	Read from Bal To removiallowed	gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p	nitrate as employe as melted orcelain
Copelar quantit were ec pressur of gas by subt	ties of the gas an quilibrated in a h re vessel and the re was measured. T dissolved was det tracting the numbe	Known d the melt eated final 'he amount ermined r of moles	Read from Bal To remov allowed cassero	gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p le contained in a	nitrate as employe as melted orcelain dessicato
Copelar quantit were ed pressur pressur of gas by subt of gas calcula	nd and Zypko (1). ties of the gas an quilibrated in a h re vessel and the re was measured. T dissolved was det tracting the numbe present in the ga ated from the Beat	Known d the melt leated final 'he amount .ermined r of moles s phase, tie -	Read from Bal To remo allowed cassero	gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p le contained in a D ERROR:	nitrate as employe as melted orcelain dessicato
Copelar quantit were ed pressur of gas by subt of gas calcula Bridger number admitte	nd and Zypko (1). ties of the gas an quilibrated in a h re vessel and the re was measured. T dissolved was det tracting the numbe present in the ga ated from the Beat nan equation (2), of moles original ed.	Known d the melt leated final 'he amount .ermined r of moles .s phase, tie - from the ly	ESTIMATED	gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p le contained in a D ERROR: δP/atm	nitrate as employe as melted orcelain dessicato
Copelar quantit were ed pressur of gas by subt of gas calcula Bridger number admitte	nd and Zypko (1). ties of the gas an quilibrated in a h re vessel and the re was measured. T dissolved was det tracting the numbe present in the ga ated from the Beat nan equation (2), of moles original ed.	Known d the melt leated final 'he amount .ermined .r of moles .s phase, .tie - from the ly	Read from Bal To remo allowed cassero ESTIMATED	gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p le contained in a D ERROR: δP/atm 25:	nitrate as employe as melted orcelain dessicato
Copelar quantit were ed pressur of gas by subt of gas calcula Bridger number admitte	nd and Zypko (1). ties of the gas an quilibrated in a h re vessel and the re was measured. T dissolved was det tracting the numbe present in the ga ated from the Beat nan equation (2), of moles original ed.	Known d the melt leated final The amount .ermined r of moles .s phase, tie - from the ly	Read from Bal To remo allowed cassero ESTIMATEL REFERENCE 1. Cope J. Pl	<pre>gent grade sodium ker and Adamson w ve moisture, it w to freeze in a p le contained in a D ERROR:</pre>	<pre>nitrate as employe as melted orcelain dessicato = ± 3 o, W. C. 69, 3631.</pre>

COMPONENTS:	<u></u>		ORIGINAL M	EASUREMENTS:	j
(1) Nit	itrogen; N <sub>2</sub> ; [7727-37-9]		Copeland, J. L.; Seibles, L.		s, L.
(2) Sod [76	lium nitrate; NaN 531-99-4]	03;	J. Phys. Chem. <u>1966</u> , 70, 1811 - 15		, 1811 - 15.
VARIABLES:	T/K = 628 - 727		PREPARED F	BY:	
Р	kPa = 14185.5 -	43164.5		N. P. Bansa	1
EXPERIMENTA	AL VALUES:				
continu	led				
1	T = 669.5 K			T = 641.5 K	
415	16.0	6.64	387	19.8	7.67
258	18.0	4.64	244	20.2	4.94
205 151	18.3 20.4	3.75 3.08	194 144	19.3 20.1	3.74 2.90
	T = 655.5 K			т = 628.5 к	
398	10 5	7 77	275	21 0	7 90
323	18.3	5.91	306	19.9	6.07
251	18.7 18.8	4.71	238 192	20.0 17.9	4.76
148	18.6	2.75	140	20.1	2.82
The	۸ ۸s errors indicated	H/kcal mol <sup>-1</sup> °/cal K <sup>-1</sup> mol are the leas	= -2.73; -1 = -16; t-square;	± 0.09 .6 ± 0.1 s probable errors	s (authors).
		AUXILIARY	INFORMATIC	)N	
METHOD/APP.	ARATUS/PROCEDURE:		SOURCE AN	D PURITY OF MATERIAL	S;
	,				
			(		
			1		
			ESTIMATED	ERROR:	
			PFFFDENC	····	
				i <b>o</b> i	
			[		
L			1		

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
1/ADT ADT EC .	
VARIABLES.	N. P. Bansal
EXPERIMENTAL VALUES:	
No depression in freezing point of the solvent was observed from the solubility of nitrogen at atmospheric pressure indicating that nitrogen solubility in sodium nitrate was less than $10^{-4}$ mole fraction.	
AUXILIARY INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Cryoscopy.	Nitrogen from commercial cylinders (B.O.C.) was dried by passing through a liquid air trap. Sodium nitrate containing less than 0.0003% of cation and less than 0.001% of anion impurities was dried for several days at 240°C followed by thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.
	ESTIMATED ERROR:
	Freezing point was measured within <u>t</u> 0.02°C.
	REFERENCES:
	1. Rhodes, E.; Ubbelohde, A. R.
	<b>Proc. Royal Soc. A</b> <u>1959</u> , <b>251</b> , 156.

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Kawamura, K; Teramato, Y.; Suzuki, Y.	
(2) Sodium nitrate; NaNO <sub>3</sub> ;	Denki Kagaku <u>1982</u> , <b>50</b> , 232-235	
[7631-99-4]		
VARIABLES:	PREPARED BY:	
T/K = 593 - 643	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
Nitrogen gas solubilities, $K_p$ (mol cm <sup>-3</sup> atm <sup>-1</sup> ), at various temperatures are given below :		
T/K 107	Kp/mol cm <sup>-3</sup> atm <sup>-1</sup>	
593 643	$2.5 \pm 0.20$ 3.4 ± 0.30	
The enthalpy, $\Delta H$ , for dissolution of gas in the melt was calculated from the relation : d ln K <sub>p</sub> /d(1/T) = $-\Delta H/R$ and was found to be : $\Delta H/kcal mol^{-1} = 4.7 \pm 2.0$		
AUXILIARY INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution Method. Details of the apparatus, which was almost identical to that developed by Grimes et al. (1), are given in the paper. The melt in the saturating vessel was saturated with $N_2$ by bubbling the gas for 4h. The saturated melt was then transferred to the elution vessel and helium gas bubbled through it to liberate the dissolved $N_2$ from the melt. The	Reagent grade NaNO <sub>3</sub> was dried at 423K for a week. Nominal purities of nitrogen and helium gases were 99.9989 % and 99.998 % respectively.	
amount of N <sub>2</sub> gas was determined quantitatively using gas chromato-	ESTIMATED ERROR:	
graphy.	Solubility = 6 - 10 % (authors)	
	REFERENCES :	
	<ol> <li>Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</li> </ol>	
L. L	1	

104
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(1) Nitrogen; N <sub>2</sub> ; $[7727-37-9]$ (2) Potassium nitrate; KNO <sub>3</sub> ;	Green, W. J. <b>Ph. D. Thesis</b> , Virginia Polytechnic Institute 1969.	
[7757-79-1]	Green, W. J.; Field, P. E. J. Phys. Chem. <u>1980</u> , <b>84</b> , 3111 - 3114.	
VARIABLES:	PREPARED BY:	
T/K = 618 - 698 P/kPa = 50.663 - 151.988	N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{\rm H},$ for the solubility of $N_2$ in molten $KNO_3$ at different temperatures are:		
T/K 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
618 623 624 632 643 672 685 685 686 698	2.93 2.71 2.77 2.39 2.58 3.05 3.16 3.21 2.90	
Smoothed Data: The temperature dependence of $K_{H}$ is expressed by the equation: $\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) = -5.972 - 376.37/(T/K)$ std. dev. = 1.1% (authors) The enthalpy of solution, ^H, and entropy of solution, ^S, are: $\Delta H/\text{kcal mol}^{-1} = 1.72 \pm 0.78$ $\Delta S/\text{cal } K^{-1} \text{ mol}^{-1} = -5.64 \pm 1.2$ (at 668 K)		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: Elution method. Diagram and details of the gas solubility apparatus are given in the original publication. After saturating the melt with nitrogen gas, the gas phase was evacuated. Helium was introduced into the system as eluting gas to approximately 1 atm. pressure. The resultant gas mixture of nitrogen and helium was analyzed with an Aerograph Model 90-P gas chromatograph (Varian).	SOURCE AND PURITY OF MATERIALS: Dry nitrogen and helium obtained from Airco were used directly from the cylinders. Reagent grade potassium nitrate from Baker was used without any further treatment. ESTIMATED ERROR: δC/P = ± 5% (authors) REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; $N_2$ ; [//2/-3/-9]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.	
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.	
VARIABLES:	PREPARED BY:	
	N. P. Bansal	
EXPERIMENTAL VALUES:		
No depression in freezing point of the solvent was observed from the solubility of nitrogen at atmospheric pressure. This indicated that nitrogen solubility in molten potassium nitrate was less than 10 <sup>-4</sup> mole fraction.		
ΔΙΙΥΤΙ ΤΑΡΥ ΙΝΕΩΡΜΑΤΙΩΝ		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Cryoscopy.	Nitrogen from commercial cylinders (B.O.C.) was dried by passing through a liquid air trap. Potassium nitrate containing less than 0.0003% of cation and 0.001% of anion impurities was dried for several days at 240°C followed by the thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.	
	ESTIMATED ERROR:	
	Freezing point was measured within ± 0.02°C	
	REFERENCES :	
	1. Rhodes, E.; Ubbelohde. A. R.	
	Proc. Royal Soc. A <u>1959</u> , 251A, 156.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Nitrogen; N<sub>2</sub>; [7727-37-9]</li> <li>(2) Cesium nitrate; CsNO<sub>3</sub>; [7789-18-6]</li> </ul>	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R. <b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
No depression in freezing point of the solvent was observed from the solubility of nitrogen at atmospheric pressure. This indicated that nitrogen solubility in molten cesium nitrate was less than 10 <sup>-4</sup> mole fraction.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopy.	Nitrogen from commercial cylinders (B.O.C.) was dried by passing through a liquid air trap. Cesium nitrate containing less than 0.1% of all impurities was dried at 240°C for many days followed by the thermal shock technique (1). Drying was completed by evacuating the system after melting the salt.
	ESTIMATED ERROR:
	Accuracy of freezing point measurement was ± 0.02°C
	REFERENCES:
	1. Rhodes, E.; Ubbelohde, A. R.
	<b>Proc. Royal Soc. A</b> <u>1959</u> , <b>251A</b> , 156.

	107	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; N₂; [7727-37-9]	Borodzinski, A.; Sokolowski, A.; Suski, L.	
<pre>(2) Zinc chloride; ZnCl<sub>2</sub>; [7646-85-7]</pre>	<b>J. Chem. Thermodyn. <u>1975</u>, 7,</b> 655 - 60.	
VARIABLES: P/kPa = 10 - 100 one temperatue : T/K = 720	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES: For the solubility of nitrogen in the melt, the Henry's law constant, K <sub>H</sub> , is:		
T/K Solubility/mol fraction Pa <sup>-1</sup> 10 <sup>7</sup> K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
720 (3.33 $\pm$ 0.10) x 10 <sup>-1</sup>	.o 5.74≞	
* Value calculated by the compiler using density data of ZnCl <sub>2</sub> from Janz, G. J. Molten Salts Handbook, Academic Press, New York, <u>1967</u> .		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: Volumetric method. Schematic diagram of the experimental arrangement used is given in the original publication. The melt was saturated with nitrogen. The process of saturation was enhanced by a magnetic stirrer. The change in volume of the gas caused by its dissolution in the melt was determined. Temperature was Controlled within + 1 K.	SOURCE AND FURITY OF MATERIALS: Nitrogen used was 99.99% pure. Zinc chloride p. a. was distilled under vacuum prior to its distillation directly into the apparatus.	
	ESTIMATED ERROR: solubility = ± 5% (authors)	
	REFERENCES :	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; $N_2$ ; [7727-37-9] (2) Sodium nitrate; NaNO <sub>3</sub> ;	Paniccia, F.; Zambonin, P. G.	
<pre>[7631-99-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	J. Chem. Soc. Faraday Trans. I <u>1972</u> , 68, 2083 - 89.	
VARIABLES:	PREPARED BY:	
T/K = 508 - 603 P/kPa = 10 <sup>2</sup>	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solvent was an equimolar molten mixture of sodium and potassium nitrates. The solubilities of nitrogen in the melt at four temperatures are:		
т/к 10 <sup>в</sup> к		
508	0.73	
533	0.88	
603	1.1	
Smoothed Data: The temperature dependence of Her	ry's law constant, $K_{H}$ , is expressed	
by: $\log(K_{\rm w}/{\rm mol~cm^{-3}~bar^{-1}})$	= -6.395 - 885.9/(T/K) (compiler)	
	= 1.5%  (compiler)	
sta. dev	· = 1.5% (Compiler)	
The enthalpy, AH, and standard en	tropy, AS°, of solution are:	
$\wedge H/kJ mol^{-1} = 16.5$		
∧S°/J K <sup>-1</sup>	$mol^{-1} = -34$ (at 533 K)	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique.	purified by keeping in contact with	
The details of the apparatus	Ascarite (A. H. Thomas Co) for several	
measurements are described	impurities and molecular sieve 5A	
elsewhere (1). Briefly, the melt	(Carlo Erba, Milano) at -80°C to	
hourrs. The vacuum was	Reagent grade sodium and	
disconnected and nitrogen gas	potassium nitrates were used to	
pressure. The melt was vigorously	in the molten state.	
stirred and pressure changes were read from a manometer as a	COTIVATED EDDOD-	
function of time until equilibrium	ESTIMATED ERKOR:	
dissolved was calculated from the	Nothing specified.	
final pressure variation after a suitable calibration		
	REFERENCES:	
	1. Desimoni, E.; Paniccia, F.; Zambonin, P. G.	
	J. Electroanal. Chem. <u>1972</u> , 38, 373.	
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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9]	Kawamura, K; Teramato, Y.; Suzuki, Y. Denki Kagaku 1982, 50, 232-235	
(2) Sodium Nitrate; NaNO <sub>3</sub> ;	Denki Alguna <u>1902</u> , 50, 252-255	
[7631-99-4] (3) Potassium Nitrate: KNO <sub>2</sub> :		
[7757-79-1]		
VARIABLES:	PREPARED BY:	
T/K = 543 - 643 $KNO_3/mol \ \% = 25 - 75$ P/kPa: 101.325 (compiler)	N. P. Bansal	
EXPERIMENTAL VALUES:		
Nitrogen gas solubilities, K <sub>p</sub> ( are given below :	mol cm <sup>-3</sup> atm <sup>-1</sup> ), at various temperatures	
Melt composition /mole % KNO3		
25 50	66 75	
T/K 10 <sup>7</sup> K <sub>p</sub> /mol T/K 10 <sup>7</sup> K <sub>p</sub> /m cm <sup>-3</sup> atm <sup>-1</sup> cm <sup>-3</sup> atm	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12 593 1.5 ± 0.12 593 1.7 ± 0.10 12 643 2.0 ± 0.10 12	
The enthalpies, $\Delta H$ , for disso from the relation : d ln K <sub>p</sub> /d(1/T) = - The values of $\Delta H$ are given b Melt composition/mol % of KN 25 50 75	Lution of gas in the melt were calculated $\Delta H/R$ pelow : $O_3 \qquad \Delta H/kcal mol^{-1}$ $4.0 \pm 1.8$ $2.0 \pm 0.6$ $2.5 \pm 1.0$	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution Method. Details of the apparatus, which was almost identical to that developed by Grimes et al. (1), are given in the paper. The melt in the saturating vessel was saturated wit $N_2$ by bubbling the gas for 4h. The saturated melt was then transferred to the elution vessel and helium ga bubbled through it to liberate the dissolved $N_2$ from the melt. The amount of $N_2$ gas was determined	Reagent grade NaNO <sub>3</sub> and KNO <sub>3</sub> were dried at 423K for a week. Nominal purities of nitrogen and helium gases were 99.9989 % and 99.998 % respectively.	
graphy.	ESTIMATED ERROR:	
	Solubility = 6 - 10 % (authors)	
	REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u> , 62, 862.	

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COMPONENTE	OPICINAL MEASUREMENTS .	
(1) Nitrogen; N <sub>2</sub> ; $[7727-37-9]$ (2) Lithium carbonate; Li <sub>2</sub> CO <sub>3</sub> ;	Appleby, A. J.; Van Drunen, C.	
<pre>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>;</pre>	J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655	
[497-19-8] (4) Potassium carbonate; K <sub>2</sub> CO <sub>3</sub> ;	- 59.	
[584-08-7]		
VARIABLES:	PREPARED BY:	
T/K = 973 - 1123	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of $N_2$ in the melt $Li_2CO_3$ - $Na_2CO_3$ - $K_2CO_3$ (43.5 - 31.5 - 25.0 mol%) at different temperatures are:		
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
700	0.69 ± 0.08	
750	$1.26 \pm 0.07$ 1.34 ± 0.10	
850	1.71 ± 0.11	
Smoothed Data:		
Temperature dependence of K <sub>H</sub> can	be expressed by the relation:	
$\log(K_{\rm m}/mo]  \rm cm^{-3}  \rm atm^{-1}) =$	$-4.367 - 2673.9/(\pi/K)$ (compiler)	
	$= (2)^{2} (-2)^{2} $	
std. dev	. = 6.8% (compiler)	
The heat of solution, $^{\Lambda}$ H, for the solubility of N <sub>2</sub> in the melt is:		
$\Delta H/kJ mol^{-1} = 51.0$		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Quenching or chilling method.	Not described.	
The diagram and details of the apparatus used and procedure		
employed are described in the		
the melt was saturated by bubbling		
the gas for 2 - 3 hr. A portion of the saturated melt was		
transferred into the chilling		
quenched to allow all the gases		
to escape. The liberated gas was flushed with a stream of helium	ESTIMATED ERROR:	
into a U - tube containing	Nothing specified.	
sieve. The contents of the tube,		
atter being allowed to come to room temperature, were flushed	REFERENCES:	
with a stream of carrier gas into		
partitioner with Linde 5A column		
and Katharometer detector for analysis. About 8 - 10 independent		
measurements were carried out.		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Fluorine; $F_2$ ; [7782-41-4]	Klemm, W.; Huss, E.	
(2) Potassium chloride; KCI; [7447-40-7]	Z. Anorg. Allg. Chem. <u>1949</u> , 258,	
(3) Cobalt chloride; CoCl <sub>2</sub> ; [7646-79-9]	221 - 25.	
VARIABLES:	PREPARED BY:	
one temperature: T/K = 598	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
The solubility of fluorine in the molten KCl - CoCl <sub>2</sub> (75 - 25 mol%) mixture at a single temperature is reported as:		
t/°C Solub	lity/mol(mol of melt) <sup>-1</sup>	
325	0.875	
The high value of solubility is due to a chemical reaction between the melt and the fluorine resulting in the formation of $K_3CoF_7$ .		
AUXILIARY INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Weight ghange V-ray ghomigal	Not available	
analysis.	NOC AVALIADIE.	
	1	
	ESTIMATED ERROR:	
	Nothing enorified	
	Nothing specified.	
	REFERENCES:	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Fluorine; F <sub>2</sub> ; [7782-41-4]	Klemm, W.; Huss, E.	
(2) Potassium chloride; KCl; [7447-40-7]	Z. Anorg. Allg. Chem. <u>1949</u> , 258,	
<pre>(3) Nickel chloride; NiCl<sub>2</sub>; [7718-54-9]</pre>	221 - 25.	
VARIABLES:	PREPARED BY:	
one temperature: $T/K = 548$	N. P. Bansal	
P/KPa: 101.325 (Compiler)		
EXPERIMENTAL VALUES:	$\mathbf{r} = \mathbf{r} \mathbf{r} \mathbf{r} \mathbf{r} \mathbf{r} \mathbf{r} \mathbf{r} \mathbf{r}$	
mixture at a single temperature is	reported as:	
t/°C Solub	ilty/mol(mol of melt) <sup>-1</sup>	
275	1.0	
The high solubility of fluorine reaction between fluorine and the m	in the melt is due to a chemical elt giving rise to the formation of	
N2122 6.		
AUXILIARY		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND FURITY OF MATERIALS:	
Weight change, X-ray, chemical analysis.	Not available.	
	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Fluorine; $F_2$ ; [7782-41-4]	Klemm, W.; Huss, E.	
(2) Potassium chloride; KCI; [7447-40-7]	Z. Anorg. Allg. Chem. 1949, 258.	
(3) Cupric chloride; CuCl <sub>2</sub> ;	221 -25.	
[7447-39-4]		
VARIABLES:	PREPARED BY:	
one temperature $T/K = 523$	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
The solubility of fluorine in mo	lten KCl - CuCl <sub>2</sub> (75 - 25 mol %) reported as:	
mixedie de la Single competitude is		
•		
t/°C Solubi	lity/mol(mol of melt) <sup>-1</sup>	
250	0.75	
The high value of solubility is	due to a chemical reaction between	
I fluorine and the melt giving rise t	b the formation of $K_3CuF_6$ .	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Weight change, X-ray, chemical	Not available.	
	(	
1	ESTIMATED EPPOP.	
1	LOTHATED LAKON.	
	BUTTIBILD ERROR.	
	Nothing specified.	

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Lithium chloride; LiCl; [7447-41-8]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.
CRITICAL EVALUATION:	

Out of the three studies (1 - 3) available for the solubility of chlorine in molten lithium chloride, those by Wartenberg (1) and Tricklebank (2) are only of a preliminary nature. The results of Ryabukhin and Bukun (3) are not very reliable as the value of pressure, at which the gas solubilities have been measured, is not given.

Additional careful studies are needed before recommended solubilities can be advanced for this system.

- 1. Wartenberg, H. V. Zeitsch. Jur. Elektrochem. 1926, 32, 330.
- 2. Tricklebank, S. B. The Electrochem. Soc. Extended Abstracts October 1969, Abstr. # 48.
- 3, Ryabukhin, Yu. M.; Bukun, N. G. Russ. J. Inorg. Chem. <u>1968</u>, 13, 597.

	115
COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Wartenberg, H. U.
(2) Lithium Chloride; LiCl; [7447-41-8]	Zeitsch. Fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARIABLES:	PREPARED BY:
one temperature: T/K = 893 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES: The solubility of Cl <sub>2</sub> in molten reported as:	LiCl at a single temperature has been
	solubility
t/°C weight fract	ion volume fraction
$620 \pm 5$ $6.98 \times 10^{-1}$	<sup>5</sup> 32.7 x 10 <sup>-3</sup>
AUXILIAR	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and procedure followed for gas solubility measurements are described in the original publication. Briefly, a quenched melt sample equilibrated with chlorine was analyzed for the chlorine content by reacting with KI solution and titrating with freshly standardized thiosulphate solution.	Lithium chloride was pure and heated with NH4Cl and NH4Br to dehydrate.
1	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Tricklebank, S. B.	
<pre>(2) Lithium Chloride; LiCl; [7447-41-8]</pre>		The Electrochem. Soc. Meeting Extended Abstracts, October 1969, Abstr. # 48.	
VARIABLES:		PREPARED BY:	
one temperature: T/K = 923 P/kPa: 101.325 (compiler)		N. P. Bansal	
EXPERIMENTAL VALUES:			
The solubility reported as:	, $C_1$ , of chlorine i	in molten LiCl at one	temperature is
	t/°C	10 <sup>6</sup> C <sub>1</sub> /mol ml <sup>-1</sup>	
	650	1.5 ± 0.5	
AUXILIARY INFORMATION			
Stripping tech	nique.	ESTIMATED ERROR: Nothing s	pecified.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Ryabukhin, Yu. M.; Bukun, N. G.
(2) Lithium chloride; LiCl; [7447-41-8]	<b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 1141 - 45; <b>Russ. J. Inorg. Chem.</b> (Eng. Transl.) <u>1968</u> , <b>13</b> , 597 - 600. (*).
VARIABLES:	PREPARED BY:
T/K = 921 - 1145 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities, C1, of chlo temperatures are:	rine in molten LiCl at different
t/°C	$10^7 C_1/mol cm^{-3}$
648 718 719 787 788 870 872	0.35 0.53 0.56 1.16 0.88 1.78 1.88
The temperature dependence of expressed by the relation: log(C <sub>1</sub> /mol cm <sup>-3</sup> ) std. The heat of solution, $\Delta H$ , is $\Delta H/kJ$	<pre>the solubility of Cl<sub>2</sub> in molten LiCl is ) = -3.650 - 3548/(T/K) (compiler) dev. = 5.1% (compiler) estimated to be: mol<sup>-1</sup> = 67.9 (compiler)</pre>
AUXILI	ARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution technique. The details of the apparatus and procedure used have been described elsewhere (1). In brief the melt was saturated with chlorine. A part of the saturated melt was separated and sparged with argon to free the dissolved chlorine. The liberated chlorine was absorbed in KI solution and iodine generated was titrated	Not described.
with thiosulfate solution.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Ryabukhin, Yu. M.
	Russ. J. Inorg. Chem. <u>1966</u> , 11, 1296.

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

## CRITICAL EVALUATION:

Four experimental studies (1 - 4) are available for the solubility of chlorine in molten sodium chloride. One of these studies (1) is only of a preliminary nature. The results of reference (2) are not accurate because of the uncertainty in the temperature measurements and the reaction of dissolved gas with oxides on the stirrer or the walls of the vessel, according to Ryabukhin (3). The problem with the work of reference (3) is the value of the pressure, at which the gas solubilities have been measured, is not given. Tentative values based on the work of Andresen et al. (4) are given in Table 1.

## Table 1

Solubilities as a Function of Temperature

T/K	107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1090	4.18
1100	4.33
1110	4.48
1120	4.63
1130	4.79
1140	4.95
1150	5.11
1160	5.28
1170	5.44

- 1. Wartenberg, H. U. Zeitsch. Fur. Elektrochem. 1926, 32, 330.
- 2. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. 1962, 7, 565.
- 3. Ryabukhin, Yu. M.; Bukun, N. G. Russ. J. Inorg. Chem. <u>1968</u>, 13, 597.
- 4. Andresen, R. E.; Ostvald, T.; Oye, H. A. Proc. Intl. Symp. Molten Salts (Pemsler, J. P. et al., eds.) The Electrochem. Soc. <u>1976</u>, 111.

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Wartenberg, H. U.
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>		Zeitsch. Fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARTABLES :		PREPARED BY:
VARIABLES: PREPARED BY: one temperature: T/K = 1093 N. P/kPa: 101.325 (compiler)		N. P. Bansal
EXPERIMENTAL VALUES:		
The solubility of C reported as:	$l_2$ in molten M	NaCl at a single temperature has been
		solubility
t/°C	weight fracti	on volume fraction
820 ± 5	1.16 x 10 <sup>-5</sup>	5.63 x 10 <sup>-3</sup>
	AUXILIARY	INFORMATION
METHOD /AP PARATUS / PROCEDURE :		SOURCE AND PURITY OF MATERIALS:
For details of the apparatus and procedure, see the original paper. A quenched melt sample equilibrated with chlorine was analyzed for the chlorine content by reacting with KI solution and titrating with freshly standardized thiosulfate solution.		Sodium chloride used was pure and heated with NH4Cl and NH4Br to dehydrate.
		ESTIMATED ERROR:
		Nothing specified.
		REFERENCES :

n, N. G.	
Zh. Neorg. Khim. <u>1968</u> , <b>13</b> , 1141 - 45 Russ. J. Inorg. Chem. (Eng. Transl.) <u>1968</u> , <b>13</b> , 597 - 600. (*).	
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lten NaCl is compiler)	
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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Ryabukhin, Yu. M.	
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>		<b>Zh. Neorg. Khim.</b> <u>1962</u> , <b>7</b> , 1101 - 04; <b>Russ. J. Inorg. Chem.</b> (Eng. Transl.) <u>1962</u> , <b>7</b> , 565 - 67. (*).	
VARIABLES: D (1-D-	0.0.025	PREPARED BY:	
r/kra =	90.925	N. D. Paperl	
1/1 - 112	0 - 1290	N. F. Dalisai	
EXPERIMENTAL VALUES:			
The solubiliti temperatures, und	es, C <sub>1</sub> , of chlorin er a pressure of 7	e in molten NaCl at different 42 mm Hg are:	
	t/°C	107 $C_1/mol \ cm^{-3}$	
•	817		
	881	3.02	
	935	4.65	
	1025	7.40	
		······································	
Temperature de given by the rela The standard e solubility of Cl <sub>2</sub>	pendence of the solution: $\log(C_1/\text{mol cm}^{-3}) =$ std. denotes std. denotes $\Delta H^\circ/kJ$ mol $\Delta S^\circ/J K^{-1}$	Lubility of $Cl_2$ in molten NaCl -2.777 - 4325/(T/K) (compile v. = 2.3% (compiler) standard entropy, $\Delta S^\circ$ , changes $^{-1} = 82.7 \pm 4$ mol <sup>-1</sup> = -53.2 (at 1123 K)	is er) s for the
	AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCED	URE:	SOURCE AND PURITY OF MATERIALS;	
Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original paper. In brief, the melt was saturated with chlorine by bubbling the gas through it. The dissolved chlorine was removed from the saturated melt by sparging it with argon. The liberated chlorine was absorbed in KI solution and iodine generated was titrated with		Liquified chlorine (99.55 used. Argon used contained 0.00 oxygen and 0.04% nitrogen. Chlorine and argon were p by bubbling through conc. $H_2S$ passing over $P_2O_5$ . Dried and remelted "chemi pure" grade NaCl was used. ESTIMATED ERROR:	%) was 08% purified 50₄ and ically
standard thiosulfa	ate solution.	Nothing specified.	•
		REFERENCES :	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
CUTE ONER 15 .		
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Andresen, R. E.; Ostvald, T.;	
(2) Sodium chloride. Nacl.	Oye, H. A. Prog. Int. Symp. Molter Salts	
[7647-14-5]	(Pemsler, J. P., et al., eds.) The	
	Electrochem. Soc. <u>1976</u> , 111 - 22.	
VARIABLES :	PREPARED BY:	
T/K = 1091 - 1170	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of chlorine in molten NaCl at different temperatures are:		
t/°C 10	$K_{H}/mol \ cm^{-3} \ atm^{-1}$	
	4 12 4 0 20	
818 833	4.12 ± 0.28 4.52	
860	4.94 ± 0.39	
897	5.39 ± 0.23	
Smoothed Data: The temperature dependence of K	is given by the expression.	
$\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}):$	= -4.699 - 1831.3/(T/K) (compiler)	
std. de	v. = 1.1% (compiler)	
The standard enthalow AHP and	standard entropy AS <sup>e</sup> for the	
dissolution of chlorine are:	scandara cheropy, ab , for the	
A 110 / 12 T mal ==		
AR-7KB MOL	- 50.5 1 7.7	
∆S°/J K <sup>-1</sup> 1	$nol^{-1} = -88.8$ (at 1123 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique.	Chlorine (99.5%) gas of "High Purity" from Matheson was used	
apparatus are given in the	directly from the cylinder.	
original paper and the method	NaCl used was Baker Analysed and	
described elsewhere (1). In	was melted and Cl, bubbled through	
brief, chlorine gas is filled	the melt for about an hour and then	
into a thermostated volume above	recrystallized. Salts were handled	
closed quartz vessel. The drop in		
gas pressure is recorded as a function of time. The walve of		
the pressure, at equilibrium, is	ESTIMATED ERROR:	
used for determination of the gas solubility.	Nothing specified.	
	REFERENCES :	
	1. Andresen, R. E.; Paniccia, F.;	
	Zambonin, P. G.; Oye, H. A.	
	Symposium, Vol. 1, Helsinki 1975, 127.	

CORPORENTS :	URIGINAL MEADUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> </ul>	Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. Fourth Nordic High Temp. Symp NORTEMPS-75, 1975, <u>1</u> , 127 - 142.
VARIABLES:	PREPARED BY:
T/K = 1090 - 1168	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
-,	
EXPERIMENTAL VALUES: Henry's Law constants, K <sub>H</sub> , at va	rious temperatures are given below
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
817	4.22
	4.41
	4.12
	3.98
	5.97
860	5.05
	4.18
	5.02
	5.18
895	5,30
	5.18
	5.20
	5.36
Heat of dissolution, $\Delta H$ , as ev	valuated from the expression:
$\Delta H = -R (\ln K_{H}) / d(1/T)$ was found	l to be 8.0 kcal mol <sup>-1</sup> .
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Manometric method.	NaCl (Baker Analyzed) was melted
The method used for gas solubili-	and Cl <sub>2</sub> bubbled through it for 1h.
described earlier(1). The furnace	bubbling Ar for 10-15 min. The salt
temperature was controlled to	solidified, heated under dry N <sub>2</sub> to
better than ± 2°C.	20°C above its melting point, and
	the temperature 4-5°C each hour Clean
	salt crystals were picked up and used
	in the solubility experiment. Ar was
	99.997%, from Norsk Hydro a. s.
	ESTIMATED ERROR:
	Not specified.
	PEFEDENCES.
	ABREACTOR DE Destant -
	Zambonin, E.; Paniccia, F.;
	J. Electroanal. Chem. 1972, 38,
	373.

124	
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> </ul>	Ratvik, A. P.; Ostval Acta Chem. Scand. <u>198</u> 623 - 638.
VARIABLES: T/K = 1100 - 1300 $P/kPa = 10^{2}$	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The validity of Henry's law w solubility at various Cl <sub>2</sub> pressur	as verified by measuring es. Temperature dependen

y measuring the are dependence of solubility,  $K_p$  (mol cm<sup>-3</sup> bar<sup>-1</sup>), is expressed by the relation : log K<sub>p</sub>  $= (-4.263 \pm 0.214) - (2508.8 \pm 259.2)$ т AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Manometric method. The quality and purification of salts have been described earlier(3). The procedure used for gas solubility measurements was similar to the one described elsewhere (1,2). For details see the original publication. ESTIMATED ERROR: S. D. for log(solubility) = 0.027. **REFERENCES:** 1.Waernes, O.; Ostvald, T. Acta Chem. Scand. <u>1983</u>, A37, 293. 2.Waernes,O.; Palmisano,F.; Ostvald,T Acta Chem. Scand. <u>1983</u>, A37, 207. 3.Andreson,R.E;Ostvald,T;Oye,H.A;Proc. Int.Symp.Molten Salts. The Electrochem

Soc., Princeton, NJ1976, 111

P.; Ostvald, T.; Oye, H. A. Scand. <u>1985</u>, **A39**,

COMPONENTS .	ORTGINAL MEASUBEMENTS .
	on of the here of the second sec
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Waernes, O.; Palmisano, F.;
(2) Sodium chloride: NaCl:	Ostvald, T.; Acta Chem. Scand. 1983. A37. 207-217.
[7647-14-5]	
T/K = 1119 - 1210	PREPARED BY: N. P. Bansal
P/kPa = 119.990 - 133.322	
	· · · · · · · · · · · · · · · · · · ·
EXPERIMENTAL VALUES:	
Values of Henry's law constant, $K_{\rm H},$ for the solubility of $\rm Cl_2$ at various temperatures are given below	
T/°C 107 K <sub>r</sub>	/mol cm <sup>-3</sup> atm <sup>-1</sup>
846 4 5	54 + 0.19
892 5.8	$37 \pm 0.17$
937 6.8	36 ± 0.50
Temperature dependence of K <sub>H</sub> ca	in de expressed as:
$\log K_{H} = -3.973 - 264$	16/T
Standard enthalpy for the disso	olution of Cl <sub>2</sub> was evaluated from
the equation : $A^{\mu\nu} = -P dlp K /d(1/2)$	
$\Delta n = -\kappa \dim \kappa_{\rm H}/{\rm U}(1)$	1)
and was found to be $(50.7 \pm 8.5)$ kJ	mol <sup>-1</sup> .
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method.	NaCl(p.a) from E. Merck AG was
The method used for gas solu-	dried under vacuum at 400°C for 2h.
the same as earlier described(1).	The salt was recrystallized from the melt under N <sub>2</sub> atmosphere. Only clear
For details see the original	crystals were used.
paper.	Ar( >99.99%) from Norsk Hydro a.s. Norway was used without further pur-
	ification.
	Cl <sub>2</sub> (>99.6%) from J. T. Baker Chemicals was used.
	ESTIMATED ERROR-
]	
	Not specified.
	-
	REFERENCES:
	Zambonin, P. G.; Oye, H.
	Proc. Fourth Nordic High Temp.
	Symp NORTEMPS - /5, 19/5, 1, 12/

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Out of the four studies (1 - 4) available for the solubility of chlorine in molten potassium chloride, the one by Wartenberg (1) is only of a preliminary nature. According to Ryabukhin (3), the results of their earlier work (2) are not accurate because of the uncertainty in the temperature measurements and the reaction of dissolved gas with oxides on the walls of the container or the stirrer. These problems have been overcome in their later investigation (3). However, in this study the value of the atmospheric pressure, at which the gas solubilities have been measured, is not reported. Tentative solubility values based on the work of Andresen et al. (4)

are given in Table 1.

## Table 1

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Tentative Solubilities as a Function of Temperature

T/K	107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1070	(14.88)
1080	15.29
1110	16.56
1120	17.42
1150 1160	18.29 (18.73)

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

- 1. Wartenberg, H. U. Zeitsch. Fur. Elektrochem. 1926, 32, 330.
- 2. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. 1962, 7, 565.
- 3. Ryabukhin, Yu. M.; Bukun, N. G. Russ. J. Inorg. Chem. 1968, 13, 597.
- 4. Andresen, R. E.; Ostvald, T.; Oye, H. A. Proc. Intl. Symp. Molten Salts (Pemsler, J. P., et al., eds.) The Electrochem. Soc. <u>1976</u>, 111.
| COMPONENTS:  |   |  |
|--|---|--|
|  |   | ORIGINAL MEASUREMENTS:   |
| (1) Chlorine; $Cl_2$ ; [7782-50-5]   |   | Wartenberg, H. U.  |
| (2) Potassium chloride;<br>[7447-40-7]   | ; KCl;  | Zeitsch. Fur. Elektrochem. <u>1926</u> , 32,<br>330 - 36.  |
| VARIABLES:   |   | PREPARED BY:   |
| one temperature: T/K = 1093<br>P/kPa: 101.325 (compiler)   |   | N. P. Bansal   |
| EXPERIMENTAL VALUES:   |   |  |
| The solubility of Cl<br>reported as:   | l <sub>2</sub> in molten 1  | KCl at a single temperature has been   |
|  |   | solubility   |
| t/°C   | weight fract  | ion volume fraction  |
| 820 ± 5  | 5.03 x 10 <sup>-1</sup>   | 23.8 x 10 <sup>-3</sup>  |
|  |   |  |
|  |   |  |
|  | AUXILIARY   | INFORMATION  |
| METHOD / APPARATUS / PROCEDURE :   | AUXILIARY   | INFORMATION<br>SOURCE AND PURITY OF MATERIALS:   |
| METHOD/APPARATUS/PROCEDURE:<br>Details of the appar<br>procedure followed for<br>solubility measurements<br>in the original paper.<br>a quenched melt sample<br>equilibrated with chlor<br>analyzed for the chlori<br>by reacting with KI sol<br>titrating with freshly<br>standardized thiosulfat | AUXILIARY<br>gas<br>s are given<br>In brief,<br>rine was<br>ine content<br>lution and<br>ce solution. | INFORMATION<br>SOURCE AND PURITY OF MATERIALS:<br>Potassium chloride used was pure<br>and was dehydrated by heating with<br>NH4Cl and NH4Br.   |
| METHOD/APPARATUS/PROCEDURE:<br>Details of the appar<br>procedure followed for<br>solubility measurements<br>in the original paper.<br>a quenched melt sample<br>equilibrated with chlor<br>analyzed for the chlori<br>by reacting with KI sol<br>titrating with freshly<br>standardized thiosulfat | AUXILIARY<br>gas<br>s are given<br>In brief,<br>rine was<br>ine content<br>lution and<br>te solution. | INFORMATION<br>SOURCE AND PURITY OF MATERIALS:<br>Potassium chloride used was pure<br>and was dehydrated by heating with<br>NH4Cl and NH4Br.   |
| METHOD/APPARATUS/PROCEDURE:<br>Details of the appar<br>procedure followed for<br>solubility measurements<br>in the original paper.<br>a quenched melt sample<br>equilibrated with chlor<br>analyzed for the chlori<br>by reacting with KI sol<br>titrating with freshly<br>standardized thiosulfat | AUXILIARY<br>gas<br>s are given<br>In brief,<br>cine was<br>ine content<br>lution and<br>ce solution. | INFORMATION<br>SOURCE AND PURITY OF MATERIALS:<br>Potassium chloride used was pure<br>and was dehydrated by heating with<br>NH4Cl and NH4Br.<br>ESTIMATED ERROR:<br>Nothing specified. |

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Andresen, R. E.; Ostvald, T.; Ove. H. A.	
(2) Potassium chloride; KCl; [7447-40-7]	Proc. Int. Symp. Molten Salts (Pemsler, J. P., et al., eds.) The Electrochem. Soc. <u>1976</u> , 111 - 22.	
VARIABLES:	PREPARED BY:	
T/K = 1073 - 1158 P/kPa: 101.325 (1 atm.)	N. P. Bansal	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, K <sub>H</sub> , for the solubility of chlorin in molten KCl at different temperatures are:		
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
800	15.06 ± 0.35	
839 885	16.49 ± 0.59 18.71 + 0.22	
Smoothed Data: The temperature dependence of K <sub>H</sub>	is given by the expression:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -4.538 - 1379.8/(T/K) (compiler)	
std. dev	7. = 0.5% (compiler)	
The standard enthalpy, AH°, and the dissolution of chlorine are:	the standard entropy, $\space{2}S^\circ$ , changes for	
ΔH°/kJ mol <sup>-3</sup>	= 26.3 + 2.2	
	$nol^{-1} = -87.0$ (at 1123 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique. The diagram and details of the apparatus are given in the original publication and the method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. KCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.	
equilibrium, is used for calculation of the cas solubility	Nothing specified	
calculation of the gas solubility.	Nothing Specified.	
	REFERENCES:	
	<ol> <li>Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. 4th Nordic High Temperature Symposium Vol. 1, Helsinki, <u>1975</u>, 127.</li> </ol>	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. Fourth Nordic High Temp. Symp NORTEMPS - 75, <u>1975</u> , 1, 127 - 142.
VARIABLES: T/K = 1073 - 1158 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: Henry's law constants, K <sub>H</sub> , at va	arious temperatures are given below:
T/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
800	14.96 15.28 14.87 14.66 15.54
840	16.38 16.54 17.18 16.76 15.57
885	18.65 18.90 18.87 18.42
Heat of dissolution, $\Delta H$ , as evalu $\Delta H = -R \ dln \ K_H / \ d(1/T) \ was$	ated from the expression : found to be 7.5 kCal mol <sup>-1</sup> .
AUXILIARY	
Manometric method. The method used for gas solubili- ty measurements was the same as described earlier(1). The furnace temperature was controlled to better than ± 2°C.	SOURCE AND FURITY OF MATERIALS: KCl (Merck, P. A.) was melted and Cl <sub>2</sub> bubbled through it for 1h. The dissolved Cl <sub>2</sub> was removed by bubbling Ar for 10-15 min. The salt was soli- dified, heated under dry N <sub>2</sub> to 20°C above its melting point, and then slowly recrystallized by lowering the temperature 4-5°C each hour. Clear salt crystals were picked up and used in the solubility experiment. Ar was 99.997%, from Norsk Hydro a. s.
	ESTIMATED ERROR:
	Not specified.
	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373.

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Ryabukhin, Yu. M.; Bukun, N. G.	
(2) Potassium chloride; KCl; [7447-40-7]	<pre>Zh. Neorg. Khim. 1968, 13, 1141 - 45; Russ. J. Inorg. Chem. (Eng. Transl.) 1968, 13, 597 - 600. (*).</pre>	
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:	
$\pi/\kappa = 1096 - 1299$	N P Pangal	
17. 1050 1255	N. F. Dansat	
EXPERIMENTAL VALUES:		
The solubilities, $C_1$ , of chlorin temperatures are:	e in molten KCl at different	
t/°C	$10^7 C_1/mol cm^{-3}$	
823	13 30	
824	12.04	
827	13.90	
890	16.30	
890	16.88	
958	20.30	
1025	25.14	
	25.50	
The temperature dependence of the solubility of $Cl_2$ in molten KCl is expressed by the relation: $log(C_1/mol \ cm^{-3}) = -4.025 - 2044.9/(T/K)$ (compiler) std. dev. = 1.8% (compiler) The standard enthalpy, $\Delta H^\circ$ , and standard entropy, $\Delta S^\circ$ , changes for the solubility of $Cl_2$ are: $\Delta H^\circ/kJ \ mol^{-1} = 38.8 \pm 2$ $\Delta S^\circ/J \ K^{-1} \ mol^{-1} = -77.4$ (at 1123 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution technique. The details of the apparatus and procedure employed have been described elsewhere (1). In brief, the melt was saturated with chlorine. A portion of the saturated melt was separated and purged with argon to remove dissolved chlorine. The liberated chlorine was absorbed in KI solution and iodine generated was	Not described.	
titrated with thiosulfate	ESTIMATED ERROR:	
Solution.	Nothing specified.	
	REFERENCES:	
	1. Ryabukhin, Yu. M.	
	<b>Russ. J. Inorg. Chem.</b> <u>1966</u> , <b>11</b> , 1296.	

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Components:	ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Ryabukhin, Yu. M.	
(2) Potassium chloride; KCl; [7447-40-7]	<b>Zh. Neorg. Khim.</b> <u>1962</u> , <b>7</b> , 1101 - 04; <b>Russ. J. Inorg. Chem.</b> (Eng. Transl.) <u>1962</u> , <b>7</b> , 565 - 67. (*)	
VARIABLES: $P/kPa = 98.925$	PREPARED BY:	
m/v = 1121 = 1219	N. D. Pangal	
1/K - 1121 - 1516	h. F. Bansar	
EXPERIMENTAL VALUES:	<u> </u>	
The solubilities, C1, of chlorin temperatures, under a pressure of 7	e in molten KCl at different 42 mm Hg are:	
t/°C	$10^7 C_1/mol cm^{-3}$	
848	10 40	
851	11.24	
925	13.93	
1038	20.32	
1045	18.89	
by the expression: $\log(C_1/\text{mol cm}^{-3}) = -4.204 - 1978.6/(T/K)$ (compiler) std. dev. = 1.7% (compiler) The standard enthalpy, $\Delta H^\circ$ , and standard entropy, $\Delta S^\circ$ , of solution ar $\Delta H^\circ/kJ \text{ mol}^{-1} = 26.4 \pm 7$ $\Delta S^\circ/J K^{-1} \text{ mol}^{-1} = -89.4$ (at 1123 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original paper. In brief, the melt was saturated with chlorine by bubbling the gas through it. The dissolved chlorine was removed from the saturated melt by flushing it with argon. The liberated chlorine was absorbed	Liquified chlorine (99.5%) was used. Argon used contained 0.008% oxygen and 0.04% nitrogen. Chlorine and argon were purified by bubbling through conc. $H_2SO_4$ and passing over $P_2O_5$ . Dried and remelted "chemically pure" grade KCl was used.	
in KI solution and amount of		
lodine generated was titrated with a standard thiosulfate solution.	Nothing specified.	
	REFERENCES:	

132

COMPONENTS :	ORTGINAL MEASUREMENTS.		
	SALSTAND HERDURATEN IS :		
(1) Chlorine, $Cl_{-}$ , $[7782-50-5]$	Muzhzhavlev, K. D: Lebedev, O. A:		
$(1)$ chiorine, $C1_2$ ; $[7782-50^{+}5]$	Tatakin, A. N; Dronayaeva, O. N.		
(2) Potassium chloride; KCl;	Sov. J. Non-Ferrous Met. 1970, <u>11</u> ,		
[7747-40-7]	49-52.		
VARIABLES: $m/r = 1072 = 1172$	PREPARED BY:		
T/K = 10/3 = 11/3	N. P. Ballsal		
P/kPa: 101.325 (1 atm.)			
EXPERIMENTAL VALUES:			
The solubility of $Cl_2$ , $C(mol \ cm^{-3})$ , in molten KCl is expressed by the equation :			
$C = \frac{1.215 \times 10^{-2}}{T} \exp \left[ \frac{-10780 - 5.28T}{RT} \right]$			
Where T is the temperature in kelv	vin, and R is the gas constant.		
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AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Desorption Method . The melt was	Liquified $(1 - (\approx 99.5))$ and argon		
saturated with Cl <sub>2</sub> by bubbling the	meeting the GOST standard 10157-62		
gas for about 1.5h at the rate of	were used.		
6 - 10 liters/h. The melt was allow-	Dried and remelted chemically-pure		
stripped of the dissolved Cl, by	salts were used.		
bubbling argon gas for about 20 mins.			
at a rate of 12 liters/h and the			
liberated gas was absorbed in a KI			
The salt was melted under a			
continuous flow of dry hydrogen ch-			
loride gas. The melt was purified	ESTIMATED ERROR:		
WITH HCL gas for 0.5h followed by Ar gas for 0.5h. It took 15 min			
(approx.) to saturate the chloride	Not specified.		
melt with HCl and 15-20 mins. to	-		
expel the dissolved HCl by bubbling	REFERENCES:		
AL Yas.			

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COMPONENTS:	EVALUATOR:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.
CRITICAL EVALUATION:	

Two experimental studies (1,2) have been reported for the solubility of chlorine in molten rubidium chloride. However, in the work of Leonova and Ukshe (1), the chlorine gas pressure at which solubility measurements have been carried out is not given. Tentative values based on the work of Andresen et al. (2) are given in Table 1.

Table	1
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Tentative Solubilities as a Function of Temperature

Т/К	$10^7 \text{ K}_H/\text{mol cm}^{-3} \text{ atm}^{-1}$
1020	18.94
1030	19.47
1040	20.02
1050	20.56
1060	21.11
1070	21.66

References:

- 1. Leonova, L. S.; Ukshe, E. A. Sov. Electrochem. 1970, 6, 871.
- Andresen, R. E.; Ostvald, T.; Oye, H. A. Proc. Intl. Symp. Molten Salts (Pemsler, J. P., et al. eds.) The Electrochem. Soc. <u>1976</u>, 111.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Chlorine: Cl.: [7782-50-5]	Andresen, R. E.: Ostvald, T.
(2)  Pubidium chlorida, Phg	Oye, H. A.
[2] Rubiaium chioride; RDCI; [7791-11-9]	(Pemsler, J. P. et al., eds.) The
	Electrochem. Soc. <u>1976</u> , 111 - 22.
VARIABLES:	PREPARED BY:
T/K = 1016 - 1070	N. P. Bansal
P/KPa: 101.325 (1 atm.)	l
EXPERIMENTAL VALUES:	
The values of Henry's law consta in molten RbCl at different tempera	nt, $K_{H}$ , for the solubility of chlorine tures are:
t/°C 10	$7 K_{\rm W}/{\rm mol} \ {\rm cm}^{-3} \ {\rm atm}^{-1}$
743	18.49 ± 0.89
771	$20.76 \pm 0.36$
	21.30 1 0.46
Smoothed Data:	
The temperature dependence of $K_{_{\mathbf{H}}}$	is given by the relation:
$\log(K_{\rm H}/{\rm mol~cm^{-3}~atm^{-1}})$	= -4.472 - 1275.7/(T/K) (compiler)
std. de	$v_{1} = 1.4\%$ (compiler)
The standard onthe law 4110 and	
dissolution of chlorine are:	standard entropy, AS', changes for the
AH°/kJ mol-	$^{1} = 23.7 + 3.5$
AS*/J K - I	$mol^{-2} = -86.3$ (at 1123 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique	
The diagram and details of the	Mathogon "High Duritur" ablering
annamatua and dinam in +1	Matheson "High Purity" chlorine (99.5%) was used directly from the
apparatus are given in the original paper. The method and	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder.
apparatus are given in the original paper. The method and procedure followed are described	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of are calculated	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified.
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Andresen, R. E.; Paniccia, F.;
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. Ath Nordig High Terrorature
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl <sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. 4th Nordic High Temperature Symposium, Vol. 1, Helsinki 1975,
apparatus are given in the original paper. The method and procedure followed are described elsewhere (1). In brief, chlorine gas is filled into a thermostated volume above the melt which is kept in a closed quartz vessel. The drop in gas pressure is measured with time. The pressure reading, at equilibrium, is used for calculation of gas solubility.	<pre>Matheson "High Purity" chlorine (99.5%) was used directly from the cylinder. Merck p.a. RbCl was used. Before use, it was melted, Cl<sub>2</sub> bubbled through the melt for about an hour and then recrystallized. Salts were handled in a glove box.</pre> ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. 4th Nordic High Temperature Symposium, Vol. 1, Helsinki 1975, 127.

COMPONENTS .		ORIGINAL MEASUREMENTS .
CONFORENTS:		VALUERAL READUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Leonova, L. S.; Ukshe, E. A.
(2) Rubidium chloride; RbCl; [7791-11-9]		Elektrokhim. <u>1970</u> , 6, 892 - 3; Sov. Electrochem. <u>1970</u> , 6, 871.
VARIABLES:	<u></u>	PREPARED BY:
T/K = 1054 - 1275 P/kPa: 101.325 (1 atm.)		N. P. Bansal
EXPERIMENTAL VALUES:		
The solubiliti temperatures are:	es, C <sub>1</sub> , of chlorine	e in molten RbCl at different
	t/°C	107 C <sub>1</sub> /mol cm <sup>-3</sup>
	781 789	24.0
	858	27.8
	940	33.3
	943 977	34.1 35.3
	1002	36.6
The heat of so	<pre>log(C<sub>1</sub>/mol cm<sup>-3</sup>) =     std. dev lution, ^H, is esti</pre>	-4.537 - 1143.2/(T/K) (compiler) 7. = 0.6% (compiler) mated to be: -1 = 21.9 (compiler)
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEI	DURE:	SOURCE AND PURITY OF MATERIALS:
Elution technic The method fol determination of has been describe	que. lowed for the gas solubilities d elsewhere (1).	Not described.
		ESTIMATED ERROR:
		Nothing specified.
		REFERENCES:
		1. Ryabukhin, Yu. M.
		Russ. J. Inorg. Chem. <u>1962</u> , 7, 565.

COMPONENTS:		EVALUATOR:		
<pre>(1) Chlorine; (2) Cesium chl</pre>	Cl <sub>2</sub> ; [7782-50-5] Loride; CsCl; }]	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.		
CRITICAL EVALUATIO	CRITICAL EVALUATION:			
Two studies (1 - 2) are available for the solubility of chlorine in molten cesium chloride. However, in the work of Ryabukhin and Bukun (1), the value of atmospheric pressure, at which the gas solubilities have been measured, is not given. Tentative values based on the work of Andresen et al. (2) are given in Table 1.				
	Tabl	le 1		
Tent	ative Solubilities as a	a Function of Temperature		
	T/K 10 <sup>7</sup> 1	$K_{H}/mol \ cm^{-3} \ atm^{-1}$		
	940 960 980 1000 1020 1040 1060 1080 1100 1120 1140	34.32 34.86 35.39 35.91 36.41 36.90 37.38 37.85 38.31 38.75 39.19		
References: 1. Ryabukhin, 2. Andresen, R Salts (Pems	Yu. M.; Bukun, N. G. Ru R. E.; Ostvald, T.; Oye, S <b>ler, J. P., et al. eds</b>	155. J. Inorg. Chem. <u>1968</u> , 13, 597. , H. A. Proc. Intl. Symp. Molten .) The Electrochem. Soc. <u>1976</u> , 111.		

COMPONENTES	OPTOTNAL MEASUREMENTS .
our onen 19 ;	ONTOTINAL READURERENID;
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Andresen, R. E.; Ostvald, T.;
(2) Cesium chloride; CsCl;	Proc. Int. Symp. Molten Salts
[7647-17-8]	(Pemsler, J. P. et al., eds.) The
	Electrochem. Soc. $\frac{1976}{7}$ , 111 - 22.
	FREFARED DI
T/K = 935 - 1138 P/PPa- 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law consta in molten CsCl at different tempera	nt, $K_{H}$ , for the solubility of chlorine tures are:
t/°C 10	$7 \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$
662 711	$35.96 \pm 1.63$ $33.21 \pm 1.60$
731	35.57 ± 0.60
865	39.57 ± 2.22
Smoothed Data:	
The temperature dependence of K <sub>H</sub>	is expressed by the relation:
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	) = -5.136 - 308.8/(T/K) (compiler)
std. de	v. = 2.2% (compiler)
The standard enthalpy, AH°, and dissolution of chlorine are:	standard entropy, $\space{2.5}$ standard entropy, $\space{2.5}$ standard entropy, $\space{2.5}$ standard entropy
$^{H^{o}/kJ \text{ mol}^{-1}} = 11.1 \pm 1.9 \text{ (compiler)}$	
^ S°/J K <sup>-1</sup>	$mol^{-1} = -93.5$ (at 1123 K)
AUXILIARY	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique.	Matheson "High Purity" chlorine
The diagram and details of the	(99.5%) was used directly from the
original paper. The method and	Merck p.a. CsCl was used. Before
procedure followed are described	use, it was melted, Cl <sub>2</sub> bubbled
gas is filled into a thermostated	and then recrystallized. Salts were
volume above the melt which is kept in a closed quartz vessel	handled in a glove box.
The drop in gas pressure is	
reading, at equilibrium, is used	FSTIMATED EDDOD+
for calculation of gas	ESTIMATED ERROR:
solubility.	Nothing specified.
	REFERENCES :
	1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proc. 4th Nordic High Temperature Symposium, Vol. 1, Helsinki <u>1975</u> , 127.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-5	0-5] Ryabukhin, Yu. M.; Bukun, N. G.
<pre>(2) Cesium chloride; CsCl; [7647-17-8]</pre>	<b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 1141 - 45. <b>Russ. J. Inorg. Chem.</b> (Eng. Transl.) <u>1968</u> , <b>13</b> , 597 - 600. (*).
VARIABLES:	PREPARED BY:
T/K = 954 - 1195 P/kPa: 101.325 (1 a	N. P. Bansal
EXPERIMENTAL VALUES: The solubilities, C1, c temperatures are:	f chlorine in molten CsCl at different
t/°C	$10^7 C_1/mol cm^{-3}$
661 672 721 721 760 760 776 849 851 851 919 922 922 922 922 922 922 922 922 92	34.8 34.6 36.6 35.3 37.9 38.2 42.1 41.1 43.6 45.9 44.8 47.6 v = 0.9% (compiler) std. dev. = 0.9\% (compiler) $\Delta H^{\circ}$ , and standard entropy, $\Delta S^{\circ}$ , of solution are: $H^{\circ}/kJ \text{ mol}^{-1} = -92.9$ (at 1123 K)
	AUXILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution technique. The details of the appa and procedure used have be described elsewhere (1). I brief, the melt was satura with chlorine. A portion o saturated melt was separat purged with argon to remov dissolved chlorine. The li chlorine was absorbed in K solution and iodine genera	Not described. ratus en n ted f the ed and e the berated I ted was
titrated with thiosulfate solution.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. 1966 11
	1296.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> </ul>	Ratvik, A. P.; Ostvald, T.; Oye, H. A. Acta Chem. Scand. <u>1985</u> , A39, 623 - 638.
VARIABLES: T/K = 975 - 1175 $P/kPa = 10^{2}$	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The validity of Henry's law was solubility at various $Cl_2$ pressures $K_p$ (mol cm <sup>-3</sup> bar <sup>-1</sup> ), is given by the	verified by measuring the . Temperature dependence of solubility, e expression :
$\log K_{p} = (-5.383 \pm 0.04)$	45) - <u>(114.2 ± 47.8)</u> T
	·
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method. The procedure used for gas solu- bility measurements was similar to the one described elsewhere (1,2). For deltails see the original publication.	The quality and purification of salts have been described earlier(3)
	FETTMATED FDDOD-
	S. D. in log(solubility) = 0.007.
	REFERENCES: 1.Waernes,O.; Ostvald,T. Acta Chem. Scand. <u>1983</u> , A37, 293. 2.Waernes,O.;Palmisano,F.; Ostvald,T Acta Chem. Scand. <u>1983</u> , A37, 207. 3.Andreson,R.E; Ostvald,T;Oye,H.A;Pro Int.Symp.Molten Salts. The Electroche Soc. Princeton, NJ 1976. 111.

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Ryabukhin, Yu. M.
(2) Magnesium chlo [7786-30-3]	ride; MgCl <sub>2</sub> ;	<b>Zh. Neorg. Khim.</b> <u>1962</u> , <b>7</b> , 1101 - 04; <b>Russ. J. Inorg. Chem.</b> (Eng. Transl.) <u>1962</u> , <b>7</b> , 565 - 67. (*)
VARIABLES:	09 075	PREPARED BY:
T/K = 1058	- 1226	N. P. Bansal
1,	1000	
EXPERIMENTAL VALUES:	<u></u>	
The solubilities temperatures, unde	s, $C_1$ , of chlorine r a pressure of 74	e in molten MgCl <sub>2</sub> at different 2 mm Hg, are:
	t/°C	$10^7 C_1/mol cm^{-3}$
_	705	5 70
	833	6.76
	925 953	7.12 8.33
_		
Smoothed Data: Temperature dep expressed by the re	endence of the sol elation:	ubility of $Cl_2$ in molten $MgCl_2$ is
104	$g(C_1/mol \ cm^{-3}) = -$	5.248 - 1043.3/(T/K) (compiler)
	std dev	r = 2.9% (compiler)
The standard en	thalpy, $\Delta H^\circ$ , and s	standard entropy, $\Delta S^\circ$ , of solution are
	$\Delta H^{\circ}/kJ$ mol	$^{-1} = 19.9 \pm 5$
	∆S°/J K <sup>-1</sup> mo	$pl^{-1} = -100.5$ (at 1123 K)
L		
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDU	RE :	SOURCE AND PURITY OF MATERIALS:
Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original publication. Briefly speaking, the melt was saturated with chlorine by bubbling the gas through it. The dissolved chlorine was freed from the saturated melt by fluching it with parameters.		Liquefied chlorine (99.5%) was used. Argon used contained 0.008% oxygen and 0.04% nitrogen. The two gases were purified by bubbling through conc. $H_2SO_4$ and passing over $P_2O_5$ . Dried and remelted "chemically pure" grade MgCl <sub>2</sub> was used.
liberated chlorine	was absorbed	ESTIMATED ERROR:
generated was titra standard thiosulfat	todine ated with a ce solution.	Nothing specified.
		REFERENCES:
		· ·

	14
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ol> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ol>	Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronayaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.
VARIABLES: T/K = 1023 - 1173 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	L
The temperature dependence of the in molten $MgCl_2$ is expressed by the	he solubility of Cl <sub>2</sub> , C(mol cm <sup>-3</sup> ), equation:
$C = \frac{1.215 \times 10_{-2}}{T} exp$	$\begin{array}{c c} -3880 + 3.43T \\ \\ RT \\ \\ RT \\ \\ RT \\ \\ RT \\ \\ \\ RT \\$
	In, and k is the gas constant.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Desorption Method : The melt was saturated with Cl <sub>2</sub> by bubbling the gas for about 1.5h'at the rate of 6 - 10 liters/h. The melt was allow- ed to stand for 5 min. The melt was stripped of the dissolved Cl <sub>2</sub> by bubbling argon gas for about 20 mins, at a rate of 12 liters/h and the liberated gas was absorbed in a KI solution. The salt was melted under a Continuous flow of dry hydrogen ch-	SOURCE AND PURITY OF MATERIALS: Liquified Cl <sub>2</sub> (~99.5%) and argor meeting the GOST standard 10157-62 were used. Dried and remelted chemically - pure salts were used.
loride gas. The melt was purified with HCl gas for 0.5h followed by Ar gas for 0.5h. It took ≈ 15 min. to saturate the chloride melt with HCl and ≈15-20 mins. to expel the dissolved HCl by bubbling Ar gas.	ESTIMATED ERROR: Not specified. REFERENCES:

COMPONENTS :		ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [77]	82-50-5]	Wartenberg, H. U.
(2) Calcium chloride; ( [10043-52-4]	CaCl <sub>2</sub> ;	Zeitsch. Fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARIABLES:		PREPARED BY:
one temperature: T/H P/kPa: 101.325 (com	<pre>&lt; = 1073 piler)</pre>	N. P. Bansal
EXPERIMENTAL VALUES:		
The solubility of c been reported as:	nlorine in mol	ten CaCl <sub>2</sub> at a single temperature has
		solubility
t/°C	weight fracti	on volume fraction
800 ± 5	2.2 x 10 <sup>-3</sup>	6.96 x 10 <sup>-3</sup>
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
The details of the a used and procedure foll gas solubility measurem described in the origin publication. Briefly, a melt sample equilibrate chlorine was analyzed f chlorine content by rea KI solution and titrati freshly standardized th solution.	apparatus Lowed for Ments are Mal Maguenched Math Math Math Math Math Math Math Math	Calcium chloride used was pure and was dehydrated by heating with NH₄Cl and NH₄Br.
		ESTIMATED ERROR:
		Nothing specified.
		REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Van Norman, J. D.; Tivers, R. J.	
<pre>/ (2) Lead chloride; PbCl<sub>2</sub>; [7758-95-4]</pre>	Molten Salts: Characterization and Analysis (Mamantov, G., ed.), Marcel Dekker, New York, <u>1969</u> , 509 - 27.	
VARIABLES:	PREPARED BY:	
T/K = 786 - 912	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The solubilities of chlorine in temperatures, at one atmosphere pre	molten lead chloride at different ssure, are:	
t/°C 10 <sup>7</sup> C <sub>1</sub> /mol cm	-3 10 <sup>6</sup> X <sub>1</sub> /mol fraction	
513 0.52	2.95	
535 0.64	3.62	
585 0.78	4.45	
639 1.10	6.47	
$log(C_1/mol \ cm^{-3}) = -5.03 - 1765.6/(T/K)  (compiler)$ std. dev. = 1.8% (compiler) The standard heat of solution, AH°, for the dissolution of Cl <sub>2</sub> is: . AH°/kJ mol <sup>-1</sup> = 39.3		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE: Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original publication. In brief, the melt was saturated with chlorine by bubbling the gas through it. After saturation, the melt was sparged with argon to liberate the dissolved chlorine. The freed chlorine was absorbed in an aqueous KI solution and the iodine produced was titrated with a standard thiosulfate solution.	SOURCE AND PURITY OF MATERIALS: Reagent grade lead chloride was treated by passing HCl gas through the powder and temperature was slowly raised from room temperature to about 50°C above the melting point. Last traces of moisture were removed by bubbling HCl through the melt for about 2 hrs. The dissolved HCl gas was removed by argon flus- hing. Finally the melt was filtered through a quartz frit. ESTIMATED ERROR: Nothing specified. REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Van Norman, J. D.; Tivers, R. J.
<pre>(2) Silver chloride; AgCl; [7783-90-6]</pre>	Molten Salts: Characterization and Analysis (Mamantov, G., ed.) Marcel Dekker, New York <u>1969</u> , 509 - 27.
VARIABLES:	PREPARED BY:
one temperature: T/K = 791 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of chlorine in mo is:	lten AgCl at one atmosphere pressure
t/°C solubility/mol cm <sup>-:</sup>	solubility/mol fraction
518 2.31 x 10 <sup>-7</sup>	6.95 x 10 <sup>-6</sup>
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. In brief, chlorine was bubbled through the melt till it was saturated with the gas. After saturation, the melt was flushed with argon to liberate the chlorine in solution. The freed chlorine was absorbed in aqueous KI solution and the iodine produced was titrated against a standard thiosulfate solution.	Reagent grade AgCl was treated by passing HCl gas through the salt powder and temperature was slowly raised from room temperature to about 50°C above the melting point. Last traces of moisture were removed by bubbling HCl through the melt for about 2 hrs. The dissolved HCl gas was removed by argon flushing. Finally the melt was filtered through a quartz frit. ESTIMATED ERROR: solubility: ± 10% (compiler)
	REFERENCES :

COMPONENTS:	EVALUATOR:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	N. P. Bansal National Aeronautics and Space
<pre>(2) Lithium chloride; LiCl;</pre>	Administration
[7447-41-8]	Lewis Research Center
<pre>(3) Potassium chloride; KCl;</pre>	Cleveland, Ohio, 44135, U.S.A.
[7447-40-7]	December, 1989.

## CRITICAL EVALUATION:

Four experimental studies are available for the solubility of chlorine in the molten eutectic LiCl - KCl. The results of Greenberg and Sundheim (1), and Olander and Camahort (2) are only of preliminary nature and are not worth consideration here any further. Smoothed data at different temperatures from the other two investigations are presented below for comparison:

	$10^7 K_{H}/mol cm^{-3} atm^{-1}$	
т/к	Nakajima et al. (3)	Van Norman & Tivers (4)
680	(1.24)	1.30
700	(1.36)	1.40
720	(1.48)	1.49
740	1.61	1.59
760	1.74	1.70
780	1.87	1.80
800	2.01	1.90
820	2.15	2.00
840	2.29	(2.11)
850	2.36	(2.16)

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

The results of Nakajima et al. (3), and of Van Norman and Tivers (4) are in very good agreement within experimental precision. The recommended solubility values for this gas - molten salt system, taken as the mean of these two data sets are presented in Table 1 and also in Fig. 1.

References:

1. Greenberg, J.; Sundheim, B. R. J. Chem. Phys. <u>1958</u>, 29, 1029.

- 2. Olander, D. R.; Camahort, J. L. A.I.Ch.E. Jour. <u>1966</u>, **12**, 693.
- Nakajima, T.; Imato, H.; Nakanishi, K.; Watanabe, N. Denki Kagaku 1974, 42, 85.
- Van Norman, J. D.; Tivers, R. J. in "Molten Salts: Characterization and Analysis (Mamantov, G., ed.)" Marcel Dekker, New York, <u>1969</u>, 509.





COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5] (2) Lithium chloride; LiCl; [7447-41-8]</pre>	Nakajima, T.; Imoto, H.; Nakanishi, K.; Watanabe, N.	
(3) Potassium chloride; KCl; [7447-40-7]	<b>Denki Kagaku <u>1974</u>, 42,</b> 85 - 88.	
VARIABLES:	PREPARED BY:	
T/K = 723 - 848 melt comp./mol% LiCl = 50 - 78 P/kPa: 101.325 (1 atm.)	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubilities of chlorine in m different compositions are:	olten mixtures of LiCl - KCl of	
melt comp./mol% LiCl	t/°C 107 C <sub>1</sub> /mol ml <sup>-1</sup>	
50	575 2.80 ± 0.10	
59	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
	575 2.32 ± 0.18	
69 78	575 1.65 $\pm$ 0.19 575 1.10 $\pm$ 0.11	
Temperature dependence of solubility in the molten eutectic LiCl - KCl (59 - 41 mol%) can be expressed by the relation: $log(C_1/mol ml^{-1}) = -5.504 - 954.7/(T/K)$ (compiler) std. dev. = 0.9% (compiler) The heat of solution, $\wedge$ H, in the molten LiCl - KCl eutectic is: $\wedge$ H/kJ mol <sup>-1</sup> = 18.0		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. The diagram and details of the apparatus and the procedure are given in the original paper. Chlorine gas is passed through the melt till saturation is reached. A portion of the saturated melt is separated and flushed with argon to free the dissolved chlorine which is allowed to react with KI and the	Lithium and potassium chlorides were of reagent grade. The Cl <sub>2</sub> gas had a purity better than 98%. LiCl - KCl melt was prepared by dehydrating under an atmosphere of HCl using the method of Laitinen et al. (1).	
a standard sodium thiosulfate	ESTIMATED ERROR:	
solution.	Nothing specified.	
	REFERENCES:	
	<ol> <li>Laitinen, H. A.; Ferguson, W. S.; Osteryoung, R. A.</li> </ol>	
	J. Electrochem. Soc. <u>1957</u> , 104, 516.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
ANTE OVERTON	
(1) Chlorine; $Cl_2$ ; [7782-50-5] (2) Lithium chloride: LiCl:	Van Norman, J. D.; Tivers, R. J.
[7447-41-8]	Molten Salts: Characterization and
<pre>(3) Potassium chloride; KCl; [7447-40-7]</pre>	Analysis (Mamantov, G., ed.), Marcel Dekker, New York 1969, 509 - 27
,]	,, .01x <u>1909</u> , 909 - 21.
VARIABLES :	PREPARED BY:
m/w _ coo	
T/K = 623 - 823 P/kPa: 101.325 (1 a+m )	N. P. Bansal
EXPEDIMENTAL VALUES.	
The solubilities of chlorine in t different temperatures, at one atmos	ne molten LiCl - KCl eutectic at phere pressure, are:
t/°C 107 C <sub>1</sub> /mol cm <sup>-3</sup>	10 <sup>6</sup> x <sub>1</sub> /mol fraction
400 1.26	4.19
450 1.54	5.21
500 1.70 550 2.05	5.83 7.14
Smoothed Data:	
The temperature dependence of sol	ubility is given by the relation.
$\log(C_1/\text{mol } \text{cm}^{-3}) = -$	-5./84 - 749.9/(T/K) (Compiler)
std. dev	7. = 1.3% (compiler)
The standard heat of solution, AH	I°, for the dissolution of $Cl_2$ is: .
A UO /1-T	$1^{-1} = 15.5$
4 H - / KU MC	
AUXILIARY	INFURMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique.	The molten LiCl - KCl eutectic
The diagram and details of the	was prepared following the method of
followed for gas solubility	Lattinen et al. (1).
measurements are described in the	
melt was saturated with chlorine	
by bubbling the gas through it.	
purged with argon to free the	
dissolved chlorine. The liberated	
aqueous KI solution and the	ESTIMATED ERROR:
iodine generated was titrated	solubiliture 100 (comilient)
solution.	Complete (complet)
1	REFERENCES :
1	
	1. Laitinen, H. A.; Ferguson, W. S.; Osteryoung, R. A.
	J. Electrochem. Soc. <u>1957</u> , 104, 516.

CONDONITRING +	OPTOTNAL WEASUDENENTS .
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Olander, D. R.; Camahort, J. L.
(2) Lithium chloride; LiCl; [7447-41-8]	A.I.Ch.E. Jour. 1966, 12, 693 - 99.
(3) Potassium chloride; KCl;	<u></u>
[7447-40-7]	
VARIABLES:	PREPARED BY:
T/K = 673 & 773	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The solubility of chlorine in mo was measured at 400 and 500°C at one was found to be less than 4 x 10 <sup>-9</sup> o of the technique employed.	lten eutectic LiCl - KCl (59 - 41 mol%) ≥ atmosphere pressure of the gas. It j-mol cm <sup>-3</sup> , the limit of detectability
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution or stripping method. The method used for solubility measurements was essentially the same as described by Blander et al. (1). Chlorine was bubbled through the melt for 1 - 4 hours. A known amount of the saturated melt was transferred into the stripping section and flushed with argon to remove the dissolved chlorine. The freed chlorine was absorbed in sodium hydroxide solution and analyzed.	Not described. ESTIMATED ERROR: REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Chlorine: $Cl_{2}$ ; [7782-50-5]	Greenberg, J.; Sundheim, B. R.
(2) Lithium chloride; LiCl;	
[ [7447-41-8] (3) Potassium chloride: KCl:	J. Chem. Phys. <u>1958</u> , <b>29</b> , 1029 - 32.
[7447-40-7]	
VARIABLES:	PREPARED BY:
	N. D. Dengel
one temperature: $T/K = 6/3$	N. P. Bansai
	L
EXPERIMENTAL VALUES:	
Solubility of chlorine in molten pressure of slightly less than one a	LiCl - KCl eutectic at the gas atmosphere is reported as:
t/°C 10	<sup>3</sup> Solubility/molar
	0.1 - 1
400	0.1 - T
AUXILIARY	INFORMATION
METHOD ADDADATIIS ADDOCEDIDE .	CONDCE AND DUDITY OF MATERIALC.
12 Inod/AFFARATUS/FROCEDORE:	SOURCE AND PURITY OF MATERIALS:
High temperature spectroscopy. The technique for obtaining absorption spectra of molten	Analytical grade LiCl - KCl were used without further purification except for careful drying.
salt solutions has been described	
elsewhere (1).	
	1
4	
l	
	ESTIMATED ERROR:
	Nothing specified.
	PEEPENCUC.
	I NET ERENCED ;
]	1. Sundheim, B. R.; Greenberg, J.
	Dott Sal That's 1056 37 703
1	Rev. SGI. INBUL. 1930, 21, 103.
	•

COMPONENTS:EVALUATOR:(1) Chlorine; Cl2; [7782-50-5]N. P. Bansal<br/>National Aeronautics and Space<br/>Administration<br/>Lewis Research Center<br/>Cleveland, Ohio, 44135, U.S.A.<br/>December, 1989.

## CRITICAL EVALUATION:

Three experimental studies (1 - 3) are available for the solubility of chlorine in molten equimolar NaCl - KCl. All these investigations are from the same group of workers. According to Ryabukhin the results reported in ref. (2) are better than those reported in his earlier work (1) because of some errors associated with the experimental procedure. However, in ref. (2) the value of the pressure, at which the gas solubilities have been measured, is not given. Also, the results are reported only in graphical form and the graph given is so small that accurate values of gas solubilities cannot be read at different temperatures. The reults of Leonova et al. (3) who have reported gas solubilities for four different melt compositions at different temperatures, may be treated as highly tentative, at least until additional studies become available for comparison. Smoothed data at different temperatures and melt compositions, based on (3), are given in Table 1.

		107 K <sub>H</sub> /mol	cm <sup>-3</sup> atm <sup>-1</sup>	
		Melt Composit	ion/mol% NaCl	
т/к	12.5	25.0	50.0	75.0
1020	_	(7.44)	6.15	
1050	-	8.25	6.82	4.01
1080	12.29	9.09	7.51	4.52
1110	13.34	9.97	8.24	5.06
1140	14.42	10.87	8.99	5.64
1170	15.53	11.81	9.77	6.25
1200	16.66	12.77	10.57	6.89
1230	17.82	13.76	11.39	7.56
1260	18.99	14.77	12.23	8.25
1290	20.18	15.81	13.10	8.98
1320	21.38	(16.87)	(13.97)	(9.73

Table 1 Solubilities as a Function of Temperature and Composition

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

References:

- 1. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. 1962, 7, 565.
- 2. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. 1966, 11, 1296.
- Leonova, L. S.; Ryabukhin, Yu. M.; Ukshe, E. A. Sov. Electrochem. <u>1969</u>, 5, 424.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Leonova; L. S.; Ryabukhin, Yu. M.; Ukshe, E. A. Elektrochem. <u>1969</u> , 5, 464 - 6; Sov. Electrochem. (Eng. Transl.) <u>1969</u> , 5, 424 - 425. (*).
VARIABLES:	PREPARED BY:
T/K = 1011 - 1320 melt comp./mol% NaCl = 12.5 - 75 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	≜
The solubilities of chlorine in r 50, 75 mol% NaCl), at different temp are:	molten NaCl - KCl mixtures (12.5, 25, peratures, at one atmosphere pressure,
Melt composition/mol% NaCl	t/°C 107 C <sub>1</sub> /mol cm <sup>-3</sup>
12.5	81012.481412.588514.896018.2596218.55104120.8104721.2
25.0	7557.757988.178009.6987810.8695613.6095913.70103316.80
	continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The technique employed for solubility measurements was the same as described earlier (1). The melt was saturated with chlorine by bubbling the gas at a gas pressure of 1 atm. A part of the saturated melt was transferred into the stripping section and the dissolved chlorine was displaced by flushing with argon. The liberated chlorine was	Not reported.
absorbed in KI solution. The iodine generated was titrated against a standard thiosulfate solution.	Nothing specified.
	REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. <u>1966</u> , 11, 1296.

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Leonova, L. S.; Rya Ukshe, E. A. Elektrokhim. <u>1969</u> , Sov. Electrochem. <u>1969</u> , 5, 424 - 25.	abukhin, Yu. M.; 5, 464 -6; (Eng. Transl.) (*).
VARIABLES:	PREPARED BY:	
	N. P. I	Bansal
EXPERIMENTAL VALUES:		
continued		
Melt composition/mol% NaCl	t/°C 10	) <sup>7</sup> C <sub>1</sub> /mol cm <sup>-3</sup>
50.0	738 793 843 855 948 952 1014 1020	6.10 7.28 8.30 8.37 11.22 10.80 13.30 13.56
75.0	780 853 855 935 938 1008 1014	4.20 5.12 5.50 6.95 6.99 8.82 9.23
		continued
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MA	TERIALS :
	ESTIMATED ERROR:	
	REFERENCES :	

•

COMPONENTS:	1	ORIGINAL M	EASUREMENTS:	
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>		Leonova, L. S.; Ryabukhin, Yu. M.; Ukshe, E. A. Elektrokhim. <u>1969</u> , 5, 464 - 6; Sov. Electrochem. (Eng. Transl.) <u>1969</u> , 5, 424 - 25. (*).		
VARIABLES:		PREPARED E	SY:	
			N. P. Bans	sal
EXPERIMENTAL VALUES:			······································	
continued				
Smoothed Data: Temperature dependence of sol relation: log(C <sub>1</sub> /mol Values of the coefficients a and solution, ΔH, in the four moltes are:	lubil l cm <sup>-</sup> d b, n mix	ity in t <sup>3</sup> ) = a + together tures (e	he ranges studi b/(T/K) with the entha valuated by the	ed obeyed the alpies of e compiler)
Melt composition/ mol% NaCl a		b	∆H/ kJ mol <sup>-1</sup>	std. dev.
$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	5 4 1 2	-1430.5 -1595.8 -1601.8 -1979.1	27.4 30.6 30.7 37.9	0.8% 2.4% 1.3% 1.5%
AUXII METHOD/APPARATUS/PROCEDURE:	LIARY	INFORMATIO SOURCE AND	N D PURITY OF MATERI	ALS:
		ESTIMATED	ERROR:	
	i	REFERENCE	S:	

CONDONENTE			
COMPONENTS:		UNIGENAL MEADUKEMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Ryabukhin, Yu. M.	
(2) Sodium chlori	de; NaCl;	Ph Name White 1062 7 1101 04	
(3) Potassium chl	oride; KCl;	<b>Russ. J. Inorg. Chem.</b> (Eng. Transl.)	
[7447-40-7]		<u>1962</u> , <b>7</b> , 565 - 67. (*).	
VARIABLES: P/kPa	= 98.925	PREPARED BY:	
T/K = 102	3 - 1301	N. P. Bansal	
EXPERIMENTAL VALUES:			
The solubiliti	es, C1, of chlorine	in molten NaCl - KCl (50 - 50 mol%)	
at different temp	eratures, under a p	pressure of 742 mm Hg, are:	
	t/°C	$10^7 C_1/mol cm^{-3}$	
	800	3.65 4.59	
	825	5.85	
	850	7.00	
	900	8.72	
	900	8.23	
	968 970	12.43	
	1028	14.10	
Smoothed Data: Temperature dependence of the solubility of $Cl_2$ in molten NaCl - 1 (50 - 50 mol%) is given by the expression: $log(C_1/mol cm^{-3}) = -3.536 - 2971.7/(T/K)$ (compiler) std. dev. = 2.3% (compiler) The heat of solution, $\Delta H$ , is estimated to be: $\Delta H/kJ mol^{-1} = 56.9$ (compiler)			
	AUXILIARY	INFORMATION	
METHOD APPARATUS APPOCED	11DF •		
MEIROD/AFFARAIOS/FROCED	IURE :	SOURCE AND PURITY OF MATERIALS:	
Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original publication. In brief, the melt was saturated with chlorine by bubbling the gas through it. The chlorine dissolved was freed from the saturated melt by sparging it with argon. The		Liquified chlorine (99.5%) was used. Argon contained 0.008% oxygen and 0.04% nitrogen. Chlorine and argon were purified by bubbling through conc. $H_2SO_4$ and passing over $P_2O_5$ . Dried and remelted "chemically pure" grade NaCl and KCl were used.	
liberated chloring	e was absorbed	ESTIMATED ERROR:	
generated was tits standard thiosulf	rated with a ate solution.	Nothing specified.	
		DEFEDENCIC.	
		KEFEKENCES:	

	157
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Ryabukhin, Yu. M. <b>Zh. Neorg. Khim.</b> <u>1966</u> , <b>11</b> , 2415 - 16. <b>Russ. J. Inorg. Chem.</b> (Engl. Transl.) <u>1966</u> , <b>11</b> , 1296 - 97. (*).
VARIABLES:	PREPARED BY:
T/K = 1003 - 1273 P/kPa = 101.325 (1 atm)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of chlorine in t mol%) at different temperatures are graph given is too small to justify with reasonable accuracy, at differe	che molten mixture NaCl - KCl (50 - 50 presented in graphical form. The the interpolation of gas solubilities, ent temperatures.
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original paper. Briefly, the melt was saturated with chlorine by bubbling the gas through it at a gas pressure of 1 atm. A portion of the saturated melt was transferred into the stripping section. From this melt the dissolved chlorine was freed by purging it with argon. The	Chlorine was prepared by electrolysis of fused lead chloride. Argon contained 0.01% nitrogen, 0.003% oxygen, 0.004% water. Argon was purified by passing through columns of Anhydrone and phosphorus pentoxide. NaCl and KCl were of "chemically pure" grade.
liberated chlorine was absorbed in KI solution, and iodine	Nothing specified.
generated was titrated with thiosulfate solution.	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronayaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.
VARIABLES:	PREPARED BY:
T/K = 1024 - 1175	N. P. Bansal
P/kPa: 101.325 (1 atm	.)
The solubilities of Cl <sub>2</sub> in various temperatures are:	n 55.6 NaCl - 44.4 KCl(wt%) melt at
t/°C	10 <sup>7</sup> C/mol cm <sup>-3</sup>
751	1 430
803	1.973
855	2.900
502	4.930
AUX	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
<u>Desorption Method</u> : The melt was saturated with $Cl_2$ by bubbling t gas for about 1.5h at the rate of 6 - 10 liters/h. The melt was al ed to stand for 5 min. The melt stripped of the dissolved $Cl_2$ by bubbling argon gas for about 20 at a rate of 12 liters/h and the liberated gas was absorbed in a	Liquified Cl₂ (≈99.5%) and argon meeting the GOST standard 10157-62 of were used. Llow- Dried and remelted chemically - was pure salts were used. Min. KI
The salt was melted under a continuous flow of dry hydrogen loride gas. The melt was purifie	ch- cd ESTIMATED ERROR:
with HCI gas for 0.5h followed b Ar gas for 0.5h. It took $\approx$ 15 mi to saturate the chloride melt wi HCl and $\approx$ 15-20 mins. to expel th	n. th Not specified. e
aissoived HCI by bubling Ar gas.	REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]	Waernes, O.; Palmisano, F.; Ostvald, T.;
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Acta Chem. Scand. <u>1983</u> , A37, 207-217.
(3) Cesium chloride; CsCl; [7647-17-8]	
VARIABLES:	PREPARED BY:
T/K = 1119 - 1210 Melt comp./ mol% NaCl = 35 P/kPa = 119.990 - 133.322	N. P. Bansal
EXPERIMENTAL VALUES:	
Values of Henry's law constant, various temperatures are given below	$K_{H}$ , for the solubility of $Cl_2$ at
Melt comp/mol% NaCl T/°C	$10^7 K_{\rm H}/mol  {\rm cm^{-3} atm^{-1}}$
35 554 652 701	18.5 ± 0.7 19.8 ± 0.2 21.0 ± 0.3
Temperature dependence of K <sub>H</sub> ca	an be expressed as:
$\log K_{\rm H} = -5.384 - 290$	0.4/T
Standard enthalpy for the disso the equation : $\Delta H^\circ = - R dln K_H/d(1/)$ and was found to be (5.6 ± 1.3)kJ r	>lution of Cl <sub>2</sub> was evaluated from T) nol <sup>-1</sup> .
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Manometric method. The method used for gas solu- bility measurements was essentially the same as earlier described(1). For details see the original paper.	SOURCE AND PURITY OF MATERIALS: NaCl was dried under Vacuum at 400°C for 2h. The salt was recrystallized from the melt under N <sub>2</sub> atmosphere. Only clear crystals were used. CSCl ("suprapur") was dehydrated with HCl HCl upto 400°C for 10h and melted un- der Cl <sub>2</sub> . It was cooled to 50°C below the melting point and evacuated. Satur ration with Cl <sub>2</sub> and evacuation were repeated three times and the salt rec- rystallized from the melt. HCl gas(>9 .8%) and Ar(>99.9%) were used without further purification. ESTIMATED ERROR: Not specified. REFERENCES: 1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. Proc. Fourth Nordic High Temp. Symp NORTEMPS - 75, <u>1975</u> , 1, 127

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COMPONENTS:		ORIGINAL MEASUREMENTS:
<pre>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5] (2) Sodium chloride; NaCl; [7647-14-5]</pre>		Ryabukhin, Yu. M. <b>Zh. Neorg. Khim.</b> 1962. <b>7</b> . 1101 - 04:
<pre>(3) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</pre>		Russ. J. Inorg. Chem. (Eng. Transl.) 1962, 7, 565 - 67. (*).
VARIABLES: P/kPa =	98.925	PREPARED BY:
т/к = 842	- 1295	N. P. Bansal
EXPERIMENTAL VALUES:		
The solubiliti at different temp	es, $C_1$ , of chloring eratures, under a p	e in molten NaCl - MgCl <sub>2</sub> (50 - 50 mol% pressure of 742 mm Hg, are:
	t/°C	107 C1/mol cm-3
	569	0.48
	659 731	1.31 1.77
	820	2.12
	1022	5.82
Smoothed Data: Temperature de (50 - 50 mol%) is 1 The heat of so	pendence of the sole expressed by the response of $(C_1/mol \ cm^{-3}) = -$ std. dev lution, $\Delta H$ , is est $\Delta H/kJ$ mo	Lubility of $Cl_2$ in molten NaCl - MgCl <sub>2</sub> relation: -4.426 - 2381.7/(T/K) (compiler) x. = 7.6% (compiler) imated to be: $l^{-1} = 45.6$ (compiler)
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCED	URE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are described in the original paper. Briefly, the melt was saturated with chlorine by bubbling the gas through it. The dissolved chlorine was freed the saturated melt by sparging it with argon. The liberated chlorine was absorbed in KI solution and iodine generated was titrated with		Liquified chlorine (99.5%) was used. Argon contained 0.008% oxygen and 0.04% nitrogen. The two gases were purified by bubbling through conc. $H_2SO_4$ and passing over $P_2O_5$ . Dried and remelted "chemically pure" grade NaCl and MgCl <sub>2</sub> were used.
		ESTIMATED ERROR:
a standard thiosulfate solution.	Nothing specified.	
		REFERENCES:
1		,

COMPONENTS:	1	EVALUATOR:	
<ol> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> <li>(3) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ol>		N. P. Bansal National Aeronautics and Space Administration	
		Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.	
CRITICAL EVALUATION:			
Two studies (1,2) molten equimolar KCl Smoothed data from th below for comparison.	are available fo - MgCl2 using th ese studies at d	r the solubility of chlorine in e same (elution) technique. ifferent temperatures are presented	
	107 K	M/mol cm <sup>-3</sup> atm <sup>-1</sup>	
T/K Ryabu	khin (1)	Lukmanova & Vil'nyanskii (2)ª	
800 850	1.90 2.42	2.69 3.03	
900	3.01	3.35	
1000	4.34	3.98	
1050	5.08	4.27	
1150	6.67	4.80	
1200	7.52	(5.04)	
1300	9.29	(5.47)	
<ul> <li>Calculated by the evaluator using density data from G. J. Janz et al., J. Phys. Chem. Ref. Data 1975, 4, 871.</li> <li>Values in () outside temperature interval of experimental measurements; extrapolated by the evaluator.</li> <li>The two sets of data are not in agreement with each other. Values of Lukmanova et al. (2) are higher in the lower temperature range but lower at higher temperatures as compared to the results of Ryabukhin</li> </ul>			
Further work is needed before recommended values can be advanced for this system.			
References:			
-• Ryabukhin, Yu. M.	Russ. J. INOIG.	Chem. <u>1902</u> , 7, 303.	
2. Lukmanova, T. L.; Vil'nyanskii, Ya. E. Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Tekhnol. <u>1966</u> , 9, 537.			

Ryabukhin, Yu. M. <b>Zh. Neorg. Khim.</b> <u>1962</u> , <b>7</b> , 1101 - 04; <b>Russ. J. Inorg. Chem.</b> (Eng.Transl.) 1962, <b>7</b> , 565 - 67. (*).	
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PREPARED BY:	
N. P. Bansal	
L	
The solubilities, $C_1$ , of chlorine in molten KCl - MgCl <sub>2</sub> (50 - 50 mol%) at different temperatures, under a pressure of 742 mm Hg, are:	
107 K <sub>H</sub> ª/mol cm <sup>-3</sup> atm <sup>-1</sup>	
2.23 2.48 2.68 3.14 3.99 4.32 5.98 7.11 5.76 7.30 8.26 10.45 8.91 ming validity of Henry's law. continued	
AUXILIARY INFORMATION	
SOURCE AND PURITY OF MATERIALS:	
Liquefied chlorine (99.5%) was used. Argon contained 0.008% oxygen and 0.04% nitrogen. The two gases were purified by bubbling through conc. H <sub>2</sub> SO <sub>4</sub> and passing over P <sub>2</sub> O <sub>5</sub> . Dried and remelted "chemically pure" grade KCl and MgCl <sub>2</sub> were used. ESTIMATED ERROR: Nothing specified.	
CONDONENTE	OPTOTNAL WEACHINEWENTS.
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COMPONENTS:	URIGINAL MEASUREMENIS:
<pre>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5] (2) Potassium chloride; KCl;</pre>	Ryabukhin, Yu. M.
[7447-40-7] (3) Magnesium chloride; MgCl <sub>2</sub> ; [7786-30-3]	Zh. Neorg. Khim. <u>1962</u> , 7, 1101 - 04; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1962</u> , 7, 565 - 67. (*)
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
Temperature dependence of the so KCl - MgCl <sub>2</sub> is expressed by the equ	lubility of Cl₂ in molten equimolar ation:
$\log(C_1/mol\ cm^{-3}) =$	-4.940 - 1432.9/(T/K) (compiler)
std. de	v. = 4.5% (compiler)
The enthalpy of solution, $\Delta H$ , is	s estimated to be:
∆H/kJ mc	$pl^{-1} = 27.4$ (compiler)
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
	-
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS :		ORIGINAL MEASUREMENTS:	
(1) Chlorine; (2) Potassium [7447-40-	Cl <sub>2</sub> ; [7782-50-5] chloride; KCl; 7]	Lukmanova, T. L.; V Ya. E.	il'nyanskii,
(3) Magnesium [7786-30-	Chioride; MgCl <sub>2</sub> ; 3]	Khim. Tekhnol. <u>1966</u>	2 <b>aved., Knim. 1</b> , 9, 537 - 540.
VARIABLES:	773 - 1173	PREPARED BY:	
P/kPa =	36.447 - 102.338	N. P. B	ansal
EXPERIMENTAL VALUE	S:		
The solubi temperatures	lities of $Cl_2$ in molt as a function of $Cl_2$	en equimolar KCl - MgC partial pressure are r	l <sub>2</sub> at different eported as:
	-	Solubility o	f Cl <sub>2</sub>
t/°C	P <sub>cl2</sub> /atm 1	$.0^{\circ} x_{1}$ /mol fraction	10⁵ Cı/wt%
500	0.42	5.3	45
	0.65	8.1	68
	1.01	12.2	102
650	0.39	7.1	60
	0.61 0.80	11.7	98 125
	1.00	18.2	150
750	0.36	10.7	93
	0.63 0.75	15.6 18.4	129 154
	1.01	22.3	190
			continued
	AUXILIA	ARY INFORMATION	
METHOD/APPARATUS/P	ROCEDURE:	SOURCE AND PURITY OF MA	TERIALS:
Elution or stripping method. The apparatus and the method used for gas solubility measurements have been described earlier (1). Dry Cl <sub>2</sub> gas was passed through about 150 g of the melt at a rate of 10 l/hr. After saturation, a portion of the melt was transferred into the desorber and flushed with nitrogen. The chlorine gas liberated was		The method of p anhydrous melt from been described earl	reparation of the carnellite has ier (1).
decermined 100	cometrically.	ESTIMATED ERROR:	
		Nothing spe	ecified.
		REFERENCES:	
		1. Lukmanova, T. L.; Ya. E.	Vil'nyanskii,
		Izv. Vyssh. Uchek i Khim. Tekhnol.	<b>5. Zaved., Khim.</b> <u>1964</u> , <b>7</b> , 510.

CONTRAITE			OPTOTNAL WEACHDEVENTS.	
CORFORENTS;			ONTOTINAL MEADUREMENID:	
<pre>(1) Chlorine (2) Potassiu [7447=40</pre>	; Cl <sub>2</sub> ; [7782-50-5] m chloride; KCl;		Lukmanova, T. L.; V Ya. E.	il'nyanskii,
(3) Magnesiu [7786-30	m chloride; MgCl <sub>2</sub> ; -3]		Izv. Vyssh. Ucheb. Khim. Tekhnol. <u>1966</u>	Zaved., Khim. i , 9, 537 - 540.
VARTARI EC.			DDDDADDD DV.	
T/K P/kPa =	= 773 - 1173 36.447 - 102.338		N. P. B	ansal
EXPERIMENTAL VALU	ES:			<u>, , , , , , , , , , , , , , , , , , , </u>
continued				
			Solubility o	f Cl <sub>2</sub>
t/°C	P <sub>c12</sub> /atm	10	<sup>5</sup> x₁/mol fraction	10 <sup>5</sup> C <sub>1</sub> /wt%
850	0.38 0.61 0.79		15.4 18.6 22.0	127 155 183
900	0.39 0.62		16.4 20.7	137 177
	1.00		27.1	203
	AUXI		INFORMATION	
METHOD /APPARATUS /	PPOCEDUPE .		SOURCE AND PUBLITY OF MAT	EDIALC.
	, ,			JATAD,
			ESTIMATED ERROR: REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ol> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> <li>(3) Cadmium chloride; CdCl<sub>2</sub>; [10108-64-2]</li> </ol>	Nakajima, T.; Imoto, H.; Nakanishi, K.; Watanabe, N. Denki Kagaku <u>1974</u> , <b>42</b> , 85 - 88.	
[10100 01 1]		
VARIABLES:	PREPARED BY:	
T/K = 753 - 848 melt comp./mol% KCl = 33 - 63 P/kPa = 101.325 (1 atm)	N. P. Bansal	
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·	
The solubilities of chlorine in m different compositions are:	nolten mixtures of KCl - CdCl2 of	
melt comp./mol% KCl	t/°C 107 C <sub>1</sub> /mol ml <sup>-1</sup>	
33 50 63	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
Smoothed Data: Temperature dependence of solubility in the molten mixture KCl - CdCl <sub>2</sub> (63 - 37 mol%) can be expressed by the relation: $log(C_1/mol cm^{-3}) = -5.843 - 336.4/(T/K)$ (compiler) std. dev. = 1.0% (compiler) The heat of solution, $\Delta H$ , in the melt KCl - CdCl <sub>2</sub> (63 - 37 mol%) is: $\Delta H/kJ mol^{-1} = 6.28$		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. The diagram and details of the apparatus and the procedure are given in the original publication. Chlorine gas is passed through the melt till saturated. A portion of the saturated melt is separated and flushed with argon. The chlorine gas liberated is reacted with KI and the iodine generated is titrated against a	Potassium and cadmium chlorides were of reagent grade. The chlorine gas had a purity better than 98%. The KCl - CdCl <sub>2</sub> mixture was gradually heated under vacuum. Argon gas was blown in near the melting point. Dehydration was achieved by using Cl <sub>2</sub> and HCl.	
standard sodium thiosulfate	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES :	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Chlorine, $C_{1-1}$ (7782-50-51	Kowalski M., Harrington G. W.
(2) Potassium chloride; KCl;	Kowaiski, M., Mallington, G. W.
[7447-40-7]	Inorg. Nucl. Chem. Lett. <u>1967</u> , 3,
(3) Lead chloride; PbCl <sub>2</sub> ; [7758-95-4]	121 - 24.
VARTARI FS.	DEDADED DV.
T/K = 716 - 975	FREFARED BI:
melt comp./ $N_{\text{KCl}} = 0.23 - 0.70$	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The solubilities of chlorine in t	the molten mixtures of KCl - PbCl, of
different compositions at various to	emperatures are:
melt composition/N <sub>KC1</sub> t,	/°C 10 <sup>6</sup> C <sub>1</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
	······································
0.23	454 1.41
	3.44
	535 5.40
0.48	1.84
	574 1.70
	592 I.59
0.60	513 1.90
	581 1.58
	1.32
0.70	588 1.77
	702 1.40 .
	continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method.	Not described.
A known volume of the melt at the desired temperature was sature	
ated with chlorine by bubbling the	
gas through the melt. The disso	
flushing the saturated melt with	
nitrogen. The freed chlorine is	
absorbed in aqueous KI solution	
determined by titration against a	
standard thiosulfate solution.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
1	]
1	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> <li>(3) Lead chloride; PbCl<sub>2</sub>; [7758-95-4]</li> </ul>	Kowalski, M.; Harrington, G. W. Inorg. Nucl. Chem. Lett. <u>1967</u> , 3, 121 - 24.
VARIABLES :	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
The temperature dependence of s of the type: $\log(C_1/mol \ cm^{-3})$	colubility is expressed by an equation $atm^{-1}$ ) = a + b/(T/K)
The values of the coefficients a a solution, AH, for the dissolution of different compositions are:	nd b, alongwith the heats of of Cl <sub>2</sub> in molten KCl - PbCl <sub>2</sub> mixtures
Melt composition/ N <sub>KCl</sub> a*	$h^{A}H^{a}/$ std. b* kJ mol <sup>-1</sup> dev.*
0.23 -2.92 0.48 -5.97 0.60 -6.66 0.70 -6.63	9 $2125.4$ $33.2$ $0.26\%$ 8 $174.7$ $-4.16$ $0.3\%$ 7 $742.5$ $-14.1$ $0.4\%$ 1 $755.2$ $-15.4$ $0.8\%$
Estimated by the compile	r.
AUXILIA	RY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR: REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Aluminum chloride; AlCl<sub>3</sub>; [7446-70-0]</li> </ul>	Carpio, R. A.; King, L. A.; Ratvik, A. P.; Ostvold, T.; Oye, H. A Light Metals 1981; Bell, G. M., ed.; American Institute of Mining, Metallurgical and Petroleum Engineers Inc., New York, <u>1981</u> .
VARIABLES: T/K = 430 - 545 melt comp./mol% NaCl = 40.1 & 50.4 P/kPa = 60.795 - 131.723	PREPARED BY: N. P.Bansal

**EXPERIMENTAL VALUES:** 

Solutions of chlorine in molten NaCl - AlCl<sub>3</sub> obeyed Henry's law. The values of Henry's law constant,  $K_{\rm H}$ , at different temperatures in NaCl - AlCl<sub>3</sub> melts of two different compositions are:

Melt Composition/ mol% NaCl	T/K	K <sub>H</sub> x 10 <sup>6</sup> / mol cm <sup>-3</sup> atm <sup>-1</sup>
40.1	432 454	12.59 10.76
50.4	434 452 472 495 518 544	9.39 8.13 6.84 6.0 ± 0.2 5.31 4.3 ± 0.1

Data in this table are derived, from the graph given in the original paper, by the compiler.

continued

AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Manometric technique. Chlorine gas (ultra high purity) The method used for chlorine supplied by Matheson was used solubility measurements was without further purification. essentially the same as described NaCl, Merck, p.a., was evacuated elsewhere (1,2). The diagram of while the temperature was slowly raised to above the melting point. the apparatus is given in the original paper. Briefly, chlorine The salt was crystallized from the gas is filled into a thermostated melt and only clear crystals were volume above the melt. The drop used for the experiments. in gas pressure, due to its solubility in the melt, is continued recorded as a function of time ESTIMATED ERROR: till a stable equilibrium pressure is reached. The gas solubility is calculated from the equilibrium solubility: ± 4% (authors) gas pressure. **REFERENCES:** 1. Zambonin, P. G.; Cardetta, V. L.; Signorile, G. J. Electroanal. Chem. 1970, 28, 237. continued

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Aluminum chloride; AlCl<sub>3</sub>; [7446-70-0]</li> </ul>	Carpio, R. A.; King, L. A.; Ratvik, A. P.; Ostvald, T.; Oye, H. A. Light Metals 1981; Bell, G. M., ed.; American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., New York, <u>1981</u> .
VARIABLES:	PREPARED BY:
T/K = 430 - 545 melt comp./mol% NaCl = 40.1 & 50.4	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
The temperature dependence of $K_{H}$ can be expressed by the relation:	in the melt containing 50.4 mol% NaCl
log(K <sub>#</sub> /mol cm <sup>-3</sup> atm <sup>-3</sup>	-) = -6.649 + 704/(T/K) (compiler)
The enthalpy of solution, $\Delta H$ , is	:
∆H/kJ mo	1-1 = -13.6
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	continued AlCl <sub>3</sub> (Fluka) was distilled twice and filtered through a quartz frit, leaving 10% behind each time. Some samples of AlCl <sub>3</sub> were purified by enclosing in a pyrex tube alongwith a very small amount of NaCl and high purity Al wire bits. The salt was melted and the ampoule slowly pulled out of the furnace. The impurities were left in the NaCl phase. This procedure was repeated. ESTIMATED ERROR:
	REFERENCES:
	<pre>continued 2. Andresen, R. E.; Ostvald, T.; Oye, H. A. Proc. of the Int. Symp. on Molten Salts, Pemsler, J. P., et al., eds., The Electrochem. Soc., Princeton, NJ 1976, 111.</pre>

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Aluminum chloride; AlCl<sub>3</sub> [7446-70-0]</li> </ul>		Ratvik, A. P.; Ostvald, T.; Oye, H. A. Acta Chem. Scand. <u>1985</u> , A39, 623 - 638.	
VARIABLES:		PREPARED BY:	
T/K = 450 - 1300 Melt comp./mol% AlCl <sub>3</sub> = 0 P/kPa = 10 <sup>2</sup>	- 60	N. P. Bansal	
EXPERIMENTAL VALUES:			
The validity of Henry' at various $Cl_2$ pressures. I $Cm^{-3}$ bar <sup>-1</sup> ), can be express	s law was emperature ed by the	verified by measuring the solubility dependence of solubility, $K_{p}$ (mol relation:	
	$\log K_{p}$	= A + B/T	
Values of the coeffic AlCl <sub>3</sub> melts of various comp	eients A an positions a	nd B for Cl <sub>2</sub> solubility in NaCl - are given below :	
Melt composition Te (mol % AlCl <sub>3</sub> )	mp. range (K)	А В	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	
Murray Lange and the second second	AUXILIARY		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Manometric method. The procedure used for gas lity measurements was simil one described elsewhere(1,2 details see the original pu ion.	solubi- ar to the ). For blicat-	The quality and purification of salts have been described earlier(3)	
1		ESTIMATED ERROR:	
		Not specified.	
		REFERENCES: 1. Waernes, O.; Ostvald, T. Acta Chem. Scand. <u>1983</u> , A37, 293. 2. Waernes, O.; Palmisano, F; Ostvald T; Acta Chem. Scand. <u>1983</u> , A37, 207 3. Andresen, R. E.; Ostvald, T.; Oye, H. A; Proc. Int. Symp. Molten salts The Electrochem Soc. NJ. <u>1976</u> , 111.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> <li>(3) Aluminium chloride; AlCl<sub>3</sub>; [7446-70-0]</li> </ul>	Waernes, O.; Ostvald, T. Acta Chem. Scand. <u>1983</u> , A37, 293-306.
VARIABLES: T/K = 633 - 1000 melt comp/mol% AlCl <sub>3</sub> = 42.5 - 52.0 P/kPa = 26.664 - 119.990	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Values of Henry's law constant, AlCl <sub>3</sub> melts of three different compo	$K_{H}$ , at various temperatures in CsCl- ositions are given below:
Melt comp/mol% AlCl <sub>3</sub> T/°C	$10^{7} K_{H}/mol cm^{-3}atm^{-1}$
42.5 390 43.5 360 52 377 427 427	5.53 ± 0.03 5.59 ± 0.29 5.22 ± 0.12 4.75 4.21
627 627 727	4.21 3.73 ± 0.01 3.60
Linear regression analysis of the following expression $\log K_{H} = -5.824$ with a relative standard de	experimental data gives the F 360.1/T eviation of 5% in K <sub>H</sub> .
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method. The method used for gas solu- bility measurements was essentially the same as described earlier(1). Due to high vapor pressure of chloroaluminate melts, Cl <sub>2</sub> gas dissolved in these melts was remo- ved by reducing the Cl <sub>2</sub> pressure to 300 Torr, allowing the melt to remain at this pressure for equilibration.	CsCl was purified as described earli- er(1). AlCl <sub>3</sub> was distilled under vac- uum just above the melting point. The procedure was repeated three times. Mixtures of AlCl <sub>3</sub> +CsCl were prepared by melting and filtering of purified AlCl <sub>3</sub> and CsCl under vacuum. After remelting the filtrate was properly mixed and quenched. Purified salts were handled in a glove box under $N_2$ with water level < 2ppm.
	ESTIMATED ERROR:
	Not specified.
	REFERENCES: 1. Waernes, O.; Palmisano, F.; Ostvald, T. Acta Chem. Scand. <u>1983</u> , A37, 207.

	173 <sup>.</sup>
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chlorine; [7782-50-5]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> <li>(3) Aluminum chloride; AlCl<sub>3</sub> [7446-70-0]</li> </ul>	Ratvik, A. P.; Ostvald, T.; Oye, H. A. Acta Chem. Scand. <u>1985</u> , A <b>39</b> , 623 - 638.
VARIABLES:	PREPARED BY:
T/K = 650 - 1175 Melt comp./mol% AlCl <sub>3</sub> = 0 - 52 P/kPa = 10 <sup>2</sup>	N. P. Bansal
EXPERIMENTAL VALUES:	
The validity of Henry's law was at various Cl <sub>2</sub> pressures. Temperature Cm <sup>-3</sup> bar <sup>-1</sup> ), can be expressed by the	verified by measuring the solubility dependence of solubility, $K_{p}$ (mol relation:
$\log K_{p} = A + F$	3/T
Values of the coefficients A ar AlCl <sub>3</sub> melts of various compositions a	nd B for Cl <sub>2</sub> solubility in CsCl - are given below :
Melt composition Temp. range (mol% AlCl <sub>3</sub> ) (K)	A B
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method. The procedure used for gas solubi- lity measurements was similar to the One described elsewhere(1,2). For details see the original publicat- ion.	The quality and purification of salts have been described earlier(3).
1	ESTIMATED ERROR:
	Not specified.
	REFERENCES: 1.Waernes, O.; Ostvald, T. Acta Chem. Scand. <u>1983</u> , A37, 293. 2.Waernes, O.; Palmisano, F; Ostvald T. Acta Chem. Scand. <u>1983</u> , A37, 207 3.Andresen, R. E.; Ostvald, T.; Oye, H. A; Proc. Int. Symp. Molten salts The Electrochem Soc. NJ. <u>1976</u> , 111.

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COMPONENTS :		ORIGINAL MEASUREMENTS:	
(1) Chlorine; Cl <sub>2</sub> ; [7782-50-5]		Sternberg, S.; Petrescu, V.	
(2) Silver chlori	de; AgCl;	Rev Roum Chim 1975 20 1231 -	41
(3) Potassium chl	oride; KCl;	Rev. Roun. Chin. $\frac{1375}{20}$ , 20, 1231 -	41.
[7447-40-7]			
VARIABLES:		PREPARED BY:	
T/K = 673	- 973	N. P. Bansal	
		I	
EXPERIMENTAL VALUES:			
Solubilities, temperature are:	C <sub>1</sub> , of chlorine in	molten AgCl - KCl at different	
	t/°C	$10^{7} C_{1}/mol cm^{-3}$	
	400	8 24	
	500	12.9	
	600 700	23.9	
		43•/	
The gas pressure reported. The sol	under which the sol ubility values may	lubility measurements are made is no be taken to be approximate only.	ot
Smoothed Data: Temperature de	pendence of C <sub>1</sub> is a	expressed by the equation:	
1	$og(C_1/mol \ cm^{-3}) = \cdot$	-4.402 - 1129.3/(T/K) (compiler)	
	std dor		
	stu: uev	·· - 0.45	
The heat of so	lution, AH, is:		
	∆H/kJ mol	$^{-1} = + 15.65$	
	AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Chronopotentio	metric method.	Not reported	
		ESTIMATED ERROR:	
		The solubility	
		Values are only approximat	e.
		REFERENCES:	
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						17
COMPONENTS :			ORIGINAL MEASUREMENTS: Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronyaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.			
<ol> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> <li>(4) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ol>						,
VARIABLES:			PREPARED BY.			
T P/kPa:	/K = 988 : 101.32	- 1180 5 (1 atm.)	N. P.	Bansa	1	
EXPERIMENTAL VAL	UES:		<b>1</b>			
The solution	ubility s at dif	of Cl2, C in NaC ferent temperatu:	l - KCl - MgCl₂ res are:	melts	of various	
Melt comp/ wt%	t/°C	10°C/mol cm <sup>-3</sup>	Melt comp/ wt%	t/°C	10 <sup>7</sup> C/mol cm <sup>-3</sup>	
5.55 NaCl - 4.45 KCl - 80 MgCl <sub>2</sub>	750 807 845 903	3.31 3.84 3.93 3.92	39 NaCl - 31 KCl - 30 MgCl <sub>2</sub>	715 751 800 870 904	0.595 1.06 2.30 3.69 4.18	
16.6 NaCl - 13.4 KCl - 70 MgCl <sub>2</sub>	744 800 851 905	1.06 1.58 1.37 1.69	47.2 NaCl - 37.8 KCl - 5 MgCl <sub>2</sub>	730 770 830 850	1.38 1.71 2.44 3.08	
27.7 NaCl - 23.3 KCl - 50 MgCl <sub>2</sub>	715 743 861 902	0.566 0.763 2.73 3.39	53 NaCl - 42 KCl - 5 MgCl <sub>2</sub>	905 752 797 853 907	3.50 1.27 1.84 2.48 3.00	
					cont.	
		AUXILIARY	INFORMATION	*****		
METHOD/APPARATUS	/PROCEDURI	E:	SOURCE AND PURITY	OF MAT	TERIALS:	
Desorption Method : The melt was saturated with Cl₂ by bubbling the gas for about 1.5h at the rate of 6 - 10 liters/h. The melt was allow- ed to stand for 5 min. The melt was stripped of the dissolved Cl₂ by bubbling argon gas for about 20 mins. at a rate of 12 liters/h and the liberated gas was absorbed in a KI solution. The salt was melted under a Continuous flow of dry hydrogen ch- loride gas. The melt was purified with HCl gas for 0.5h followed by Ar gas for 0.5h. It took ≈ 15 min. to saturate the chloride melt with HCl and ≈15-20 mins. to expel the dissolved HCl by bubbling Ar gas.		Liquified meeting the G were used. Dried and pure salts we	Cl <sub>2</sub> ( OST st remel re use	≈99.5%) and arc andard 10157-62 ted chemically d.	jon 2 -	
		ESTIMATED ERROR: Not sj REFERENCES:	pecifi	ed.		

CONDUMENTE .	OPTCINAL MEASUPENENTS -		
<ul> <li>(1) Chlorine; Cl<sub>2</sub>; [7782-50-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> <li>(4) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ul>	Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronayaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.		
VARIABLES: T/K = 988 - 1180 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal		
EXPERIMENTAL VALUES: continued			
Temperature dependence of the solu melts of two compositions is given by	bility of Cl <sub>2</sub> in NaCl - KCl - MgCl <sub>2</sub> the equations:		
$C(mol cm^{-3}) = \frac{1.215 \times 10^{-2}}{T} exp \begin{vmatrix} -40660 - 30.3T \end{vmatrix}$			
in 15 NaCl - 75 KCl - 10MgCl <sub>2</sub> (wt%) i and	n the temperature range 700 - 940°C		
$C(mol cm^{-3}) = \frac{1.215 \times 10^{-2}}{T} exp \begin{vmatrix} -24150 - 14.4T \\ -24150 - 14.4T \end{vmatrix}$			
in 50 NaCl - 40 KCl - 10 MgCl <sub>2</sub> (wt%) in the temperature region 730 - 870°C. T is the temperature in kelvin and R is the gas constant.			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Desorption Method : The melt was saturated with Cl <sub>2</sub> by bubbling the gas for about 1.5h at the rate of 6 - 10 liters/h. The melt was allow- ed to stand for 5 min. The melt was stripped of the dissolved Cl <sub>2</sub> by bubbling argon gas for about 20 mins. at a rate of 12 liters/h and the liberated gas was absorbed in a KI solution.	Liquified Cl₂ (≈99.5%) and argon meeting the GOST standard 10157-62 were used. Dried and remelted chemically - pure salts were used.		
continuous flow of dry hydrogen ch- loride gas. The melt was purified with HCl gas for 0.5h followed by Ar gas for 0.5h. It took $\approx$ 15 min. to saturate the chloride melt with	ESTIMATED ERROR: Not specified.		
dissolved HCl by bubbling Ar gas.	REFERENCES :		

176

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1)Chlorine;Cl<sub>2</sub>; [7782-50-5] (2)Sodium chloride;NaCl;[7647-14-5] (3)Potassium chloride;KCl;[7447-40-7] (4)Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3] (5)Calcium chloride;CaCl<sub>2</sub>; [10043-52-4]</pre>	Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronyaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.
VARIABLES: T/K = 993 - 1213 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Temperature dependence of the solu 50 NaCl - 5KCl - 10MgCl <sub>2</sub> - 35CaCl <sub>2</sub> (wt	bility of $Cl_2$ , $C(mol \ cm^{-3})$ , in %) melt is given by the expression:
$C(mol cm^{-3}) = \frac{1.215 \times 10^{-2}}{T}$	$exp = \frac{-34580 - 22.55T}{RT}$
where T is the temperature in kelvi	n and R is the gas constant.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Desorption Method : The melt was saturated with Cl <sub>2</sub> by bubbling the gas for about 1.5h at the rate of 6 - 10 liters/h. The melt was allow- ed to stand for 5 min. The melt was stripped of the dissolved Cl <sub>2</sub> by bubbling argon gas for about 20 mins. at a rate of 12 liters/h and the liberated gas was absorbed in a KI solution. The salt was melted under a continuous flow of dry hydrogen ch-	Liquified Cl₂ (≈99.5%) and argon meeting the GOST standard 10157-62 were used. Dried and remelted chemically - pure salts were used.
Loride gas. The melt was purified with HCl gas for 0.5h followed by	ESTIMATED ERROR:
Ar gas for 0.5h. It took ≈ 15 min. to saturate the chloride melt with HCl and ≈15-20 mins. to expel the dissolved WCl by bybbling by sat	Not specified.
	REFERENCES :

NENTS :

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1)Chlorine;Cl<sub>2</sub>; [7782-50-5] (2)Sodium chloride;NaCl;[7647-14-5] (3)Potassium chloride;KCl;[7447-40-7] (4)Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3] (5)Barium chloride;BaCl<sub>2</sub>; [10361-37-2]</pre>	Muzhzhavlev, K. D; Lebedev, O. A; Tatakin, A. N; Dronyaeva, O. N. Sov. J. Non-Ferrous Met. 1970, <u>11</u> , 49-52.
VARIABLES: T/K = 993 - 1093 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
Temperature dependence of the sol $50 \text{ NaCl} - 10\text{KCl} - 10\text{MgCl}_2 - 30\text{BaCl}_2$ ( relation: $1.215 \times 10^{-2}$	ubility of $Cl_2$ , $C(mol \ cm^{-3})$ , in wt%) melt is given by the
$C (mol cm^{-3}) =$	exp   RT
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Desorption Method : The melt was saturated with Cl <sub>2</sub> by bubbling the gas for about 1.5h at the rate of 6 - 10 liters/h. The melt was allow- ed to stand for 5 min. The melt was stripped of the dissolved Cl <sub>2</sub> by bubbling argon gas for about 20 mins. at a rate of 12 liters/h and the liberated gas was absorbed in a KI	SOURCE AND PURITY OF MATERIALS: Liquified Cl₂ (≈99.5%) and argon meeting the GOST standard 10157-62 were used. Dried and remelted chemically - pure salts were used.
solution. The salt was melted under a continuous flow of dry hydrogen ch- loride gas. The melt was purified with HCl gas for 0.5h followed by Ar gas for 0.5h. It took ≈ 15 min. to saturate the chloride melt with HCl and ≈15-20 mins. to expel the dissolved HCl by bubbling Ar gas.	ESTIMATED ERROR: Not specified. REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Bromine; Br <sub>2</sub> ; [//26-95-6]	van Norman, J. D.; Tivers, R. J.		
(2) Lithium bromide; LiBr; [7550-35-8]	Molten Salts: Characterization and Analysis (Mamantov, G., ed.) Marcel Dekker, New York <u>1969</u> , 509 - 27.		
VARIABLES:	PREPARED BY:		
T/K = 890 & 981 P/kPa: 101.325 (1 atm.)	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubilities of bromine in m at two temperatures, at one atmosph	olten lithium bromide at two ere pressure, are:		
t/°C 10 <sup>7</sup> C <sub>1</sub> /mol cm <sup>-</sup>	<sup>3</sup> 10 <sup>6</sup> x <sub>1</sub> /mol fraction		
617 17.5 709 10.4	61.0 37.2		
$log(C_1/mol \ cm^{-3}) = -8.17 + 2148/(T/K)  (compiler)$ std. dev. = 0.08% (compiler) The standard heat of solution, AH°, for the dissolution of bromine is: $AH°/kJ \ mol^{-1} = -39.7$			
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Elution technique. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. In brief, the melt was saturated with bromine by bubbling the gas through it. After saturation, the melt was purged with argon to free the dissolved	Lithium bromide was treated by passing HBr gas through the salt powder while the temperature was raised from room temperature about 50°C above the melting point. Last traces of moisture were removed by bubbling HBr through the melt for about about 2h. The dissolved HBr was removed by argon flushing. The melt was finally filtered through a quartz frit.		
Was passed through an aqueous KI solution and the iodine produced was titrated against a standard thiosulfate solution.	ESTIMATED ERROR: Nothing specified		
	REFERENCES :		

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Bromine; Br₂; [7726-95-6]	Wartenberg, H. U.
(2) Sodium bromide; NaBr; [7647-15-6]	Zeitsch. fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARIABLES:	PREPARED BY:
one temperature: T/K = 1073 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of Br <sub>2</sub> in molten M reported as:	JaBr at a single temperature has been
t/°C 10 <sup>5</sup> S	Solubility/wt. fraction
800	26.9
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and procedure followed for gas solubility measurements are described in the original paper. Briefly, a quenched melt sample equilibrated with bromine was analyzed for the bromine content by reacting with KI solution and titration against a freshly standardized thiosulfate solution.	Sodium bromide was pure and was dehydrated by heating with NH4Cl and NH4Br.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Bromine; Br <sub>2</sub> ; [7726-95-6]	Wartenberg, H. U.
<pre>(2) Potassium bromide; KBr; [7758-02-3]</pre>	Zeitsch. fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
	DEDLEDE DV
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
one temperature: T/K = 1073	N. P. Bansal
EXPERIMENTAL VALUES:	<u></u>
The solubility of $Br_2$ in molten reported as:	KBr at a single temperature has been
t/°C 10 <sup>5</sup> S	olubility/wt. fraction
800 ± 5	98.2
	······································
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and the procedure followed for gas solubility measurements are described in the original paper. Briefly, a quenched melt sample equilibrated with bromine was analyzed for bromine content by reacting with KI solution and titration against a freshly standardized thiosulphate solution	Potassium bromide was pure and was dehydrated by heating with $NH_4Cl$ and $NH_4Br$ .
	LOIMAILU EKKUK:
	Nothing specified
	REFERENCES :

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Bromine; Br <sub>2</sub> ; [7726-95-6]	Wartenberg, H. U.
(2) Calcium bromide; CaBr <sub>2</sub> ;	Zeitsch. fur. Elektrochem. 1926, 32,
[7789-41-5]	330 - 36.
VARIABLES:	PREPARED BY:
one temperature: $T/K = 1073$	N. P. Bansal
P/kPa: 101.325 (compiler)	
EXPERIMENTAL VALUES:	CoPr at a single temperature has been
reported as:	Cabi2 at a single temperature has been
t/°C 10 <sup>5</sup> S	olubility/wt. fraction
800 ± 5	18.4
	· · · · · · · · · · · · · · · · · · ·
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and the procedure followed for gas solubility measurements are given in the original paper.	Calcium bromide was pure and was dehydrated by heating with NH <sub>4</sub> Cl and NH <sub>4</sub> Br.
In brief, a quenched melt sample equilibrated with bromine was	
analyzed for the bromine content	
and titration against a freshly	
standardized thiosuitate solution.	
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
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			183
COMPONENTS:	<u></u>		ORIGINAL MEASUREMENTS:
(1) Bromine; Br <sub>2</sub> ; [7726-95-6]		-95-6]	Block-Bolten, A.; Flengas, S. N.
(2) Silver bromide: AgBr:		:;	<b>Canad. J. Chem.</b> 1971, <b>49</b> , 2266 - 74.
[77]	85-23-1]	- •	<u> </u>
VARIABLES :			PREPARED BY:
	T/K = 760 - 950		N. P. Bansal
P/k	Pa: 101.325 (1 at	-m.)	
EXPERIMENTAL	VALUES:		
The at one a	solubilities of k atmosphere pressu	promine in mo tre of bromin	olten AgBr at different temperatures, ne, are:
	r/k 10⁴	$C_1/mol cm^{-3}$	$10^3 x_1$ /mol fraction
	760	1.076	3.66
	790	0.985	3.38
	860	0.865	2.97
8	362	0.639-	2.22*
	385 897	0.543 0.491 <del>*</del>	1.89 1.71 <sup>®</sup>
9	950	0.414-	1.46
Value	es by spring bala	ince; other v	atues by torsion balance.
Smoothed	1 Data:		
The t	cemperature deper	dence of so	lubility are given by the equations:
	log(C <sub>1</sub> /	$(mol cm^{-3}) =$	-6.32 + 1830/(T/K) (compiler)
	log(x <sub>1</sub> /mo	l fraction)	= -4.72 + 1776/(T/K) (compiler)
		AHsoin(KJ	$mol^{-1}$ ) = - 34.60 ± 2.51;
		AS <sub>soln</sub> (JK <sup>-1</sup>	$mol^{-1}) = -40.2$ (at 860K)
		AUXILIARY	INFORMATION
METHOD/APPAI	RATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Gravi	imetric method		Not described
01071	meeric meenod.		Not described.
A qua and the	rtz spring therm Ruska - Worden t	obalance,	
quartz -	· fiber type micr	obalance	
Were use	d. For further d	etails	
and the	procedure follow	ed for	
solubili	ty measurements,	refer to	
che orig	inar paper.		ESTIMATED ERROR:
			Nothing specified
			REFERENCES :
L			1

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Bromine; Br <sub>2</sub> ; [7726- 95-6]	Van Norman, J. D.; Tivers, R. J.	
(2) Lead bromide; PbBr <sub>2</sub> ; [10031-22-8]	Molten Salts: Characterization and Analysis (Mamantov, G., ed.) Marcel Dekker, New York <u>1969</u> , 509 - 27.	
VARIABLES:	PREPARED BY:	
T/K = 703 - 792	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The solubilities of bromine in m temperatures, at one atmosphere pre	olten lead bromide at two ssure, are:	
t/°C 10 <sup>7</sup> C <sub>1</sub> /mol cm	-3 10 <sup>6</sup> x <sub>1</sub> /mol fraction	
430 13.9 519 12.3	92.1 83.2	
$log(C_1/mol cm^{-3}) = -6.33 + 332/(T/K) $ (compiler) std. dev. = 0.05% (compiler) The standard heat of solution, AH°, for the dissolution of bromine is: $AH^{\circ}/kJ mol^{-1} = -5.4$		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution technique. The diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. In brief, the melt was saturated with bromine by bubbling the gas through it. After saturation, the melt was purged with argon to free the dissolved	Lead bromide was treated by passing HBr gas through the salt powder while the temperature was slowly raised from room temperature to about 50°C above the melting point Last traces of moisture were removed by bubbling HBr through the melt for about 2 hrs. The dissolved HBr was removed by argon flushing. Finally, the melt was filtered through a quartz frit.	
bromine. The liberated bromine was absorbed in an aqueous KI solution and the iodine produced was titrated against a standard thiosulfate solution.	ESTIMATED ERROR: solubility: ± 15% (compiler)	
	REFERENCES	
	REFERENCES:	

	OBTOTINAL MELOURSUM
COMPONENTS:	UKIGINAL MEASUREMENTS:
(1) Bromine; Br <sub>2</sub> ; [7726-95-6]	Greenberg, J.; Sundheim, B. R.
(2) Lithium bromide; LiBr;	
[7550-35-8]	<b>J. Chem. Phys.</b> <u>1958</u> , <b>29</b> , 1029 - 32.
[7758-02-3]	
[7750 02 5]	
VARIABLES:	PREPARED BY:
one temperature: $T/K = 673$	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubility, C, of bromine in molt pressure of slightly less than one a	ten LiBr - KBr eutectic at the gas atmosphere is reported as:
t/°C s	Solubility/molar
400	$10^{-3} - 10^{-4}$
	•
<u></u>	
AUXILIARY	
METHOD /APPARATUS / PROCEDURE :	INFORMATION
	INFORMATION
	INFORMATION SOURCE AND PURITY OF MATERIALS:
High temperature spectroscopy.	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr
High temperature spectroscopy.	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drving
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying.
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High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR:
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified
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High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.: Greenberg, J.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J. Rev. Sci. Instr. <u>1956</u> , <b>27</b> , 703.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J. Rev. Sci. Instr. <u>1956</u> , <b>27</b> , 703.
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiBr and KBr were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J. Rev. Sci. Instr. <u>1956</u> , <b>27</b> , 703.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Iodine; I <sub>2</sub> ; [7553-56-2]	Wartenberg, H. U.
(2) Sodium iodide; NaI; [7681-82-5]	Zeitsch. fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARIABLES: One temperature: $\pi/K = 973$	PREPARED BY:
P/kPa: 101.325 (compiler)	
EXPERIMENTAL VALUES:	
The solubility of iodine in molt been reported as:	en NaI at a single temperature has
t/°C 10 <sup>3</sup> s	olubility/wt. fraction
700 ± 5	2.87 <del>*</del>
approximate value only	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. In brief, a quenched melt sample equilibrated with iodine was analyzed for the iodine content by titration against a freshly standardized thiosulfate solution.	Sodium iodide was pure and was dehydrated by heating with NH₄Cl and NH₄Br
	ESTIMATED ERROR:
	The solubility value is only approximate. (author)
	REFERENCES :
1	

COMPONENTE	ORICINAL MEASUREMENTS -
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Iodine; I <sub>2</sub> ; [7553-56-2]	Wartenberg, H. U.
(2) Potassium iodide; KI; [7681-11-0]	Zeitsch. fur. Elektrochem. <u>1926</u> , 32, 330 - 36.
VARIABLES:	PREPARED BY:
one temperature: $T/K = 973$	N. P. Bansal
P/KPa: 101.325 (compiler)	L
EXPERIMENTAL VALUES:	
The solubility of iodine in molto reported as:	en KI at a single temperature has been
t/°C 10 <sup>3</sup> S4	olubility/wt. fraction
700 ± 5	6.29ª
approximate value only	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The details of the apparatus used and procedure employed for gas solubility measurements are given in the original papaer. In brief, a guenched melt sample	Potassium iodide was pure and was dehydrated by heating with $NH_4Cl$ and $NH_4Br$ .
equilibrated with iodine was analyzed for the iodine content by titration against a freshly standardized thiosulfate	
solution.	
	ESTIMATED ERROR:
	The solubility value is only approximate. (author)
	REFERENCES:

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Iodine; I<sub>2</sub>; [7553-56-2] (2) Lithium nitrate; LiNO<sub>3</sub>;</pre>	Sacchetto, G. A.; Bombi, G. G.; Fiorani, M.
<pre>[7790-69-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<b>J. Electroanal. Chem. <u>1969</u>, 20, 89 -</b> 98.
VARIABLES:	PREPARED BY:
T/K = 415 - 512 P/kPa = 1.814 - 37.490	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities, $C_1$ , of iodine in t mixture, in the temperature interva form of a log $C_1$ vs. 1/T plot. Solu	he molten LiNO <sub>3</sub> - KNO <sub>3</sub> (43 - 57 mol%) 1 415 - 512 K, are presented in the bility of iodine at 450 K is given as:
T/K C1	x 10 <sup>3</sup> /mol kg <sup>-1</sup> atm <sup>-1</sup>
450	1.46 ± 0.13
Smoothed Data:	
Temperature dependence of C. is	expressed by the relation.
	$= \frac{1}{2} \left( \frac{1}{2} - \frac{1}{2} \right) \left( \frac{1}{2} - \frac{1}{2} \right)$
$\log c_1 = -2.836$	+ 962(1/1 - 1/450) (T = 415 - 512 K)
The enthalpy of solution, AH, an	d the entropy of solution, AS, are:
∧H/kJ mol <sup>-1</sup>	$= -18.41 \pm 5.02$
$\Delta S/J K^{-1} mol^{-1} = -94.98 \pm 10.88$	
METHOD/APPAKATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A mixture of iodine and nitrogen at a known partial pressure of iodine was passed through the melt. A part of the molten solution was quenched and dissolved in aqueous KI solution and its absorbance at 350 nm was measured with a Zeiss PMQ II spectrophotometer.	Iodine from C. Erba, Milan, was used without further purification. Reagent grade lithium and potassium nitrates from C. Erba, Milan were used. The procedure employed for preparing the molten salt solvent has been described elsewhere (1).
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES :
	1. Mazzocchin, G. A.; Bombi, G. G.; Fiorani, M.
	J. Electroanal. Chem. <u>1968</u> , 17, 95.

	ORIGINAL MEASUREMENTS:
$(1)$ Iodine: $I_{2}$ ; $(7553-56-2)$	Greenberg, J.: Sundheim, B. R.
(2) Lithium chloride; LiCl;	J Char There 1050 20 1000
(3) Potassium chloride; KCl;	<b>J. Chem. Phys.</b> <u>1958</u> , <b>29</b> , 1029 - 32.
[7447-40-7]	
VARIABLES:	PREPARED BY:
one temperature: T/K = 673	N. P. Bansal
P/kPa: 101.325 (compiler)	
EXPERIMENTAL VALUES:	
The solubility of iodine in molt temperature is reported as:	en LiCl - KCl eutectic at a single
t/°C	Solubility/molar
400	10 <sup>-3</sup> - 10 <sup>-4</sup>
AUXILIARY	INFORMATION
AUXILIARY	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy.	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR:
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES:
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES:
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J. Rev. Sci. Instr. <u>1956</u> , 27, 703.
AUXILIARY METHOD/APPARATUS/PROCEDURE: High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: Analytical grade LiCl and KCl were used without further purification except for careful drying. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Sundheim, B. R.; Greenberg, J. Rev. Sci. Instr. <u>1956</u> , <b>27</b> , 703.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Iodine; I<sub>2</sub>; [7553-56-2] (2) Lithium iodide; LiI; [10377-51-2] (3) Potassium iodide; KI;</pre>	Greenberg, J.; Sundheim, B. R. <b>J. Chem. Phys. <u>1958</u>, 29,</b> 1029 - 32.
[7681-11-0]	
VARIABLES:	PREPARED BY:
one temperature: T/K = 673 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of iodine in molto ture is reported as:	en LiI - KI eutectic at one tempera-
t/°C s	Solubility/molar
400	$10^{-3} - 10^{-4}$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
High temperature spectroscopy. The technique for obtaining absorption spectra of molten salt solutions has been described elsewhere (1).	Analytical grade LiI and KI were used without further purification except for careful drying.
	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	1. Sundheim, B. R.; Greenberg, J.
	<b>Rev. Sci. Instr. <u>1956</u>, 27</b> , 703.
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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon monoxide; CO;[630-08-0]</pre>	Prutskov, D. V.; Krivoruchko, N. P.; Prisvashnvi, V. D.
(2) Magnesium chloride; MgCl <sub>2</sub> ;	Rasplavy 1988, 2, 70 - 73.
[7786-30-3]	
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1023 - 1223	N. P. Bansal
-	
EXPERIMENTAL VALUES:	
Gas solubilities, $K_{p}$ (mol cm <sup>-3</sup> a rature are given below, where $K_{p}$ is	atm <sup>-1</sup> ), in the melt at various tempe- the Henry's law constant.
T/K 107	K <sub>p</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1023	4.59 ± 0.52
1073	4.31 ± 0.36
1123	3.48 ± 0.32
1223	3.24 ± 0.27
AUXILIARY	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:
AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved CO, it was oxidized to CO <sub>2</sub> by passing over powdered CuO at 800 - 900 K. The resulting CO <sub>2</sub> was absorbed in 0.0175M Ba(OH) <sub>2</sub> solution excess of which was titrated against Potassium bipthalate. The experiment was repeated 4 - 5 times.	INFORMATION SOURCE AND PURITY OF MATERIALS: High purity MgCl <sub>2</sub> was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remo- ve H <sub>2</sub> O and O <sub>2</sub> by passing through col- umns containing P <sub>2</sub> O <sub>5</sub> and titanium sponge heated at 1200 K. CO gas was produced through decomposition of formic acid. ESTIMATED ERROR: Not specified. REFERENCES:

192	
COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Carbon monoxide; CO;[630-08-0]	Prutskov, D. V.; Krivoruchko, N. P.; Prisyashnyi, V. D.
<pre>(2) Calcium chloride; CaCl<sub>2</sub>; [10043-52-4]</pre>	Rasplavy <u>1988</u> , 2, 70 - 73.
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1073 - 1123	N. P. Bansal
EXPERIMENTAL VALUES:	
Gas solubilities, $K_{p}$ (mol cm <sup>-3</sup> at atures are given below, where $K_{p}$ is t	tm <sup>-1</sup> ), in the melt at various temper- the Henry's law constant.
T/K 107	Kp/mol cm <sup>-3</sup> atm <sup>-1</sup>
1073	$1.02 \pm 0.12$
1093	$0.98 \pm 0.09$
1123	0.93 ± 0.07
Temperature dependence of $K_p$ can be	e expressed by the relation :
$\log K_{p} = -7.940 +$	<u>_1012</u> T
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved	High purity CaCl <sub>2</sub> was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remo- ve H <sub>2</sub> O and O <sub>2</sub> by passing through co- lumns containing P <sub>2</sub> O <sub>5</sub> and titanium sponge heated at 1200 K. CO gas was produced through decomposition of formic acid.
CO, it was oxidized to $CO_2$ by passing over powdered CuO at 800 - 900 K. The resulting $CO_2$ was absorbed in 0.0175M Ba(OH) <sub>2</sub> solution excess of which was titrated against	ESTIMATED ERROR: Not specified.

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**REFERENCES:** 

potassium bipthalate.

4 - 5 times.

The experiment was repeated

Components :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon monoxide; CO;[630-08-0]</li> <li>(2) Strontium chloride; SrCl<sub>2</sub>; [10476-85-4]</li> </ul>	Prutskov, D. V.; Krivoruchko, N. P.; Prisyashnyi, V. D. <b>Rasplavy</b> <u>1988</u> , <b>2</b> , 70 - 73.
VARIABLES: D/kDoc 101 225 (compile)	PREPARED BY:
F/KPA: 101.325 (Compiler)	
1/K = 11/3 - 1323	N. P. Bansal
EXPERIMENTAL VALUES:	
Gas solubilities, K <sub>p</sub> (mol cm <sup>-3</sup> temperatures are given below, when	atm <sup>-1</sup> ), in the melt at various re $K_p$ is the Henry's law constant.
T/K 107	$K_{p}/mol \ cm^{-3} \ atm^{-1}$
1173 1213 1253	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
1293	$0.98 \pm 0.11$ 0.97 ± 0.12
Temperature dependence of $K_p$ can be log $K_p = -7.81$	be expressed by the relation : $16 + \frac{1041}{T}$ .
AUXILIAR	Y INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved CO it was origined to CO bu	High purity $SrCl_2$ was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remove $H_2O$ and $O_2$ by passing through columns containing $P_2O_5$ and titanium sponge heated at 1200 K. CO gas was produced through decomposition of formic acid.
<pre>&gt;&gt;&gt; Passing over powdered CoO<sub>2</sub> by Passing over powdered CuO at 800 - 900 K. The resulting CO<sub>2</sub> was absorbed in 0.0175M Ba(OH)<sub>2</sub> solution excess of which was titrated against potassium bipthalate. The experiment was repeated 4 -5 times.</pre>	ESTIMATED ERROR: Not specified. REFERENCES:

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COMPONENTS .	ORTGINAL MEASUREMENTS.	
Components.	ORIGINAL MERSUREMENTS:	
(1) Carbon monoxide; CO;[630-08-0]	Prutskov, D. V.; Krivoruchko, N. P.;	
	Prisyashnyi, V. D.	
(2) Barium chioride; Baci <sub>2</sub> ; [10361-37-2]	<b>Rasplavy</b> <u>1988</u> , 2, 70 - 73.	
VARIABLES: P/kPat 101 325 (commiles)	PREPARED BY:	
$T/K_{\rm Pla}$ . 101.525 (Compiler)		
1/K = 1253 - 13/3	N. P. Bansal	
EVOPDIMENTAL VALUES.		
EXPERIMENTAL VALUES:		
Gas solubilities, K <sub>p</sub> (mol cm <sup>-3</sup> at atures are given below, where K <sub>p</sub> is	m <sup>-1</sup> ), in the melt at various temper- the Henry's law constant.	
T/K 107	K <sub>p</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
1253	$0.75 \pm 0.12$	
1293	0.98 ± 0.12	
1333	$1.02 \pm 0.17$	
1373	1.37 ± 0.23	
Temperature dependence of V can be	our particulation	
remperature dependence of Kp can be	expressed by the relation :	
	2154	
$109 R_{p} = -4.599 -$	<u></u>	
	_	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method.	High purity BaCl <sub>2</sub> was recrysta-	
The melt was prepared by	llized twice from doubly distilled	
atmosphere. The melt was saturated	water and dried in a vacuum oven without permitting melting of the	
with CO gas by bubbling at the rate	hydrated salt.	
of 3-5 lit/h. It was established that saturation was attained in	Argon gas was purified to rem-	
50-60 min. Argon was bubbled at the	lumns containing $P_2O_5$ and titanium	
rate of 6-9 lit/h through the	sponge heated at 1200 K.	
dissolved CO gas. In order to	CO gas was produced through decomposition of formic acid	
determine the amount of dissolved		
CO, it was oxidized to $CO_2$ by passing over powdered CuO at	ESTIMATED ERROR:	
800 - 900 K. The resulting $CO_2$ was	NOT Specified.	
absorbed in 0.0175M Ba(OH) <sub>2</sub> solution		
potassium bipthalate.		
The experiment was repeated	REFERENCES:	
4 - 5 times.	1	
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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Carbon monoxide; CO;	Appleby, A. J.; Van Drunen, C.	
(2)  Lithium combonator Li CO	J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655	
[554-13-2]	- 59.	
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:	
T/K = 1073 & 1123	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of CO in the molten $Li_2CO_3$ at two temperatures are:		
t/°C 104 (	$C_1^{-}/mol dm^{-3} atm^{-1}$	
800	0.59. + 0.09	
850	2.25 ± 0.36	
to be entirely chemica	al	
Smoothed Data:		
The heat of solution, $\Delta H$ , for the set	olubility of CO in the melt is:	
AH/kJ mol	<sup>-1</sup> = ≈ 250.	
	250.	
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AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Quenching or chilling method. The diagram and details of the	Not described.	
apparatus used and the procedure		
original paper. Briefly, the melt		
for 2 - 3 hrs. A portion of the		
saturated melt was transferred		
where it was slowly quenched to		
allow all of the gases to escape. The liberated gas was flushed	ESTIMATED EDDOD.	
with a stream of helium into a	Nothing specified	
Linde 5A moleculat sieve. The	Nothing specified.	
allowed to come to room	DETEDENCYS .	
temperature, were flushed with a stream of carrier gas into a	ALFLKENCED;	
Fisher - Hamilton gas partitioner		
Katharometer detector for		
analysis. About 8 - 10 independent measurements were made.	}	

COMPONENTS: (1) Carbon monoxide; CO; [630-08-0] (2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4] (3) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1] VARIABLES: one temperature: T/K = 433 EXPERIMENTAL VALUES: The solubility of carbon monoxid at 433K was found to be too small ( measured with the experimental tech	PREPARED BY: $(10^{-7} \text{ mol fraction torr}^{-1})$ to be $(10^{-7} \text{ mol fraction torr}^{-1})$ to be
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique.	CO from Gerling Halz & Co., Hamburg, was used without further purification. Its purity, checked by mass spectrometry, was better than 99.5%. LiNO <sub>3</sub> (ERBA RP) was dehydrated a 70°C to avoid hydrolysis. KNO <sub>3</sub> (ERBA RP) was finely powdered and dried under vacuum at 110°C for 24 hr. ESTIMATED ERROR: Nothing specified REFERENCES:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Carbon monoxide; $CO$ ; [630-08-0]	Desimoni. E.: Paniccia. F.:
(2) Sodium nitrate; NaNO <sub>3</sub> ;	Zambonin, P. G.
[7631-99-4] (3) Potassium nitrate: KNO <sub>2</sub> :	J. Chem. Soc. Faraday Trans. I
[7757-79-1]	<u>1973, 69, 2014 - 18.</u>
VARIABLES:	PREPARED BY:
T/K = 508 - 573	N. P. Bansal
$P/kPa \cdot 101 325 (1 atm)$	
EVERTMENTAL VALUES.	l
CAFERIMENTAL VALUES:	han minten of a diam without
potassium nitrate. The solubilities at various temperatures are:	of carbon monoxide in the melt
T/K 107	K <sub>H</sub> /mol cm <sup>-3</sup> bar <sup>-1</sup>
508	0.123 0.152
573	0.204
Smoothed Data:	
The temperature dependence of He	nry's law constant, $K_{H}$ , is given by
log(K <sub>tr</sub> /mol cm <sup>-3</sup> bar <sup>-</sup>	$^{1}) = -5.98 - 980/(T/K)$
sta. de	0. = 0.12% (compiler)
The heat of solution, $\Delta H$ , and the area	e standard entropy of solution, AS°,
ΔH/kJ π	$101^{-1} = 18$
ASº / T K-1	$mol^{-1} = -26$ (at 533 K)
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
	Carbon monoxide (High Purity
High sensitivity pressure measuring technique.	grade) was further purified by keeping it in contact with Ascarite
The diagram and details of the	(A. H. Thomas Co., Philadelphia) to
apparatus are described elsewhere	remove carbon dioxide and with
at $10^{-5}$ bar for several hours for	Milano) at -80°C to remove moisture.
degassing. The vacuum was disconnected and carbon monovide	The final water content was <10 ppm.
was introduced at one atm. The	were of reagent grade(Carlo Erba,
melt was vigorously stirred with	Milano). The solvent was purified an
variations were noted, with a high	riftered in the molten state.
precision differential manometer,	ESTIMATED ERROR:
equilibrium pressure was reached.	Nothing specified
The amount of gas dissolved was	
pressure changes after a suitable	REFERENCES:
Calibration.	1 Dogimoni II Denizzi- D
	Zambonin, P. G.
	J Fleatroanal Chem 1973 39
	373.

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Carbon monoxide; CO; [630-08-0]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl;</li> </ul>	Zezyanov, S. P.; Ll'ichev, V. A. <b>Zh. Neorg. Khim. <u>1972</u>, 17, 2541 - 42;</b> Russ. J. Inorg. Chem. (Eng. Transl.)	
[7447-40-7]	<u>1972</u> , <b>17</b> , 1329 - 30. (*).	
VARIABLES:	PREPARED BY:	
P/RPa = 10.133 - 101.325	N. D. Dengol	
1/K = 963 - 11/3	N. F. Bansal	
EXPERIMENTAL VALUES:		
The solubilities, $C_1$ , of CO in molten NaCl - KCl (50 - 50 mol%) at different temperatures are:		
t/°C	$10^7 C_1/mol \ cm^{-3}$	
690	2 78	
705	2.95	
755	3.42	
800	3.86	
875	4.74	
895	4.98	
	5.07	
Variation of the solubility with temperature is expressed by the equation: $log(C_1/mol \ cm^{-3}) = -5.116 - 1388.3/(T/K)$ (compiler) std. dev. 0.34% (compiler) The heat of solution, $\Delta H$ , has been estimated to be: $\Delta H/kJ \ mol^{-1} = 26.6$ (compiler)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. The diagram and details of the apparatus used and procedure followed are given in the original paper. In brief, the melt was saturated with CO by bubbling the gas through it. A part of the saturated melt was transferred into the desorber and purged with argon to liberate the dissolved CO. The carbon monoxide was oxidized to carbon dioxide by passing the mixture of CO and argon from the desorber over copper (II) oxide heated to 673 - 773 K. The carbon dioxide was absorbed in 0.005N barium	Carbon monoxide was prepared by the decomposition of formic acid in concentrated sulfuric acid. It was further purified and dried. Argon used was to specification GOST10157- 62. "Chemically Pure" grade NaCl and KCl were used. ESTIMATED ERROR: Nothing specified REFERENCES:	
hydroxide solution. The excess of hydroxide was back titrated with hydrochloric acid and thymol phthalein.		

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Carbon monoxide; CO; [630-08-0]	Lukmanova, T. I. Villnvanskii
(2) Potassium chloride; KCl;	Ya. E.
$\begin{bmatrix} 7447 - 40 - 7 \end{bmatrix}$	Izv. Vyssh. Ucheb. Zaved., Khim. i
[7786-30-3]	$\frac{1966}{9}, 9, 537 - 540.$
T/K = 773 - 1123	PREPARED BY:
$P_{co}/atm = 0.2 - 1.0$	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of carbon monox 500, 650, 750 and 850°C are present function of pressure. It is not pos solubility from the figure which is	ide in molten equimolar KCI - MgCi2 at ed in the form of a figure, as a sible to read precise values of too small.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution or stripping method. The apparatus and the method used for gas solubility measurements have been described earlier (1). Dry CO gas was passed through about 170 g of the melt at a rate of 10 l/hr. After saturation, a portion of the melt was transferred into the desorber and flushed with nitrogen The	The method for preparation of the anhydrous melt from carnallite has been described elsewhere (1).
liberated CO was determined by	ESTIMATED ERROR:
Oxidation with I <sub>2</sub> O <sub>5</sub>	Nothing specified
	Nothing spectred
	REFERENCES:
	1 Lukmanova T I Villovanski
	Ya. E.
	Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Teknol. <u>1964</u> , 7, 510.
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NE	VENTS:		
١	Carbon	monovid	_

ORIGINAL MEASUREMENTS:		
Appleby, A. J.; Van Drunen, C. J. Electrochem. Soc <u>1980</u> , <b>127</b> , 1655 - 59.		
PREPARED BY:		
N. P. Bansal		
Solubilities of CO in the melt Li <sub>2</sub> CO <sub>3</sub> - Na <sub>2</sub> CO <sub>3</sub> (53.3 - 46.7 mol%) at different temperatures are:		
$C_1^{n}/mol \ cm^{-3} \ atm^{-1}$		
3.04 ± 0.24 3.68 ± 0.20 5.61 ± 0.20		
E CO in the melt		
Smoothed Data: The temperature dependence of $C_1$ can be expressed by the relation: $log(C_1/mol \ cm^{-3} \ atm^{-1}) = -3.564 - 3039.8/(T/K)$ (compiler) std. dev. = 4.6% (compiler) The heat of solution, $\Delta H$ , for the solubility of CO in the melt is: $\Delta H/kJ \ mol^{-1} = 58.0$		
INFORMATION		
SOURCE AND PURITY OF MATERIALS:		
Not described. ESTIMATED ERROR: Nothing specified. REFERENCES:		

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Carbon monoxide; CO;	
(2) Lithium carbonate; Li <sub>2</sub> CO <sub>3</sub> ;	Appledy, A. J.; van Drunen, C.
[554-13-2]	J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655
(3) Potassium carbonate; $K_2CO_3$ ; [584-08-7]	- 59.
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VARIABLES:	PREPARED BY
P/kPa: 101.325 (1 atm.)	
T/K = 1023 - 1123	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of CO in the melt Li three temperatures are:	. <sub>2</sub> CO <sub>3</sub> - K <sub>2</sub> CO <sub>3</sub> (42.7 - 57.3 mol%) at
t/°C 104 C	L <sup>a</sup> /mol dm <sup>-3</sup> atm <sup>-1</sup>
750	2.25 ± 0.22
800	$3.25 \pm 0.22$ $4.54 \pm 0.39$
850	5.36 ± 0.22
* Physical solubility	of CO in the melt.
Smoothed Data:	
Temperature dependence of C <sub>1</sub> can	be expressed by the relation:
$\log(C_1/\text{mol cm}^{-3} \text{ atm}^{-1})$	= -4.025 - 2510.4/(T/K) (compiler)
sta. dev	. = 2.6% (compler)
The heat of solution, $\Delta H$ , for the	e solubility of CO in the melt is:
$\Delta H/kJ mol^{-1} = 48.0$	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Quenching or chilling method.	Not described.
apparatus used and the procedure	
followed have been described in	
the original paper. Briefly, the melt was saturated by hubbling the	
gas for 2 - 3 hrs. After	
saturation, a portion of the melt	
Compartment where it was slowly	
chilled to allow all the gases to	
flushed with a stream of helium	I FOTIMATEN EDDAD.
into a U - tube containing	ESTIMATED ERROR:
	Nothing specified.
Linde 5A molecular sieve. The Contents of the tube, after being	Nothing specified.
Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room	Nothing specified.
Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier costings	Nothing specified.
Linde 5A molecular sieve. The Contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner	Nothing specified.
Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner with Linde 5A column and	Nothing specified.
Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner with Linde 5A column and Katharometer detector for analysis. About 8 -10 independent	Nothing specified.
Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner with Linde 5A column and Katharometer detector for analysis. About 8 -10 independent measurements were made.	Nothing specified.

202	
<pre>COMPONENTS:   (1) Carbon monoxide; CO;    [630-08-0]   (2) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>;    [497-19-8]   (3) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>;    [584-08-7]</pre>	ORIGINAL MEASUREMENTS: Appleby, A. J.; Van Drunen, C. J. Electrochem. Soc. <u>1980</u> , <b>127</b> , 1655 - 59.
VARIABLES: T/K = 1073 & 1123 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: Solubilities of CO in the melt N temperatures are: 	$X_{a_2}CO_3 - K_2CO_3$ (58 - 42 mol%) at two $C_1^{a}$ /mol cm <sup>-3</sup> atm <sup>-1</sup>
800 850	13.30 ± 0.9 20.10 ± 1.6
melt. Smoothed Data: The heat of solution, ΔH, for th ΔH/kJ mc	ne solubility of CO in the melt is: pl <sup>-1</sup> = 80
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Quenching or chilling method. The diagram and details of the apparatus used and procedure followed are described in the original publication. In brief, the melt was saturated by bubbling the gas for 2 - 3 hrs. A portion of the saturated melt was transferred into the chilling compartment where it was slowly quenched to allow all the gases to escape. The liberated gas was	SOURCE AND PURITY OF MATERIALS: Not described.

Nothing specified.

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**REFERENCES:** 

flushed with a stream of helium into a U - tube containing activated Linde 5A molecular

sieve. The contents of the tube, after being allowed to come to

room temperature, were flushed with a stream of carrier gas into

partitioner with Linde 5A column and Katharometer detector for analysis. About 8 - 10 independent measurements were carried out.

a Fisher - Hamilton gas

	200
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon monoxide;CO;[630-08-0] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2]</pre>	Appleby, A. J.; Van Drunen, C.
(3) Sodium carbonate; $Na_2CO_3$ ;	J. Electrochem. Soc. <u>1980</u> , 127, 1655
(4) Potassium carbonate; $K_2CO_3$ ; [584-08-7]	- 35.
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:
T/K = 973 - 1123	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of CO in the melt L. 25.0 mol%) at different temperatures	i₂CO₃ - Na₂CO₃ - K₂CO₃ (43.5 - 31.5 - s are:
t/°C 104 0	$C_1^{a}/mol dm^{-3} atm^{-1}$
700	0.86 ± 0.10
750	$1.30 \pm 0.10$
850	$2.82 \pm 0.18$
Physical solubility of	f CO in the melt.
Smoothed Data: The temperature dependence of C.	can be expressed by the relation:
$\log(C_{c}/\text{mol } \text{cm}^{-3} \text{ atm}^{-1})$	= -3.317 - 3655.8/(T/K) (compiler)
std der	z = 2.98  (compiler)
The heat of solution AW for th	e solubility of CO in the melt is.
	$1^{-1} = 69.5$
	1 - 09.9
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Quenching or chilling method.	Not described.
The diagram and details of the apparatus used and the procedure	
followed have been described in	
the original paper. Briefly, the Molten salt solvent was saturated	
by bubbling the gas for 2 - 3 hr.	
After saturation a portion of the melt was transferred into the	
chilling compartment where it was	
gases to escape. The liberated	ESTIMATED ERROR:
gas was flushed with a stream of helium into a U - tube containing	Nothing specified
activated 5A Linde molecular sleve. The contents of the tube	Nothing specified.
after being allowed to come to	REFERENCES:
with a stream of carrier gas into	
a Fisher - Hamilton gas Partitioner with Linde 54 column	
and Katharometer detector for	
measurements were carried out.	
	1

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## 204

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon monoxide;CO; [630-08-0] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>;         [554-13-2]</pre>	Borucka, A.; Appleby, A. J.
<pre>(3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8]</pre>	J. Chem. Soc. Faraday Trans. I <u>1977</u> , 73, 1420 - 35.
(4) Potassium carbonate; $K_2CO_3$ ; [584-08-7]	
VARIABLES:	PREPARED BY:
One temperature = T/K 1073	N. P. Bansal
EXPERIMENTAL VALUES:	

In the molten ternary eutectic  $\text{Li}_2\text{CO}_3 - \text{Na}_2\text{CO}_3 - \text{K}_2\text{CO}_3$  (43.5 - 31.5 - 25.0 mol%), carbon monoxide dissolves in the physical as well as chemical form. At 1073K, the concentrations of physically and chemically (as  $\text{CO}_2^{-2}$ ) dissolved carbon monoxide, respectively are 2.1 x 10<sup>-4</sup> mol dm<sup>-3</sup> and 1.7 x 10<sup>-3</sup> mol dm<sup>-3</sup> in equilibrium with 0.382 atm CO + 0.618 atm  $\text{CO}_2$  gas mixture.

AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Steady-state polarization and rapid scan voltammetry.	Not described.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :
	1

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COMPONENTS:	EVALUATOR:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Two sudies (1,2) have been reported for the solubility of carbon dioxide in molten LiNO<sub>3</sub>. The values of Paniccia and Zambonin have been obtained by extrapolating their results in LiNO<sub>3</sub> - KNO<sub>3</sub> mixtures. Out of the two data points, the one at 523 K is at a temperature below the melting point of LiNO<sub>3</sub>. The value of  $K_{\rm H}$  at 623 K is in excellent agreement with the results of Sada et al. (2). The enthalpy of solution,  $\Delta H$ , reported by Sada et al. is positive while Paniccia and Zambonin reported a negative value.

Tentative values of solubility based on the results of Sada et al. (2), are given in Table 1.

## Table 1

Tentative Solubilities as a Function of Temperature

T/K	$10^{6} \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$
570	3.38
580	3.46
590	3.54
600	3,62
610	3.70
620	3.78
630	3.86
640	3.93
650	4.01

References:

- Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u>, 69, 2019.
- Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. J. Chem. Eng. Data <u>1981</u>, 26, 279.

	OPTCINAL MERCUPERSTOR	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Paniccia, F.; Zambonin, P. G.	
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	J. Chem. Soc. Faraday Trans. I <u>1973</u> , <b>69</b> , 2019 - 25.	
VARIABLES:	PREPARED BY:	
T/K = 523 & 623 P/kPa: 101.325 (1 atm.)	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of carbon dioxide were measured in molten $LiNO_3 - KNO_3$ mixtures of various compositions. A linear relationship was observed between the logarithm of the solubility $(x_1)$ and the melt compositions. The extrapolated values of $x_1$ in pure molten $LiNO_3$ at two temperatures are:		
T/K $10^4 x_1$ /mol fraction bar <sup>-1</sup> $10^6 K_H$ /mol cm <sup>-3</sup> atm <sup>-1</sup>		
523*     2.1       623     1.5	3.85	
<sup>b</sup> Calculated by the compiler using density data from: G. J. Janz, Molten Salts Handbook, Academic Press, New York (1967). Smoothed Data: The enthalpy of solution, ΔH, and the standard entropy of solution, ΔS°, are reported to be: ΔH/kJ mol <sup>-1</sup> = -9.0 ΔS°/J K <sup>-1</sup> mol <sup>-1</sup> = -28.0 (at 623 K)		
AUXILIARY INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Extrapolated from the solubility data of carbon dioxide in lithium nitrate - potassium nitrate mixtures. Solubilities in the nitrate mixtures were measured by the manometric method (1,2).	High purity quality carbon dioxide (S.I.O., Milan) was dried in dry ice. Reagent grade lithium nitrate (Carlo Erba, Milan) was used without further treatment.	
	ESTIMATED ERROR: Nothing specified.	
	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardetta, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemato, I.; Shiomi, N.	
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	J. Chem. Eng. Data <u>1981</u> , 26, 279 - 81.	
VARIABLES:	PREPARED BY:	
P/kPa: 101.325 (1 atm.) T/K = 573 - 648	N. P. Bansal	
EVERATARY NATINES.		
LAFERIMENTAL VALUES:		
The solubilities of CO <sub>2</sub> in molter one atmosphere pressure are:	h LiNO <sub>3</sub> , at different temperatures, at	
t/°C 10 <sup>6</sup> K <sub>r</sub>	/mol cm <sup>-3</sup> atm <sup>-1</sup>	
300	3.39	
325	3.64	
350	3.96	
Smoothed Data: Temperature dependence of $K_{H}$ is $\epsilon$	expressed by the relation:	
$\log(K_{\rm H}/{\rm mol~cm^{-3}~atm^{-1}})$	= -4.87 - 342.5/(T/K) (compiler)	
std. dox	x = 0.6 <sup>8</sup> (compiler)	
The heat of solution, $\Delta H$ , is esti-	imated to be:	
∆H/kJ mo	$pl^{-1} = 6.6$ (compiler)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Tlution to shaims	Combon dismide (00.06%) was of	
The apparatus and procedure	superpure grade and free from water.	
used for solubility measurements	Lithium nitrate was of reagent	
The melt was saturated with	grade.	
carbon dioxide by bubbling the		
dioxide dissolved in the melt was		
eluted by bubbling nitrogen. The		
eluted mixture was measured with		
an infrared carbon dioxide analyzer.	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>	
	J. Chem. Eng. Data <u>1980</u> , 25, 45.	

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio, 44135, U.S.A. December, 1989.
CRITICAL EVALUATION:	

Four investigations are available (1 - 4) for the solubility of carbon dioxide in molten NaNO<sub>3</sub> using three different experimental methods. Paniccia and Zambonin (1) employed a manometric technique, Bratland and Krohn (2) chilling method, while Field and Green (3) and Sada et al. (4) used the elution technique. Smoothed data at different temperatures from various studies are compared below:

		107 K <sub>H</sub> /mol	cm <sup>-3</sup> atm <sup>-1</sup>	
т/к	Ref. 1	Ref. 2	Ref. 3	Ref. 4
600 620	4.04	12.8	1.19	10.3
640 660	4.25	16.6 18.6	1.03 (0.97)	

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

The results of all four investigations are quite different. Further studies are needed in order to recommend solubility values for this gas - molten salt system.

References:

- 1. Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u>, 69, 2019.
- 2. Bratland, D.; Krohn, C. Acta Chem. Scand. 1969, 23, 1839.
- 3. Field, P. E.; Green, W. J. J. Phys. Chem. 1971, 75, 821.
- 4. Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M. J. Chem. Eng. Data <u>1980</u>, 25, 45; Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. Ibid. <u>1981</u>, 26, 279.

208

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Carbon dioxide; CO <sub>2</sub> ;	Paniccia, F.; Zambonin, P. G.
[124-38-9]	J. Chem. Soc. Faraday Trans. I
(2) Sodium nitrate; NaNO <sub>3</sub> ;	<u>1973</u> , <b>69</b> , 2019 - 25.
[7631-99-4]	
	DEEDADED BV.
$P/kPa = 10^2$	REFRIED DI
T/K = 592 - 671	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities, $X_1$ , or $CO_2$ in temperature, are presented in the f derived from the graph, by the comm	motten NaNO <sub>3</sub> , as a function of orm of a graph. The values of $x_1$ viler, are:
10 <sup>5</sup> X <sub>1</sub> /	107 K <sub>H</sub> /
T/K mole fraction	bar <sup>-1</sup> mol cm <sup>-3</sup> atm <sup>-1a</sup>
592 1.78 607 1.80	4.02 4.05
626 1.80	4.02
639 1.91 652 1.82	4.24
671 2.00	4.39
Molten Salts Handbook, Academi Smoothed Data: The temperature dependence of x <sub>1</sub> $log(x_1/mol \ fraction \ bar^{-1})$ $log(K_H/mol \ cm^{-3} \ atm^{-1}) =$ The enthalpy of solution, $^{\Lambda}H$ , an $^{\Lambda}S^{\circ}$ , are: $^{\Lambda}H/kJ \ m$ $^{\Lambda}S^{\circ}/J \ K^{-1}$	and K <sub>H</sub> are expressed by the relations = -4.304 - 267.1/(T/K) (compiler) = -6.055 - 204.6/(T/K) (compiler) d the standard entropy of solution, $mol^{-1} = 4.0$ $mol^{-1} = -25.0$ (at 623 K)
AUXILIAR	Y INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique. Details of the experimental method are described elsewhere (1,2). Briefly, the apparatus Was evacuated and carbon dioxide Was introduced into the system at about one bar pressure. The initial pressure was immediately noted. The melt was vigorously stirred and the pressure variations, due to the gas	High purity quality carbon dioxide (S.I.O., Milan) was dried in dry ice. Reagent-grade sodium nitrate (Carlo Erba, Milan) was used without further treatment.
dissolution, were recorded until	ESTIMATED ERROR:
The final value of gas pressure Was noted and Henry's law Constant was calculated.	Nothing specified.
	REFERENCES:
	1. Desimoni, E.; Paniccia. F.;
	Zambonin, P. G.
	J. Electroanal. Chem. <u>1972</u> , 38, 373.
	Signorile, G.
	J. Electroanal. Chem. <u>1970</u> , 28, 237.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</pre>	Bratland, D.; Krohn, C.		
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	Acta Chem. Scand. <u>1969</u> , 23, 1839 - 40.		
VARIABLES:	PREPARED BY:		
T/K = 590 - 670 P/kPa: 101.325 (1 atm.)	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubilities of $CO_2$ in the melt are reported only in the graphical form in the temperature range 590 - 670 K. The values of Henry's law constants, $K_{\rm H}$ , extracted from the graph, at different temperatures, are:			
Т/К 10	<sup>6</sup> K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
595 636 670	1.26 1.59 1.99		
Smoothed Data: Temperature dependence of K <sub>H</sub> is log(K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup> )	expressed by the relation: = -4.132 - 1055.2/(T/K) (compiler)		
std. de	v. = 1.3% (compiler)		
The heat of colution AU is ost	impted to be		
The heat of solution, why is est			
∧H/kJ mo	$1^{-1} = 20.2$ (compiler)		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Chilling method. The experimental method has been described in detail elsewhere (1,2). The melt is saturated with the gas. The dissolved gas is separated from the salt by freezing the melt. The expelled carbon dioxide is measured by transporting it by a stream of pure argon into absorption vessels containing	Carbon dioxide (99.95%) was obtained from Oslo Kulsyrefabric A/S. Sodium nitrate of pro analysi grade was obtained from E. Merck A. G. and Riedel de Haen A. G. Sodium nitrate was vacuum dried at 450°C for 12 hrs.		
Ascarite/Denyarite.	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES:		
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, <b>19</b>, 13.</li> <li>Ibid. Acta Chem. Scand. <u>1966</u>, 20, 1811.</li> </ol>		

\*

COMPONENTS :		ORIGINAL MEASUREMENTS:	
(1) Carbon dioxi	de; $CO_2$ ;	Field, P. E.; Green, W. J.	
[124-38-9]		Green, W. J.	
(2) Sodium nitrate; NaNO <sub>3</sub> ;		Ph. D. Thesis, Virginia Polytechnic	
[/631-99-4]		Institute <u>1969</u> .	
VARIABLES:		PREPARED BY.	
т/к =	587 - 639		
P/kPa = 9	3.219 - 121.59	N. P. Bansal	
EXPERIMENTAL VALUES:			
Henry's law was obeyed over the pa atm). The values of Henry's law cons are:		pressure range studied (0.92 - 1.20 stant, $K_{H}$ , at different temperatures	
	T/K 10 <sup>7</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
	597	1 251	
	589	1.255	
	614	1.117	
	639	1.024	
Smoothed Data: The temperatu	re dependence of K <sub>H</sub>	is given by the expression:	
log(K <sub>H</sub> /mol	$cm^{-3} atm^{-1}) = (-7.90)$	) ± 0.04) + (585.08 ± 0.03)/(T/K)	
	std. dev.	= 0.16%	
The opthalow	of colution AN and	optropy of solution AS area	
The enchalpy	or solucion, "H, and	entropy of solution, AS, are:	
	$\Lambda H/kcal mol^{-1} =$	$= (-2.68 \pm 0.12)$	
	∆S/cal K <sup>-1</sup> mol <sup>-1</sup>	= (-14.55 ± 0.20) (at 637 K)	
	AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCE	EDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution technique. Diagram of the gas solubility apparatus is given in the original publication. The experimental operation consisted of three steps: saturation, elution and analysis. After saturating the melt with carbon dioxide gas, the gas phase was evacuated. Helium was		Matheson Bone Dry carbon dioxide and helium obtained from Airco were used directly from the cylinders. Baker's reagent grade sodium nitrate was used without further purification.	
eluting gas to a	pproximately	ESTIMATED ERROR:	
1 atm. pressure.	The resultant		
helium was analy:	zed with an	solubility = $\pm$ 5% (authors)	
(Varian). The ca	as chromatograph rrier gas used	DEFEDENCIC.	
was also helium.	Average of four	REFERENCES:	
measurements was Calculation of the	used for he gas solubility.		

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</pre>		<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> <li>J. Chem. Eng. Data <u>1980</u>, 25, 45 - 47.</li> <li>Sada, E.; Katoh, S.; Yoshii, H.; Takemoto I. Spiomi N</li> </ol>	
[7631-99-	4]	Ibid. <u>1981</u> , <b>26</b> , 279 - 81.	
VARIABLES:	101 225 (1 atm )	PREPARED BY:	
P/kPa: 101.325 (1 atm.) T/K = 583 - 623		N. P. Bansal	
EXPERIMENTAL VALUES	:		
The solubi	lities of CO <sub>2</sub> in molter e pressure are:	n NaNO $_3$ , at different temperatures, at	
	t/°C 10 <sup>6</sup>	$K_{H}/mol \ cm^{-3} \ atm^{-1}$	
	310	1.07	
	330	1.03	
		T.00	
	AUXILIARY	INFORMATION	
METHOD/APPARATUS/PI	ROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution tec Diagram and solubility app the original p saturated with the gas throug about 50 min. dissolved in t by bubbling ni concentration in the eluted	chnique. d details of the paratus are given in paper. The melt was n CO <sub>2</sub> by bubbling gh the melt for Carbon dioxide the melt was eluted itrogen. The of carbon dioxide mixture was	Carbon dioxide (99.96%) was superpure grade and free from water. Sodium nitrate was of reagent grade. It was dried in a dessicator for a few days followed by drying in a vacuum oven at 423 - 473 K drying for several hours. It was further dried by bubbling anhydrous nitrogen through the molten salt.	
determined wit carbon dioxide	ch an infrared e analyzer (Shimadzu.	ESTIMATED ERROR:	
Type URA-25).	······································	std. error in solubility: < ± 10%	
1		REFERENCES :	
L			

COMPONENTS:	EVALUATOR:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Three investigations are available (1 - 3) for the solubility of carbon dioxide in molten KNO<sub>3</sub> employing two different experimental methods. Smoothed data at different temperatures from the three studies are compared below:

T/K	Ref. 1	Ref. 2	Ref. 3
620	2.83		1.59
640	2.85	10.5	1.50
670	2.95	11.1	1.38

The solubility values of the three investigations are quite different. The  $\Delta H$  values are not only different in magnitude, but also opposite in sign.

Further experimental studies are required before this system can be properly evaluated and recommended values can be advanced.

References:

- Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u>, 69, 2019.
- Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. J. Chem. Eng. Data <u>1981</u>, 26, 279.

3. Green, W. J. Ph. D. Thesis, Virginia Polytechnic Institute 1969.

COMPONENTS :	ORIGINAL MEASUREMENTS:			
(1) Carbon dioxide; $CO_2$ ; [124-38-9]	Paniccia, F.; Zambonin, P. G.			
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	J. Chem. Soc. Faraday Trans. I <u>1973</u> , <b>69</b> , 2019 - 25.			
VARIABLES:	PREPARED BY:			
$P/kPa = 10^{2}$	N. D. Dangel			
1/K = 616 = 676	N. F. Dalisal			
EXPERIMENTAL VALUES:				
The solubilities, $x_1$ , of $CO_2$ in molten $KNO_3$ at different temperatures are reported in graphical form. The values of $x_1$ derived from the graph, by the compiler, are:				
10 <sup>5</sup> x <sub>1</sub> / T/K mol fraction ba	$10^7 K_{H}/$ ar <sup>-1</sup> mol cm <sup>-3</sup> atm <sup>-1a</sup>			
616 1 54	2.88			
628 1.46	2.72			
640 1.54 670 1.61	2.85			
	2.55			
"Molten Salts Handbook" Academic Press, New York (1967). Smoothed Data: The temperature dependence of $x_1$ and $K_H$ are expressed by the relations: $log(x_1/mol \ fraction \ bar^{-1}) = -4.473 - 217.3/(T/K)$ (compiler) $log(K_H/mol \ cm^{-3} \ atm^{-1}) = -6.308 - 149.1/(T/K)$ (compiler) The enthalpy of solution, $^{A}$ H, and the standard entropy of solution, $^{A}$ S°, are: $^{A}$ H/kJ mol <sup>-1</sup> = 3.0				
AUXILIARY	INFORMATION			
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
The experimental procedure has been described in detail elsewhere (1,2). In brief, the apparatus was evacuated and then carbon dioxide was introduced into the system at about one bar	dioxide (S.I.O., Milan) was dried in dry ice. Reagent grade potassium nitrate (Carlo Erba, Milan) was used without further purification.			
pressure. The initial gas pressure was immediately noted. The melt was vigorously stirred				
and the fall in gas pressure due to its solubility in the melt was	ESTIMATED ERROR:			
recorded till equilibrium was attained. The final gas pressure was noted and Henry's constant	Nothing specified.			
was evaluated.	REFERENCES:			
	<ol> <li>Desimoni. E.; Paniccia, F.; Zambonin, P.G.</li> <li>J. Electroanal. Chem. <u>1972</u>, 38, 373.</li> <li>Zambonin, P. G.; Cardetta, V.L.; Signorile, G.</li> <li>J. Electroanal. Chem. <u>1970</u>, 28, 237.</li> </ol>			

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Carbon dioxide; $CO_2$ ; [124-38-9]	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.	
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	J. Chem. Eng. Data <u>1981</u> , 26, 279 - 81.	
VARIABLES: P/kPa: 101.325 (1  atm.) T/K = 643 - 673	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubilities of CO <sub>2</sub> in molter at one atmosphere pressure are:	N KNO <sub>3</sub> , at different temperatures,	
t/°C 10 <sup>6</sup> H	K <sub>22</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
370 375 400	1.06 1.20 1.12	
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted mixture was measured with	Carbon dioxide (99.96%) was superpure grade and free from water Potassium nitrate used was of reagent grade.	
an infrared carbon dioxide	ESTIMATED ERROR:	
unaryzer.	Nothing specified.	
	REFERENCES:	
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>	
	J. Chem. Eng. Data <u>1980</u> , 25, 45.	

COMPONENTS :		ORIGINAL MEASUREMENTS:	
(1) Carbon dios [124-38-9]	kide, CO₂;	Green, W. J. Ph. D. Thesis. Virginia	Polytechnic
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]		Institute <u>1969</u> .	
VARIABLES:		PREPARED BY:	
T/K = 611 - 669		N. P. Bansa	1
EXPERIMENTAL VALUES:			
For the solu upto the pressu range was only reported solubi different tempo	ubility of CO <sub>2</sub> in molt ure of 200 torr. The e used in calculating t ilities. The values of eratures are:	ten KNO <sub>3</sub> , Henry's law was experimental data in this the thermodynamic paramet Henry's law constant, K	obeyed only pressure ers and the H, at
-	T/K 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
	611	0.57	
	613 614	1.37 1.64	
	615 624	1.10 1.83	
	625 631	1.01	
	633 643	1.31	
	646	1.75	
	667	1.19	
	669	1.03	
			continued
	AUXILIARY	INFORMATION	
METHOD/APPARATUS/PRO	DCEDURE:	SOURCE AND PURITY OF MATERIAL	LS;
Elution technique. Diagram and details of the gas solubility apparatus are given in the original publication. The experimental process consisted of three steps: saturation, elution and analysis. After saturating the melt with carbon dioxide, the gas phase was evacuated. Helium was introduced into the system as eluting gas to approximately 1 arm processors		Matheson Bone Dry c and helium obtained from used directly from the Source and purity o described.	arbon dioxide m Airco were cylinders. f KNO3 not
approximately 1 atm. pressure. The resultant gas mixture of carbon dioxide and helium was analyzed with an Aerograph Model 90-P gas chromatograph (Varian). The carrier gas used was also helium.		ESTIMATED ERROR: $\delta C/P = \pm 5\%$ (at REFERENCES:	uthors)

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Green, W. J.
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	<b>Ph. D. Thesis</b> , Virginia Polytechnic Institute <u>1969</u> .
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
Temperature dependence of $K_{H}$ is	expressed by the equation:
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -7.604 + 499.06/(T/K)
std. de	v. = 0.52%
The enthalpy of solution, <b>^</b> H, an	d entropy of solution, AS, are:
AH/kcal mol <sup>-1</sup>	$= -2.28 \pm 0.44$
∆S/cal K <sup>-1</sup> mol <sup>-</sup>	<sup>1</sup> = -13.11 ± 0.69 (at 670 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
·	
	ESTIMATED ERROR:
	REFERENCES:
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COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.		
(2) Rubidium nitrate; RbNO <sub>3</sub> ; [13126-12-0]	<b>J. Chem. Eng. Data <u>1981</u>, 26,</b> 279 - 81.		
VARIABLES:	PREPARED BY .		
P/kPa: 101.325 (1 atm.)			
T/K = 623 - 723	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubilities of CO <sub>2</sub> in molter one atmosphere pressure are:	n RbNO3, at different temperatures, at		
t/°C 10 <sup>6</sup> H	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
250	1.80		
400	1.78		
450	1.77		
Smoothed Data:			
Temperature dependence of K., is a	expressed by the relation:		
LOG(K <sub>H</sub> /mOL Cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.921 + 119.2/(T/K) (compiler)		
std. dev	7. = 0.8% (compiler)		
The heat of solution, $\Delta H$ , is est.	imated to be:		
	1 = -2.3 (complier)		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS.		
	Sound and tourn of mathematic		
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the	Carbon dioxide (99.96%) was of superpure grade and free from water. Rubidium nitrate was of reagent grade.		
an infrared carbon dioxide	ESTIMATED ERROR:		
analyzer.	Nothing specified.		
	REFERENCES		
	1. Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.		
	<b>J. Chem. Eng. Data</b> <u>1980</u> , <b>25</b> , 45.		

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.		
<pre>(2) Cesium nitrate; CsNO<sub>3</sub>;     [7789-18-6]</pre>	<b>J. Chem. Eng. Data</b> <u>1981</u> , <b>26</b> , 279 - 81.		
VARIABLES:	PREPARED BY:		
P/kPa: 101.325 (1 atm.) T/K = 723 - 773	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubilities of CO <sub>2</sub> in molter at one atmosphere pressure are:	h CsNO <sub>3</sub> , at different temperatures,		
t/°C 107 K	S <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
450 475 500	9.60 8.10 9.30		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of CO <sub>2</sub> in the eluted gas mixture was measured with an	Carbon dioxide (99.96%) was of superpure grade and free from water. Cesium nitrate was of reagent grade.		
infrared carbon dioxide analyzer.	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES:		
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>		
	<b>J. Chem. Eng. Data</b> <u>1980</u> , <b>25</b> , 45.		

COMPONENTS: (1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Sodium chloride; NaCl; [7647-14-5] EVALUATOR: N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Six studies (1 - 6) are available for the solubility of carbon dioxide in molten NaCl. Values of refs. 1 and 2 are too high by about an order of magnitude, probably, due to the formation of nickel oxide from the nickel containers which reacts with carbon dioxide to form carbonate ions (3). These two investigations are, therefore, rejected. Smoothed data at different temperatures from the remaining four studies are compared below:

	$10^7 \text{ K}_H/\text{mol cm}^{-3} \text{ atm}^{-1}$					
	т/к	Ref. 3	Ref. 4	Ref. 5	Ref. 6°	
	1100 1130 1160 1190 1220 1250 1270	5.20 5.59 5.98 6.37 6.77 7.18 7.45	5.18 5.57 5.97 6.37 6.78 7.20 7.48	 9.9*  10.1 <sup>b</sup>	7.10 7.51 7.92 8.31 8.72 8.98	
	At 1223 K At 1273 K Values in using den Academic	(mol cm <sup>-3</sup> sity data f Press, New	atm <sup>-1</sup> ) were From Janz, ( York, 1967,	e calculated 3. J. "Molto	d by the eval en Salts Hand	uator <b>book"</b> ,
teo inv lov va:	The studies (3,4) are from the same group of workers using the same techniques and their results are lower compared to the other two investigations. The values of Bezukladnikov et al. (6) are 10 - 15% lower than those of Sada et al. (5). Further studies are needed in order to advance recommended solubility values for this gas - molten salt system.					
Rei	ferences:					
1.	Grjotheim, K. Scand. <u>1962</u> ,	; Heggelund 16, 689.	l, P.; Krohr	n, C.; Matzi	Eeld, K. Acta	Chem.
2.	Krohn, C, Tid	sskr. Kjemi	. Bergv. Me	et. <u>1962</u> , 22	2, 207.	
3.	Bratland, D.; Scand. <u>1966</u> ,	Grjotheim, <b>20</b> , 1811.	K.; Krohn,	, C.; Matzfe	eld, K. Acta (	Chem.
4.	Bratland, D.; <u>1967</u> , <b>19</b> , 13.	Grjotheim,	K.; Krohn,	, C.; Matzfe	eld, K. J. Me	tals
5.	Sada, E.; Kat Eng. Data <u>198</u>	oh, S.; Yos <u>1</u> , <b>26</b> , 279.	shii, H.; Ta	akemato, I.;	; Shiomi, N.	J. Chem.
6.	Bezukladnikov Phys. Chem. <u>1</u>	, A, B.; De <u>970</u> , <b>44</b> , 13	evyatkin, V. 9.	N.; Ll'che	eva, O. N. Ru	ss. J.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	1. Grjotheim, K.; Heggelund, P.; Krohn, C.; Matzfeldt, K. Acta Chem. Scand. <u>1962</u> , <b>16</b> , 689 - 94.		
(2) Sodium chloride; NaCl; [7647-14-5]	2. Krohn, C. Tidsskr. Kjemi, Bergv, Met. <u>1962</u> , 22, 207 -10.		
VARIABLES: P/PPat 101 325 (1 atm )	PREPARED BY:		
$\pi/\kappa = 1085 = 1221$	N D Bangal		
178 - 1005 1221	No 1. Dunsul		
EXPERIMENTAL VALUES:			
Solubilities of CO <sub>2</sub> at 1 atm. pre	essure at different temperatures are:		
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
812.2	4.20		
813.0	4.81		
830.4	4.18		
852.0	5.07		
948.3	5.71		
Smoothed Data: Temperature dependence of the Her the equation:	mry's law constant, $K_{H}$ , is given by		
$\log(K_{H}/mol ml^{-1} atm^{-1})$	= -4.19 - 1273.5/(T/K) (compiler)		
std. dev	7. = 3.4% (compiler)		
The heat of solution, AH, is:			
AH/k.I.mol	-1 = 29.7		
	- 25.7		
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Stripping method	Not described		
The technique was essentially	Not described.		
the same as used by Grimes et al.			
the apparatus and procedure is			
given in the original paper.			
This method is basically the elution technique. The melt was			
saturated with carbon dioxide by			
Pupping the gas through it. A part of this saturated molten			
salt was transferred to the	ESTIMATED ERROR:		
of its CO <sub>2</sub> - content by bubbling	Nothing specified.		
pure nitrogen. The amount of $CO_2$			
was determined by absorption in Ascarite.	DEFEDENCES		
	ALTERENCES ;		
	1. Grimes, W. R.; Smith, N. V.; Watson, G.		
	J. Phys. Chem. <u>1958</u> , <b>62</b> , 862.		

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.		
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	<b>Acta Chem. Scand.</b> <u>1966</u> , <b>20</b> , 1811 - 26.		
VARIABLES: P/kpat 101 225 (1 atm )	PREPARED BY:		
r/r = 1074 = 1270	N. D. Pangal		
1/1 = 10/4 = 12/0	N. F. Dalisat		
EXPERIMENTAL VALUES:			
Solubilities of CO <sub>2</sub> at 1 atmosph temperatures are:	re CO <sub>2</sub> pressure at different		
t/°C 107	K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
	5 0 4 0 <i>C</i> 4 <del>0</del>		
801	$5.9 \pm 0.04^{-1}$		
862	5.64 ± 0.29		
904	$6.19 \pm 0.20$		
997	7.58 ± 0.47		
By volumetric method	; rest by chilling method.		
Smoothed Data:			
Temperature dependence of Henry' equation:	s law constant, $K_{H}$ , is given by the		
$\log(K_{\rm m}/mo)$ ml <sup>-1</sup> atm <sup>-1</sup>	$= -5.12 - 1280/(\pi/K)$ (compiler)		
	$= 2.2^{\circ}  (\text{complex})$		
sta. de	v = 3.2% (complet)		
	continued		
AUXILIARY	INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Three different techniques	Carbon dioxide - not mentioned.		
thermogravimetric and chilling	analysi quality from E. Merck A. G.		
method. Detailed description of	In the volumetric and		
each technique is given in the	thermogravimetric measurements, the		
Volumetric Method: The change in	the chilling method, the salt was		
volume of the gas (at constant	dried under vacuum at 450°C for 4		
pressure) caused by its	hrs.		
directly determined. This is not			
a very accurate method and was	ESTIMATED ERROR:		
finally abandoned. The estimated			
about 25%.	solubility = ± 10% (authors)		
Thermogravimetric Method: The			
sample due to the dissolution of	REFERENCES :		
the gas is determined using a			
balance. Chilling Mothod, It orploug the			
separation of the dissolved das			
from the salt by freezing of			
Continued			

COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.		
(2) Sodium chloride; NaCl; [7647-14-5]	<b>Acta Chem. Scand.</b> <u>1966</u> , <b>20</b> , 1811 - 26.		
VARIABLES:	PREPARED BY:		
T/K = 1074 - 1270	N. P. Bansal		
EXPERIMENTAL VALUES:			
continued			
The heat of dissolution, AH, and	the entropy of dissolution, $\$ S, are:		
∆H/kJ mo	$1^{-1} = 24.7$		
∆S/J K <sup>-1</sup> 1	$mol^{-1} = 21.3$ (at 1150 K)		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
continued .			
the melt. The expelled carbon			
dioxide is carried into the absorption vessel by a stream of			
pure nitrogen. This method is less cumbersome and more			
expedient than the other two but			
accuracy.			
	ESTIMATED ERROR:		
	REFERENCES:		

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COMPONENTS:	ORIGINAL MEASUREMENTS:			
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.			
<pre>(2) Sodium chloride; NaCl;   [7647-14-5]</pre>	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.			
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:			
T/K = 1100 - 1285	N. P. Bansal			
-,				
EXPERIMENTAL VALUES:				
Solubilities of $CO_2$ in molten so temperatures are reported in the for $K_{H}$ derived from the plot, by the com- presented below:	lium chloride at different cm of a log $K_{H}$ <u>vs.</u> 1/T plot. Values of npiler, at different temperatures are			
Т/К 107 н	K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>			
1101	5.2 t 0.2			
1133	5.6 ± 0.3			
1176	$6.2 \pm 0.2$ $6.8 \pm 0.4$			
1285	7.7 ± 0.5			
Smoothed Data: Temperature dependence of $K_{H}$ is expressed by the equation: $\log(K_{H}/\text{mol ml}^{-1} \text{ atm}^{-1}) = -5.094 - 1311/(T/K)$ (compiler) std. dev. = 0.15% (compiler) The heat of dissolution, $AH$ , and entropy of dissolution, $AS$ , are: $AH/kJ \text{ mol}^{-1} = 25.94$ $AS/J K^{-1} \text{ mol}^{-1} = 22.6$ (at 1150 K)				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Four different techniques have been employed. Detailed description of the apparatus and procedure for each method are given in the original paper. <u>Stripping Method</u> : The melt is saturated with the gas. The dissolved gas is stripped with an inert gas and absorbed in Ascarite. This method gave results about an order of	Sodium chloride, <u>pro analysi</u> quality, from Merck AG, Darmstadt, West Germany was used. It was either dried <u>in situ</u> (volumetric and thermogravimetric methods) or pre-dried in vacuum at 450°C for 4 hrs. (chilling method).			
magnitude higher than those	ESTIMATED ERROR:			
obtained by all other methods. <u>Volumetric Method</u> : The change in volume of gas (at constant pressure) caused by its discultion in the molt is	solubility = ± 10% (authors)			
directly determined. This is not an accurate method, the estimated uncertainty being about 25%. <u>Thermogravimetric Method</u> : The gain in the weight of the melt sample due to the dissolution of continued	REFERENCES:			

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.
<pre>(2) Sodium chloride; NaCl;     [7647-14-5]</pre>	<b>J. Metals <u>1967</u>, 19,</b> 13 - 20.
VARIABLES:	PREPARED BY:
T/K = 1100 - 1285	N. P. Bansal
EXPERIMENTAL VALUES:	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
continued	
the gas is measured using a	
thermobalance.	
gas is removed from the melt by	
expelled gas is carried into	
Ascarite/Dehydrite by a stream	
of pure argon. This method is simpler and more expedient than	ESTIMATED ERROR:
the others but giving comparable or better accuracy.	
-	
	REFERENCES:

ORIGINAL MEASUREMENTS:

COMPONENTS:

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.		
(2) Potassium chloride; KCl; [7447-40-7]	<b>J. Chem. Eng. Data <u>1981</u>, 26,</b> 279 - 81.		
VARIABLES:	PREPARED BY:		
T/K = 1208 - 1273	N. P. Bansal		
EXPERIMENTAL VALUES:			
The gas solubilities at 1 atmosp	nere pressure are:		
<sup>1</sup> t/°C 10 <sup>7</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
935	8.33		
950	9.78		
1000	9.08		
Smoothed Data:			
Temperature dependence of K <sub>H</sub> is g	given by the equation:		
log(K <sub>w</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -5.758 - 358.3/(T/K) (compiler)		
std do	$= 2 E_{\mu}^{\mu} (\text{compiler})$		
	· - 5.5% (Compiler)		
The enthalpy of solution, $\Delta H$ , is	estimated to be:		
$\Delta H/kJ \text{ mol}^{-1} = 6.9  (\text{compiler})$			
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon divide by bubbling the	Carbon dioxide (99.96%) was of superpure grade and free from water. Potassium chloride was of reagent grade.		
gas through the melt. Dissolved gas in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted			
mixture was measured with an infrared carbon dioxide analyzer.	ESTIMATED ERROR:		
	Nething coesified		
	Nothing specified.		
	REFERENCES:		
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>		
	J. Chem. Eng. Data <u>1980</u> , 25, 45.		

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> </ul>	Bezukladnikov, A. B.; Devyatkin, V. N.; Ll'icheva, O. N. Zh. Fiz. Khim. <u>1970</u> , 44, 253 - 54; Russ. J. Phys. Chem. (Eng. Transl.) <u>1970</u> , 44, 139. (*).
VARIABLES: P/kPa: 101.325 (compiler) T/K = 1133 - 1273	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·
Solutions of carbon dioxide in mo temperature dependence of solubility 1133 - 1273 K, is expressed by the r	olten NaCl obey Henry's law. The $\gamma$ , $x_1$ (mol fraction), in the range relations:
$x_1$ (mol fraction) = 36.1	$x \ 10^{-5} \ \exp[-5804 \ cal/RT]$
$log(x_1/mol fraction) =$	-3.4425 - 1268.6/(T/K) (compiler)
The heat of solution, $\Delta H$ , is give	en as:
∆H/kJ mol	$^{-1} = +24.28$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. Carbon dioxide is bubbled through the melt till saturated. The dissolved gas is displaced by flushing with an inert gas. The liberated CO <sub>2</sub> is absorbed in barium hydroxide solution. The excess of barium hydroxide is titrated with potassium hydrogen phthalate.	Not reported. ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
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COMPONENTS: (1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Potassium chloride; KCl; [7447-40-7] EVALUATOR: N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

CRITICAL EVALUATION:

Seven investigations (1 - 7) have been reported for the solubility of carbon dioxide in molten KCl. Results of refs. 1 and 2 are too high by almost an order of magnitude, probably, due to the formation of nickel oxide from the nickel containers which reacts with carbon dioxide to form carbonate ions (4). These two studies are, therefore, rejected. Smoothed data from the remaining sources at different temperatures are presented below for comparison:

1

	$10^7 \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$					
	T/K	Ref. 3	Ref. 4	Ref. 5	Ref. 6	Ref. 7ª
-	1070 1100 1130 1160 1190 1220 1250 1280 1300 1320	6.50 6.88 7.27 7.65 8.04 8.42 8.80 (9.18) (9.43) (9.69)	6.37 6.75 7.12 7.50 7.88 8.26 8.63 (9.00) (9.25) (9.50)	(7.42) 7.70 7.99 8.26 8.53 8.80 (9.06) (9.32) 	 (8.41) (8.57) (8.73) 8.88 9.02 (9.16) (9.26) 	(7.35) (7.75) 8.14 8.53 8.90 9.27 9.62 9.97 10.19 10.41
a.	Values in ata from Gan York, <u>1967</u> Values in ( measurement;	(mol cm <sup>-3</sup> z, G. J. " ) outside extrapola	atm <sup>-1</sup> ) calc Molten Salt the tempera ted by the	ulated by t s Handbook" ture interv evaluator.	he evaluato , Academic al of exper	r using density Press, New imental
The studies $(3,4)$ are from the same group of workers using the same techniques and their results are consistently low by about 10% in comparison to the values of Bezukladnikov et al. (7). The results of $(5,6,7)$ agree with each other in certain temperature ranges but differ at other temperatures due to the difference in the values of $\Delta H$ reported by them. Additional investigations are required in order to advance recommended solubility values for this system.						
Re:	ferences:					
1.	<ol> <li>Grjotheim, K.; Heggelund, P.; Krohn, C.; Matzfeldt, K. Acta Chem. Scand. <u>1962</u>, 16, 689.</li> </ol>					
2.	Krohn, C. T	idsskr. Kj	emi, Bergv.	Met. <u>1962</u> ,	22, 207.	
<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, 19, 13.</li> </ol>						
4.	Bratland, D Scand. <u>1966</u>	; Grjothe , <b>20</b> , 1811	im, K.; Kro •	hn, C.; Mat	zfeldt, K.	Acta Chem.
5.	Novozhilov, Chem. <u>1972</u> ,	A. L.; De 46, 1398.	vyatkin, V.	N.; Grilov	a, E. I. <b>Ru</b>	ss. J. Phys.
6.	Sada, E.; Ka Eng. Data <u>19</u>	atoh, S.; <u>981</u> , <b>26</b> , 2	Yoshii, H.; 79.	Takemoto,	I.; Shiomi,	N. J. Chem.
7.	Bezukladniko Phys. Chem.	ov, A. B.; <u>1970</u> , <b>44</b> ,	Devyatkin, 139.	V. N.; Ll'	icheva, O. 1	N. Russ. J.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	1. Grjotheim, K.; Heggelund, P.; Krohn, C.; Matzfeldt, K. Acta Chem. Scand. <u>1962</u> , <b>16</b> , 689 - 94.		
<pre>(2) Potassium chloride; KCl;     [7447-40-7]</pre>	2. Krohn, C. Tidsskr. Kjemi, Bergv., Met. <u>1962</u> , 22, 207 - 10.		
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:		
T/K = 1064 - 1243	N P Bancal		
EXPERIMENTAL VALUES:			
Solubilities of CO <sub>2</sub> at 1 atm pres	ssure at different temperatures are:		
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
791.0	2.73		
792.9	3.02		
823.5	2.78		
835.5	4.14		
863.1	5.26 4.02		
903.0	4.65		
925.0	6.81 8.90		
the equation: log(K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup> ) std. dev The heat of solution, AH, is: AH/	<pre>// = -2.339 - 3415.8/(T/K) (compiler) // = 5.7% (compiler) //kJ mol<sup>-1</sup> = 61.9</pre>		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;		
Stripping method. The technique used was essentially the same as used by Grimes et al. (1). The detailed description of the apparatus and procedure is given in the original publication. This method is basically the elution technique. The melt was saturated with carbon dioxide by bubbling the gas through it. A part of this saturated molten salt was	Not described.		
transferred to the stripping			
Content by bubbling pure	Nothing specified.		
nitrogen. The amount of CO <sub>2</sub> was			
Ascarite.	REFERENCES:		
	1. Grimes, W. R.; Smith, N. V.; Watson, G. M.		
	J. Phys. Chem. <u>1958</u> , 62, 862.		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.	
(2) Potassium chloride; KCl; [7447-40-7]	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.	
VARIABLES:	PREPARED BY:	
T/K = 1074 - 1276 P/kPa: 101.325 (1 atm.)	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of $CO_2$ in fused KCl <u>vs</u> . 1/T plot. Values of K <sub>H</sub> at different plot, by the compiler, are given be	are reported in the form of a log $K_{H}$ rent temperatures derived from the low:	
T/K 10 <sup>7</sup> H	$x_{H}/mol ml^{-1} atm^{-1}$	
1074 1123 1188 1224 1276	6.5 ± 0.3 7.2 ± 0.2 8.0 ± 0.3 8.6 ± 0.2 9.0 ± 0.1	
Smoothed Data: Temperature dependence of $K_{H}$ is expressed by the equation: $\log(K_{H}/\text{mol ml}^{-1} \text{ atm}^{-1}) = -5.272 - 979.3/(T/K)$ (compiler)		
The heat of solution, $\Delta H$ , and ent	cropy of dissolution, AS, are:	
∆H/kJ mol	L <sup>-1</sup> = 19.7	
∆S/J K <sup>-1</sup> n	$nol^{-1} = 17.2$ (at 1150 K)	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Four different techniques have been employed. Detailed description of the apparatus and procedure for each method are given in the original paper. <u>Stripping Method</u> : The melt is saturated with the gas. The dissolved gas is stripped with an inert gas and absorbed in Ascarite. This method gave results about an order of	Potassium chloride, <u>pro analysi</u> quality, from Merck AG, Darmstadt, West Germany, was used. It was either dried <u>in situ</u> (volumetric and thermogravimetric methods) or pre-dried in vacuum at 450°C for 4 hrs. (chilling method).	
magnitude higher than those obtained by all other methods. Volumetric Method: The change in	ESTIMATED ERROR:	
volume of gas (at constant pressure) caused by its dissolution in the melt is	solubility = ± 10% (authors)	
directly determined. This is not an accurate method, the estimated uncertainty being about 25%	KEFERENCES:	
Thermogravimetric Method: The gain in the weight of the melt continued		

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.	
<pre>(2) Potassium chloride; KCl; [7447-40-7]</pre>	<b>J. Metals <u>1967</u>, 19,</b> 13 - 20.	
VARIABLES:	PREPARED BY:	
T/K = 1074 - 1276	N. P. Bansal	
EXPERIMENTAL VALUES:		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Continued		
sample due to the dissolution of the gas is measured using a thermobalance. <u>Chilling Method</u> : The dissolved gas is removed from the melt by freezing of the melt. The expelled gas is carried into absorption vessels containing Ascarite/Dehydrite by a stream of pure argon. This method is simpler and more expedient than the others but giving comparable or better accuracy.	ESTIMATED ERROR:	
	KEFEKENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.	
<pre>(2) Potassium chloride; KCl; [7447-40-7]</pre>	Acta Chem. Scand. <u>1966</u> , 20, 1811 - 26.	
VARIABLES:	PREPARED BY:	
T/K = 1049 - 1275	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
Solubilities of CO <sub>2</sub> at different	temperatures at 1 atm. pressure are:	
t/°C 107	K <sub>m</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>	
776	7.2 + 1.8 *	
799	6.45 ± 0.23	
851	$7.15 \pm 0.20$ $7.90 \pm 0.01$	
912	8.03 ± 0.24	
952	$8.57 \pm 0.21$ $8.95 \pm 0.19$	
By volumetric method;	other values by chilling method.	
Smoothed Data: Temperature dependence of the Hen the equation:	ry's law constant, $K_{H}$ , is given by	
log(K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>	) = -5.28 - 980/(T/K)	
std. dev	. = 2.2% (compiler)	
The heat of dissolution, AH, and	the entropy of dissolution, AS, are:	
$AH/kI mol^{-1} = 18.8 AS/$	$T K^{-1} mol^{-1} = 16.3$ (at 1150 K)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Detailed description of	Carbon dioxide - not mentioned	
each technique is given in the	Potassium chloride was of pro	
original publication.	analysi grade from E. Merck A. G. in	
volume of the gas (at constant	measurements, the salt was dried in	
pressure) caused by its	situ, whereas in the chilling	
dissolution in the melt is directly determined This is not	method, the salt was dried under	
a very accurate method and was		
finally abandoned. The estimated		
Thermogravimetric Method: The gain		
in the weight of the melt sample	ESTIMATED ERROR:	
due to the dissolution of the gas	solubility = +109  (authors)	
<u>Chilling Method</u> : It employs the		
separation of the dissolved gas	REFERENCES	
melt. The expelled CO <sub>2</sub> is carried		
into the absorption vessel by a		
hod is less cumbersome and more		
expedient than the other two but		
the accuracy is comparable or better.	• · · ·	

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I.		
<pre>(2) Potassium chloride; KCl; [7447-40-7]</pre>	Russ. J. Phys. Chem. (Eng. Transl.) <u>1972</u> , <b>46</b> , 1398 - 1400. (*).		
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:		
T/K = 1078 - 1223	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubilities of $CO_2$ in molte:	n KCl at different temperatures are:		
т/к	10 <sup>4</sup> Soly./M		
1078	7.50		
1120 1175	7.93 8.41		
1223	8.84		
Smoothed Data:			
Temperature dependence of K <sub>H</sub> is e	expressed by the relation:		
$\log(\text{Solv/mol} \text{ cm}^{-3})$	= -5.526 - 646/(T/K) (compiler)		
std des	r = 0.14 (compiler)		
The best of colution AU is out	instal to be		
The near of solution, $\Delta n$ , is est			
	$1^{-2} = 12.4$ (compiler)		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method.	Condensation method was employed		
The diagram and details of the apparatus used and procedure followed are given in the original paper. In brief, the melt is saturated with carbon dioxide. A portion of the saturated melt is either sparged with argon or it is solidified and the solid salt evacuated. The volume of liberated CO <sub>2</sub> is then	for drying the gases.		
determined with a gas burette.	ESTIMATED ERROR:		
	solubility = ± 1% (authors)		
	REFERENCES:		

234	
COMPONEN	TS:
(1) (	Carbon dioxide; CO <sub>2</sub> ; [124-38-9]
(2)	Potassium chloride; KCl; [7447-40-7]
VARIABLE	2S: P/kPa: 101.325 (1 atm )

Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. J. Chem. Eng. Data 1981, 26, 279 -81. PREPARED BY: P/kPa: 101.325 (1 atm.) T/K = 1208 - 1273N. P. Bansal EXPERIMENTAL VALUES: The gas solubilities at 1 atmosphere pressure are:

ORIGINAL MEASUREMENTS:

t/°C	107 K <sub>**</sub> /mol cm <sup>-3</sup> a	atm <sup>-1</sup>
935	8.33	
970 1000	. 8.74 9.08	

Smoothed Data:

Temperature dependence of  $K_{H}$  is given by the equation:  $\log(K_{\rm H}/{\rm mol}\ {\rm cm}^{-3}\ {\rm atm}^{-1}) = -5.758 - 358.3/({\rm T/K})$ (compiler) std. dev. = 3.5% (compiler) The enthalpy of solution,  $\Delta H$ , is estimated to be:

 $\Delta H/kJ \mod^{-1} = 6.9$  (compiler)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved gas in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted mixture was measured with an infrared carbon dioxide analyzer. SOURCE AND PURITY OF MATERIALS:

Carbon dioxide (99.96%) was of superpure grade and free from water. Potassium chloride was of reagent grade.

ESTIMATED ERROR:

Nothing specified.

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**REFERENCES:** 

1. Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.

J. Chem. Eng. Data 1980, 25, 45.
	230
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Bezukladnikov, A. B.; Devyatkin, V. N.; Ll'icheva, O. N. Zh. Fiz. Khim. <u>1970</u> , 44, 253 - 54; Russ. J. Phys. Chem. (Eng. Transl.) <u>1970</u> , 44, 139. (*).
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1133 - 1323	N. P. Bansal
EXPERIMENTAL VALUES:	• • • • • • • • • • • • • • • • • • •
Solutions of carbon dioxide in m temperature dependence of solubilit 1133 - 1323 K, is expressed by the	olten KCl obey Henry's law. The y, $x_1$ (mol fraction), in the range equations:
$x_1$ (mol fraction) = 38.9 x	10 <sup>-5</sup> exp[-5047 cal/R(T/K)]
$log(x_1/mol fraction)$	= -3.410 - 1103.1/(T/K) (compiler)
The heat of solution, $ riangle$ H, is given by	ven as:
∆H/kJ mol <sup>-</sup>	$^{-1} = + 21.12$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. Carbon dioxide is bubbled through the melt till saturated. The dissolved gas is displaced by flushing with an inert gas. The liberated CO <sub>2</sub> is absorbed in barium hydroxide solution. The excess barium hydroxide is titrated with potassium hydrogen phthalate.	Not reported.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.
<pre>(2) Rubidium chloride; RbCl; [7791-11-9]</pre>	<b>J. Chem. Eng. Data <u>1981</u>, 26,</b> 279 - 81.
VARIABLES: P/kPa: 101.325 (1 atm.) T/K = 1123 - 1223	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The gas solubilities, $K_{\mu}$ , at a pr	essure of one atmosphere are:
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
850	6.09
950 950	6.63 7.31
Smoothed Data:	
Temperature dependence of $K_{H}$ is e	expressed by the equation:
$\log(K_{\rm m}/{\rm mol}\ {\rm cm}^{-3}\ {\rm atm}^{-1})$	= -5.247 - 1087.5/(T/K) (compiler)
std der	x = 0.4 <sup>2</sup> (compiler)
The best of relation AV is only	
The neat of solution, AH, is est	imated to be:
∆H/kJ mo	$1^{-1} = 20.8$ (compiler)
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution technique. The apparatus and procedure used for solubility measurements was the same as decribed in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Gas dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted mixture was measured with an	Carbon dioxide (99.96%) was of superpure grade and free from water. Rubidium chloride was of reagent grade.
infrared carbon dioxide analyzer.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>
	<b>J. Chem. Eng. Data</b> <u>1980</u> , <b>25</b> , 45.

Components :	ORIGINAL MEASUREMENTS:
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Bezukladnikov, A. B.; Devyatkin, V. N.; Ll'icheva, O. N. <b>Zh. Fiz. Khim. <u>1970</u>, 44,</b> 253 - 54;
<pre>(2) Cesium chloride; CsCl; [7647-17-8]</pre>	Russ. J. Phys. Chem. (Eng. Transl.) <u>1970</u> , <b>44</b> , 139. (*).
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1060 - 1230	N. P. Bansal
EXPERIMENTAL VALUES:	
Solutions of carbon dioxide in mo temperature dependence of solubility 1060 - 1230 K, is expressed by the e	olten CsCl obey Henry's law. The $y$ , $x_1$ (mol fraction), in the range equations:
$x_1$ (mol fraction) = 108.4 x 10 <sup>-5</sup> exp[-6434 cal/R(T/K)]	
$log(x_1/mol \ fraction) =$	= -2.965 - 1406.3/(T/K) (compiler)
The heat of solution, $\Delta H$ , is given as:	
$\Delta H/kJ mol^{-1} = + 26.92$	
AUXILIARY INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution method.	Not reported.
Carbon dioxide is bubbled through the melt till saturated.	
The dissolved gas is displaced by sparging with an inert gas	
The liberated $CO_2$ is absorbed in	
excess of barium hydroxide is	
titrated with potassium hydrogen phthalate.	
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :
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Components :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>;[124-38-9]</li> <li>(2) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ul>	Prutskov, D. V.; Krivoruchko, N. P.; Prisyashnyi, V. D. Rasplavy <u>1988</u> , 2, 70 - 73.	
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:	
T/K = 1023 - 1223	N. P. Bansal	
EXPERIMENTAL VALUES:		
Gas solubilities, K <sub>p</sub> (mol cm <sup>-3</sup> a tures are given below, where K <sub>p</sub> is	tm <sup>-1</sup> ), in the melt at various tempera- the Henry's law constant.	
T/K 10 <sup>5</sup>	$K_p/mol \ cm^{-3} \ atm^{-1}$	
1023	5.69 ± 0.51	
1073 1123	$4.52 \pm 0.44$ $3.55 \pm 0.25$	
1273 1223	3.18 ± 0.20 3.00 ± 0.22	
Temperature dependence of K <sub>p</sub> can be	e expressed by the relation :	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved CO, it was oxidized to CO <sub>2</sub> by passing over powdered CuO at 800 - 900 K. The resulting CO <sub>2</sub> was absorbed in 0.0175M Ba(OH) <sub>2</sub> solution excess of which was titrated against potassium bipthalate. Experiment was repeated 4 - 5 times.	High purity MgCl <sub>2</sub> was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remove H <sub>2</sub> O and O <sub>2</sub> by passing through columns containing P <sub>2</sub> O <sub>5</sub> and titanium sponge heated at 1200 K. CO gas was produced through decomposition of formic acid. ESTIMATED ERROR: Not specified. REFERENCES:	

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>;[124-38-9] (2) Calcium chloride; CaCl<sub>2</sub>; [10043-52-4]</pre>	Prutskov, D. V.; Krivoruchko, N. P.; Prisyashnyi, V. D. Rasplavy <u>1988</u> , 2, 70 - 73.
VANTANTRO-	
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 1073 - 1123	N. P. Bansal
EXPERIMENTAL VALUES:	
Gas solubilities, $K_{p}$ (mol cm <sup>-3</sup> at atures are given below, where $K_{p}$ is t	cm <sup>-1</sup> ), in the melt at various temper- the Henry's law constant.
T/K 10 <sup>7</sup>	Kp/mol cm <sup>-3</sup> atm <sup>-1</sup>
1073	3.49 ± 0.37
1100 1123	3.19 ± 0.39 2.96 ± 0.32
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved	High purity CaCl <sub>2</sub> was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remove $H_2O$ and $O_2$ by passing thro- ugh columns containing $P_2O_5$ and titanium sponge heated at 1200 K. $CO_2$ was purified to remove moisture and $O_2$ by passing over $P_2O_5$ and heated copper shavings
CO, it was oxidized to CO <sub>2</sub> by passing over powdered CuO at 800 - 900 K. The resulting CO <sub>2</sub> was absorbed in 0.0175M Ba(OH) <sub>2</sub> solution excess of which was titrated against potassium bipthalate.	ESTIMATED ERROR: Not specified. REFERENCES:
The experiment was repeated 4 - 5 times.	

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<ul> <li>(1) Carbon Dioxide; CO<sub>2</sub>;[124-38-9]</li> <li>(2) Strontium chloride; SrCl<sub>2</sub>; [10476-85-4]</li> </ul>	Prutskov, D. V.; Krivoruchko, N. P.; Prisyashnyi, V. D. <b>Rasplavy</b> <u>1988</u> , <b>2</b> , 70 - 73.
VARIABLES: P/kPa: 101.325 (compiler) T/K = 1173 - 1323	PREPARED BY: N. P. Bansal
Gas solubilities, Kp(mol cm <sup>-3</sup> at atures are given below, where Kp is	tm <sup>-1</sup> ), in the melt at various temper- the Henry's law constant.
T/K 10 <sup>6</sup>	K <sub>p</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1173 1213 1253 1293 1323	3.06 ± 0.27 2.81 ± 0.29 2.41 ± 0.17 2.00 ± 0.19 2.04 ± 0.18
AUXILIARY	INFORMATION
AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution method. The melt was prepared by melting the chloride under dry HCl atmosphere. The melt was saturated with CO gas by bubbling at the rate of 3-5 lit/h. It was established that saturation was attained in 50-60 min. Argon was bubbled at the rate of 6-9 lit/h through the saturated melt to liberate the dissolved CO gas. In order to determine the amount of dissolved CO, it was oxidized to CO <sub>2</sub> by passing over powdered CuO at 800 - 900 K. The resulting CO <sub>2</sub> was absorbed in 0.0175M Ba(OH) <sub>2</sub> solution excess of which was titrated against potassium bipthalate. The experiment was repeated 4 - 5 times.	INFORMATION SOURCE AND PURITY OF MATERIALS: High purity SrCl <sub>2</sub> was recrysta- llized twice from doubly distilled water and dried in a vacuum oven without permitting melting of the hydrated salt. Argon gas was purified to remov H <sub>2</sub> O and O <sub>2</sub> by passing through column containing P <sub>2</sub> O <sub>5</sub> and titanium sponge heated at 1200 K. CO gas was produced through decomposition of formic acid. ESTIMATED ERROR: Not specified. REFERENCES:

	OBTOTNAL WEACHIDENERING -	
COMPONENTS :	UKIGINAL MEASUKEMENTS:	
(1) Carbon Diovide. $CO \cdot [124-39-9]$	Prutskov, D. V. Krivoruchka N. D.	
(1) Carbon Dioxide; $CO_2$ ; $[124-36-9]$	Prisyashnyi, V. D.	
(2) Barium chloride; BaCl <sub>2</sub> ;	<b>Rasplavy</b> <u>1988</u> , <b>2</b> , 70 - 73.	
[10361-37-2]		
VARTABLES	DDEDADED RY.	
P/kPa: 101.325 (compiler)		
T/K = 1253 - 1373	N. P. Bansal	
EXPERIMENTAL VALUES:		
Gas solubilities, $K_{p}$ (mol cm <sup>-3</sup> tures are given below, where $K_{p}$ is	atm <sup>-1</sup> ), in the melt at various tempera- the Henry's law constant	
т/к 10	<sup>6</sup> K <sub>p</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
	1.05 1.0.00	
1253	$1.86 \pm 0.23$ $1.84 \pm 0.15$	
1333	1.89 ± 0.22	
1373	1.92 ± 0.17	
Temperature dependence of $K_p$ can be expressed by the relation : log $K_p = -5.543 - \frac{293}{7}$		
	•	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method.	High purity BaCl <sub>2</sub> was recrysta-	
The melt was prepared by	llized twice from doubly distilled	
atmosphere. The melt was saturated	without permitting melting of the	
with CO gas by bubbling at the rate	hydrated salt. Argon gas was purif-	
or 3-5 lit/h. It was established that saturation was attained in	ied to remove $H_2O$ and $O_2$ by passing through columns containing $P_1O_2$ and	
50-60 min. Argon was bubbled at the	titanium sponge heated at 1200 K. CO <sub>2</sub>	
rate of 6-9 lit/h through the	was purified to remove moisture and	
dissolved CO gas In order to	$O_2$ by passing over $P_2O_5$ and heated	
determine the amount of dissolved		
Passing over powdered CuO at	ESTIMATED ERROR:	
800 - 900 K. The resulting CO <sub>2</sub> was	Not specified.	
absorbed in 0.0175M Ba(OH) <sub>2</sub> solution		
potassium bipthalate.	DEDEDENCIA	
The experiment was repeated	KLFERENCES:	
<sup>z - </sup> times.		

COMPONENTS: (1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Zinc chloride; ZnCl<sub>2</sub>; [7646-85-7] EVALUATOR: N. P. Bansal National Aeronautic and Space Administration. Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

#### CRITICAL EVALUATION:

Two studies are available (1,2) for the solubility of carbon dioxide in molten ZnCl<sub>2</sub>. Sada et al. (1) used the elution technique while Borodzinski et al. (2) employed a volumetric method. The results at different temperatures from the two investigations are compared in Fig. 1.



At higher temperatures, Fig. 1 shows an excellent agreement between the results of the two studies. However, Sada et al. (1) reported a negative value for  $^{A}$ H, in contrast to a positive value given by Borodzinski, et al. Tentative solubilities based on the results of Sada et al. (1) are given in Table 1. However, additional studies are needed in order to advance recommended values of solubility for this system.

Table 1Tentative Solubilities as a Function of Temperature

			•
	T/K	10 <sup>6</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	_
	580	1.82	•
	600	1.74	
	620	1.61	
	660	1.55	
	680	1.50	
	700	1.45	
	720	1.41	
	740	1.37	
	760	1.33	
	780	1.50	
		· · · · · · · · · · · · · · · · · · ·	,
References: 1. Sada, E.;	Katoh, S.; Be	niko, H.; Yoshii, H.; Kayano, M	. J. Chem.
Engg. Dat	<b>a</b> <u>1980</u> , <b>25,</b> 45		1075
2. Borodzins	K1, A.; SOKOLO	WSK1, A.; SUSK1, L. J. Chem. Th	ermodyn. <u>1975</u>
1, 000,			

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	243
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</pre>	Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.
<pre>(2) Zinc chloride; ZnCl<sub>2</sub>; [7646-85-7]</pre>	<b>J. Chem. Eng. Data</b> <u>1980</u> , <b>25</b> , 45 - 47.
VARIABLES:	PREPARED BY:
P/RPa: 101.325 (1 atm.) T/K = 573 - 723	N. P. Bansal
EXPERIMENTAL VALUES:	
The gas solubilities at 1 atr	nosphere pressure are given as:
t/°C	$10^{6} \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$
300	1.76
325	1.80
375	1.65
400 450	1.47 1.38
Smoothed Data:	
Temperature dependence of $K_{H}$	is given by the expression:
log(K <sub>H</sub> /mol cm <sup>-3</sup> at	$tm^{-1}$ ) = -6.31 + 330.6/(T/K) (compiler)
std.	. dev. = 1.8% (compiler)
The heat of solution, $\Delta H$ , is	estimated to be:
ΔH/k.T	$m_{0}^{1-1} = -6^{3}$
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND FURITY OF MATERIALS;
Elution method. Diagram and details of the solubility apparatus are given in the original paper. The melt was saturated with $CO_2$ by bubbling the gas through the mel for about 50 min. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of $CO_2$ in the eluted mixture was determined with an infrared	Carbon dioxide (99.96%) was superpure grade and free from water. Zinc chloride was of reagent grade. It was dried in a desiccator for a few days and also in a vacuum oven at 150 - 250°C for several hours. It was further dried by bubbling anhydrous nitrogen through the salt in the molten state.
(Shimadzu, Type URA-25).	ESTIMATED ERROR:
	std. error in solubility: < ± 10%
	REFERENCES:

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Borodzinski, A.; Sokolowski, A.; Suski, L.	
<pre>(2) Zinc chloride; ZnCl<sub>2</sub>; [7646-85-7]</pre>	<b>J. Chem. Thermodyn.</b> <u>1975</u> , <b>7</b> , 655 - 60.	
VARIABLES: $P/kPa = 10 - 100$	PREPARED BY:	
T/K = 709 - 778	N. P. Bansal	
EXPERIMENTAL VALUES: Solubilities of CO <sub>2</sub> in the melt a	at different temperatures are:	
T/K 10 <sup>10</sup> x <sub>1</sub> /mol fraction 1	Pa <sup>-1</sup> 10 <sup>6</sup> K <sub>H</sub> <sup>a</sup> /mol ml <sup>-1</sup> atm <sup>-1</sup>	
709 6.52 ± 0.06	1.127	
719 6.41 ± 0.20	1.106	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.214	
753 7.40 ± 0.30	1.268	
778 7.46 ± 0.50	1.271	
<pre>^ Values of K<sub>H</sub> calculated by the compiler using density of <math>2nCl_2</math> from Janz, G. J. "Molten Salts Handbook" Academic Press, <u>1967</u>. Smoothed Data: Temperature dependence of the Henry's law constant is given by the equations: <math>log(x_1/mol \ fraction \ Pa^{-1}) = -8.535 - 454/(T/K)</math> (compiler) <math>log(K_H/mol \ ml^{-1} \ atm^{-1}) = -5.357 - 411.6/(T/K)</math> (compiler) std. dev. = 2.1% (compiler) The standard enthalpy, <math>\wedge H^\circ</math>, and standard entropy, <math>\wedge S^\circ</math>, of solution of the gas are: <math>\wedge H^\circ/kJ \ mol^{-1} = 8.74 \pm 3.68</math> <math>\wedge S^\circ/J \ K^{-1} \ mol^{-1} = -9.58 \pm 5.02</math> (at 720 K)</pre>		
Volumetric method. Diagram and details of the arrangement used are given in the original paper. The melt was saturated with the gas. The saturation process was enhanced by a magnetic stirrer. The change in the volume of the gas caused by its dissolution in the melt was determined. The temperature was controlled within ± 1 K.	Carbon dioxide was 99.99% pure. Zinc chloride p.a. was distilled under vacuum prior to its distillation directly into the apparatus.	
	ESTIMATED ERROR:	
	solubility = ± 5% (authors)	
	REFERENCES :	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</pre>	Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.	
<pre>(2) Stannous chloride; SnCl<sub>2</sub>; [7772-99-8]</pre>	<b>J. Chem. Eng. Data</b> <u>1980</u> , <b>25</b> , 45 - 47.	
VARIABLES: _ ()	PREPARED BY:	
P/RPa: 101.325 (1 atm.) T/K = 543 - 673	N. P. Bansal	
EXPERIMENTAL VALUES:		
The gas solubilities at one atmo	sphere pressure are given as:	
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
270	3.86	
300 350	4.01 3.96	
400	3.75	
Smoothed Data:		
Temperature dependence of K <sub>H</sub> is	expressed by the relation:	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -6.474 + 38.296/(T/K) (compiler)	
std. de	$v_{\rm compiler}$	
The heat of solution AH is est	imated to be	
ΔH/kJ mol	-1 = -0.73 (compiler)	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution technique. Diagram and details of the	Carbon dioxide (99.96%) was superpure grade and free from water.	
solubility apparatus are described in the original	Stannous chloride was of reagent	
publication. The melt was	for a few days followed by in a	
saturated with carbon dioxide by bubbling the gas through the	vacuum oven at 150 - 200°C for several hours. It was further dried	
melt for about 50 min. Carbon diovide diggelued in the melt	by bubbling anhydrous nitrogen	
Was eluted by bubbling nitrogen.	state.	
the eluted mixture was determined	ESTIMATED ERROR:	
with an infrared carbon dioxide		
	std. error in solubility: < ± 10%	
	REFERENCES:	
1		

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>;    [124-38-9]</pre>	Bratland, D.; Krohn, C.
<pre>(2) Sodium fluoride; NaF; [7681-49-4]</pre>	Acta Chem. Scand. <u>1969</u> , 23, 1839 - 40.
VARIABLES:	PREPARED BY:
T/K = 1270 - 1380 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The authors reported the solubil temperature interval 1270 - 1380 K The values of Henry's law constants different temperatures are:	ities of $CO_2$ in the melt in the in graphical form only. , $K_{H}$ , extracted from the graph, at
Т/К 10 <sup>с</sup> К	Mol ml <sup>-1</sup> atm <sup>-1</sup>
1273 1281 1313 1383	1.88 <sup>4</sup> 1.99 2.59 5.01
Value from thermograv by chilling method.	imetric technique; rest
Smoothed Data: Temperature dependence of $K_H$ is expressed by the relation: $\log(K_H/\text{mol ml}^{-1} \text{ atm}^{-1}) = -0.3436 - 6863.4/(T/K)$ (compiler) std. dev. = 1.4% (compiler) The heat of solution, $\wedge H$ , is estimated to be: $\wedge H/kJ \text{ mol}^{-1} = 131.4$ (compiler)	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Chilling method. The experimental method has been described in detail elsewhere (1,2). The melt is saturated with the gas. The dissolved gas is separated from the salt by freezing the melt. The expelled carbon dioxide is measured by transporting it by a stream of pure argon into absorption vessels containing	Carbon dioxide (99.95%) was obtained from Oslo Kulsyrefabrik A/S. Sodium fluoride was of pro analysi and suprapur grades from E. Merck A. G. It was vacuum dried at 450°C for 12 hrs.
Ascarite/Dehydrite.	ESTIMATED ERROR: Presence of oxide impurity in molten NaF may react with $CO_2$ to form $CO_3^{2^-}$ .
	<pre>REFERENCES: 1. Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, 19, 13. 2. Ibid. Acta Chem. Scand. <u>1966</u>, 20, 1811.</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Cambon distride (2)	Problem d. D Witching of	
(1) Carbon dloxide; $CO_2$ ; [124-38-9]	Bratland, D.; Krohn, C.	
(2) Potassium fluoride; KF; [7789-23-3]	Acta Chem. Scand. <u>1969</u> , 23, 1839 - 40.	
VARIABLES:	PREPARED BY:	
T/K = 1150 - 1280	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
The authors reported the solubilities of $CO_2$ in the melt in the temperature range 1150 - 1280 K, only in graphical form. The values of Henry's law constants, $K_{\rm H}$ , extracted from the graph, at different temperatures, are:		
Т/К 106 И	۲	
1154	1.99	
1220	2.24	
	2.12	
Smoothed Data: Temperature dependence of $K_H$ is expressed by the equation: $\log(K_H/\text{mol ml}^{-1} \text{ atm}^{-1}) = -4.334 - 1585/(T/K)$ (compiler) std. dev. = 2.1% (compiler) The heat of solution, $\Delta H$ , is estimated to be:		
∆H/kJ mol <sup>-1</sup> = 30.3 (compiler)		
AUXILIARY INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Chilling method. The experimental method has been described in detail elsewhere (1,2). The melt is saturated with the gas. The dissolved gas is separated from the salt by freezing the melt. The expelled carbon dioxide is measured by transporting it by a stream of pure argon into absorption vessels containing	Carbon dioxide (99.95%) was obtained from Oslo Kulsyrefabrik A/S. Potassium fluoride was of reagent grade from Baker and Adamson.	
Ascarite/Dehydrite.	ESTIMATED ERROR:	
	Presence of oxide impurity in molten KF may react with $CO_2$ to form $CO_3^{2-}$ .	
	REFERENCES:	
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, 19, 13.</li> <li>Ibid. Acta Chem. Scand. <u>1966</u>, 20, 1811.</li> </ol>	

COLL OREN 19 :		EVALUATOR:
<ul><li>(1) Carbon dioxi</li><li>(2) Potassium br</li><li>[7758-02-3]</li></ul>	de; CO <sub>2</sub> ; [124-38-9] comide; KBr;	N. P. Bansal National Aeronautics and Space Research. Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.
CRITICAL EVALUATION:		
Two independe carbon dioxide i from the two inv	ent studies (1,2) are in molten KBr. Smoothe vestigations are compa	available for the solubility of ed data at different temperatures ared below:
	107 1	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
т/к	Sada et al. (1)	Bratland et al. (2)
1100 1120 1140 1160 1180 1200 1220	(10.59) (10.48) 10.37 10.27 10.17 10.08 9.99	9.12 9.43 9.73 10.03 10.33 10.63 (10.93)
Further work of solubility fo	needs to be done in o or this gas - molten s	order to advance recommended values salt system.
References:		
References: 1. Sada, E.; Kat Eng. Data <u>198</u>	:oh, S.; Yoshii, H.; T : <u>1</u> , <b>26</b> , 279.	Fakemoto, I.; Shiomi, N. <b>J. Chem.</b>

COMPONENTS:	ORIGINAL MEASUREMENTS:
com onemis .	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.
<pre>(2) Potassium bromide; KBr; [7758-02-3]</pre>	<b>J. Chem. Eng. Data</b> <u>1981</u> , <b>26</b> , 279 - 81.
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:
T/K = 1123 - 1223	N. P. Bansal
EXPERIMENTAL VALUES:	
The gas solubilities at one atmos	phere pressure are:
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
850	1.02
950	0.97
Smoothed Data:	
Temperature dependence of $K_{H}$ is e	xpressed by the equation:
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -6.236 + 287.2/(T/K) (compiler)
std. de	v. = 3% (compiler)
The heat of solution, $\Delta H$ , is esti	mated to be:
∆H/kJ mol	$-^{-1} = -5.5$ (compiler)
	· - ·
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted mixture was determined	Carbon dioxide (99.96%) was of superpure grade and free from water. Potassium bromide was of reagent grade.
with an infrared carbon dioxide analyzer.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	<ol> <li>Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.</li> </ol>
	J. Chem. Eng. Data 1980 25 45.

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Carbon dioxide; CO <sub>2</sub> ; [124-38-9]	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.	
(2) Potassium bromide; KBr; [7758-02-3]	<b>Acta Chem. Scand.</b> <u>1966</u> , <b>20</b> , 1811 - 26.	
VARIABLES:	PREPARED BY:	
T/K = 1048 - 1200	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EXPERIMENTAL VALUES:		
Gas solubilities at different temperatures at 1 atm pressure are:		
t/°C	$10^7 \text{ K}_{\text{FF}}/\text{mol ml}^{-1} \text{ atm}^{-1}$	
775	8.46 ± 0.14	
829 874	9.36 ± 0.13 9.80 ± 0.20	
927	10.89 ± 0.14	
Smoothed Data:		
Temperature dependence of the the equation:	Henry's law constant, $K_{H}$ , is given by	
log(K <sub>H</sub> /mol ml <sup>-1</sup> a	$tm^{-1}$ ) = -5.24 - 880/(T/K)	
std.	dev. = 0.7% (compiler)	
The heat of dissolution, AH,	and the entropy of dissolution, AS, are:	
∆H/kJ	$mol^{-1} = 16.7$	
^S/J K	$^{-1}$ mol $^{-1}$ = 14.6	
A1121		
METHOD /APPARATUS /PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Chilling method. Detailed description and diagram of the apparatus is given in the original paper. It employs the separation of dissolved gas from the salt by freezing of the melt. The expelled carbon dioxide is carried into the absorption vessel by a stream of pure nitrogen.	Carbon dioxide - not given. Potassium bromide was of <u>pro</u> analysi grade from E. Merck A. G. The salt was dried under vacuum at 450°C for 4 hours.	
	ESTIMATED ERROR:	
	solubility = $\pm 10\%$ (authors)	
	REFERENCES:	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
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<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.	
<pre>(2) Potassium bromide; KBr; [7758-02-3]</pre>	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.	
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:	
T/K = 1048 - 1200	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of $CO_2$ in molten KBr are presented in the form of a log H <u>vs.</u> 1/T plot. Values of K <sub>H</sub> derived from the graph, by the compiler, at various temperatures are given below:		
т/к 107 к	#/mol ml <sup>-1</sup> atm <sup>-1</sup>	
1048	8.5 + 0.15	
1103	9.4 ± 0.20	
1145 1199	9.8 ± 0.20 10.9 ± 0.20	
Smoothed Data:		
Temperature dependence of $K_{H}$ is e	xpressed by the relation:	
log(K./mol ml <sup>-1</sup> atm <sup>-1</sup> )	= -5.24 - 872.4/(T/K) (compiler)	
std. dev	. = 0.7% (compiler)	
The heat of solution, AH, and ent	ropy of solution. AS, are:	
	$\frac{1}{2} = 17.15$	
	- 17.15	
∆S/J K <sup>-</sup> mo	$1^{-1} = 15.06$ (at 1150 K)	
AUXILIARY	INFORMATION	
Detailed deggriptions of the	SOURCE AND FURILY OF MATERIALS:	
apparatus and procedure for each	Potassium bromide, pro analysi	
method are given in the original	quality, from Merck AG, Darmstadt,	
Volumetric Method: The change in	dried in situ (volumetric and	
volume of gas (at constant pressu-	thermogravimetric methods) or	
the melt is directly determined.	pre-dried in vacuum at 450°C for 4 hrs. (chilling method).	
This is not an accurate method, the		
estimated uncertainty being about 25%.		
Thermogravimetric Method: The gain		
In weight of a melt sample due to the dissolution of the gas is	ESTIMATED ERROR:	
measured using a thermobalance.		
is separated from the melt by	$solubility = \pm 10\%$ (authors)	
freezing of the melt. The expelled	REFERENCES :	
vessels containing Ascarite/Dehv-		
drite expelled gas is carried into		
stream of pure argon. This method		
is simpler and more expedient than		
or better accuracy.		

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COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Carbon diox [124-38-9]	ide; CO <sub>2</sub> ;	Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.
(2) Zinc bromid [7699-45-8]	e; ZnBr <sub>2</sub> ;	<b>J. Chem. Eng. Data <u>1980</u>, 25, 45 -</b> 47.
VARIABLES:		PREPARED BY:
P/kPa: : T/K = 6	101.325 (1 atm.) 73 - 748	N. P. Bansal
EXPERIMENTAL VALUES:		
The gas solu	bilities at a pressu	re of 1 atm are given as:
	t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
	400	2.19
	450 475	1.80 1.78
Smoothed Data:		
Temperature	dependence of K. is	given by the expression:
	r =	
	g(RH/MOI Chi achi )	
	std. de	v. = 1.8% (compiler)
The heat of	solution, $\Delta H$ , is est	imated to be:
	$\Delta H/kJ$ mol	-1 = -12.3 (compiler)
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PRO	CEDURE:	SOURCE AND PURITY OF MATERIALS:
Flution tech	nique	Carbon dioxide (09 96%) was
Diagram and	details of the	superpure grade and free from water.
described in th	ratus are e original	Zinc bromide was reagent grade. It was dried in a desiccator for a
publication. Th	e melt was	few days followed by in a vaccum
the gas through	$CO_2$ by bubbling the melt for 50	hours. It was further dried by
min. Carbon dio	xide dissolved in	bubbling anhydrous nitrogen through
nitrogen. The a	mount of carbon	the salt in the molten state.
dioxide in the	eluted mixture was	ESTIMATED EDDOD.
carbon dioxide	analyzer	ESTIMATED ERROR.
(Shimadzu, Type	URA-25.	std. error in solubility: < ± 10%
		REFERENCES :
1		

00//0.000/000	
Conforents :	OKIGINAL MEADUREMENID:
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.
<pre>(2) Potassium iodide; KI; [7681-11-0]</pre>	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.
	····-
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:
T/K = 973	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubility of $CO_2$ in molten KI ir presented in the form of a log $K_{H}$ vs from the graph, by the compiler, is	1 a very narrow temperature range is 3. $1/T$ plot. The value of $K_{H}$ derived given below:
T/K 107 K	K <sub>#</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
973	19.4 ± 0.6
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Detailed descriptions of the	Potassium iodido, pro analuci
method are given in the original	quality, from Merck AG, Darmstadt,
Volumetric Method: The change in	West Germany was used. It was either dried in situ (volumetric and
volume of gas (at constant pressu-	thermogravimetric methods) or
the melt is directly determined.	hrs. (chilling method).
This is not an accurate method, uncertainty being about 25%.	
Thermogravimetric Method: The gain	
the dissolution of the gas is	ESTIMATED ERROR:
measured by a thermobalance.	
gas is removed from the melt by	solubility = ± 10% (authors)
gas is carried into absorption	
vessels containing Ascarite/	REFERENCES :
argon. This method is simpler and	
More expedient than the others	
accuracy.	
	]

254		
COMPONE	NTS:	
(1)	Carbon dioxide; CO <sub>2</sub> ;	

[124-38-9]	Krohn, C.; Matzfeldt, K.
<pre>(2) Potassium iodide; KI;</pre>	Acta Chem. Scand. <u>1966</u> , 20, 1811
[7681-11-0]	26.
VARIABLES: $P/kPa: 101.325 (1 \text{ atm.})$	PREPARED BY:
T/K = 954 & 973	N. P. Bansal

ORIGINAL MEASUREMENTS:

Bratland, K.; Grjotheim, K.;

## EXPERIMENTAL VALUES:

Solubilities of CO2 in molten KI at 1 atm. pressure at two temperatures are:

t/°C	107 K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
681	9.8 ± 0.6 <sup>m</sup>
700	19.2 ± 0.6 <sup>m</sup>

- \* By volumetric method
- <sup>b</sup> By chilling method

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Two different techniques have been used: volumetric and chilling method. A detailed description of each technique is given in the original publication. <u>Volumetric Method</u>: The change in volume of the gas (at constant pressure) caused by its dissolution in the melt is directly determined. This is not a very accurate method and was finally abandoned. The established uncertainty in the results was about 25%. Chilling Method: It employs the separation of the dissolved gas from the salt by freezing the melt. The expelled carbon dioxide is carried into the absorption vessel by a stream of pure nitrogen. This a less cumbersome and more expedient method than the other but the accuracy of the results is better.

## SOURCE AND PURITY OF MATERIALS:

Carbon dioxide - not given. Potassium iodide was of <u>pro</u> <u>analysi</u> grade from E. Merck A. G. In the volumetric and thermogravimetric measurements, the salt was dried in situ, whereas in the chilling method, the salt was dried under vacuum at 450°C for 4 hrs.

ESTIMATED ERROR:

solubilty =  $\pm$  10%

**REFERENCES:** 

	255	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dioxide; CO<sub>2</sub>;     [124-38-9]</pre>	Andresen, R. E.	
(2) Sodium carbonate; Na <sub>2</sub> CO <sub>3</sub> ; [497-19-8]	J. Electrochem. Soc. <u>1979</u> , 126, 328 - 34.	
VARIABLES: P/kPa = 39.997 - 101.325	PREPARED BY:	
one temperature: T/K = 1153	N. P. Bansal	
EXPERIMENTAL VALUES:		
For the solubility of $CO_2$ in molten $Na_2CO_3$ , the value of Henry's law Constant, $K_{H}$ , is:		
t/°C 106	K <sub>rr</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
880	9.6 ± 2.3*	
* Value not corrected f reaction:	or the effect of the	
Na <sub>2</sub> CO <sub>3</sub>	$^{>}$ Na <sub>2</sub> O + CO <sub>2</sub> (g)	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique. The diagram and details of the apparatus used are given in the original paper. The procedure followed has been described in detail elsewhere (1). In brief, the apparatus was first evacuated and then filled with CO <sub>2</sub> to a pressure of about 1 atm. Due to gas dissolution, the gas pressure dropped. Equilibrium was attained	CO <sub>2</sub> (99.6%) was used directly from the cylinder. Reagent grade Na <sub>2</sub> CO <sub>3</sub> supplied by Baker was dried at about 445 K in an oven, then in the furnace at about 645 K under CO <sub>2</sub> pressure of 100 torr for about a day.	
when the pressure did not change for about 1 hr. The volume of the	ESTIMATED ERROR:	
gas dissolved was determined from the initial and final positions of the mercury meniscus in the	solubility = ± 30%	
Manometer. The apparatus was earlier calibrated using argon.	REFERENCES:	
changes as small as 0.05 torr could be read.	<ol> <li>Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proceedings of the 4th Nordic High Temperature Symposium, Vol. 1, (Tilbi, M.; Editor), Helsinki 1975, 127.</li> </ol>	

COMPONENTS: **ORIGINAL MEASUREMENTS:** (1) Carbon dioxide; CO<sub>2</sub>; Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. [124-38-9] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4] J. Chem. Eng. Data 1981, 26, 279 (3) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] - 81. VARIABLES: PREPARED BY: one temperature: T/K = 623melt comp./mol%  $NaNO_3 = 0 - 100$ N. P. Bansal P/kPa: 101.325 (1 atm.) EXPERIMENTAL VALUES: The solubilities of  $CO_2$  at one atmosphere pressure and 623K in LiNO<sub>3</sub> - NaNO<sub>3</sub> melts of different compositions are: 10° C1/ mol cm-3 10⁴ x₁/ Melt composition/ mol fraction of NaNO3 mol fraction 0.0 3.86 1.54 0.07 4.70 1.89 0.20 3.68 1.52 0.25 4.67 1.93 0.50 2.79 1.19 1.37 0.52 3.18 0.66 2.34 1.03 1.00 1.04 0.468 AUXILIARY INFORMATION SOURCE AND PURITY OF MATERIALS: METHOD/APPARATUS/PROCEDURE: Carbon dioxide (99.96%) was of Elution technique. superpure grade and free from water. The apparatus and procedure used for solubility measurements Sodium nitrate and lithium was the same as described in (1). nitrate were of reagent grade. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of  $CO_2$  in the eluted mixture was determined with an infrared carbon dioxide analyzer. ESTIMATED ERROR:

Nothing specified.

REFERENCES :

1. Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.

J. Chem. Eng. Data 1980, 25, 45.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u> , <b>69</b> , 2019 - 25.
VARIABLES: $P/kPa = 10^2$ T/K = 473 - 540	PREPARED BY: N. P. Bansal

# EXPERIMENTAL VALUES:

1

The solubilities,  $x_1$ , of  $CO_2$  in molten mixtures of  $LiNO_3 - KNO_3$ (50 - 50, 66.67 - 33.33 mol%) at different temperatures are reported in graphical form in the original paper. The values of  $x_1$ , derived from the graph by the compiler, are:

Melt composition/ mol% LiNO <sub>3</sub> 7	$\frac{10^5 x_1}{K}$ mol fraction bar <sup>-1</sup>
50.0 4	74     5.62       99     5.55       29     5.29
66.67 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	78       10.03         86       8.96         88       8.96         94       9.41         03       9.07         12       9.07         13       9.76         17       8.42         28       8.42         39       8.63
	continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Manometric method. The experimental procedure has been described in detail elsewhere (1,2). In brief, the apparatus was evacuated and then carbon dioxide was introduced into the system at about one bar pressure. The initial gas pressure was immediately noted. The melt was vigorously stirred and the fall in gas pressure due	SOURCE AND PURITY OF MATERIALS: High purity quality carbon dioxide (S.I.O., Milan) was dried in dry ice. Reagent grade lithium and potassium nitrates (Carlo Erba, Milan) were used without further purification. The melt container was made of Teflon.
to its dissolution in the melt Was continuously recorded till equilibrium was reached. The final gas pressure was noted and the Henry's constant was Calculated.	ESTIMATED ERROR: Nothing specified.
	1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373 2. Zambonin, P. G.; Cardetta, V. L. Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237

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COMPONENTS:		ORIGIN	AL MEASUREMENTS:	
(1) Carbon dioxide; C [124-38-9]	:0 <sub>2</sub> ;	Pani	.ccia, F.; Zambo	nin, P. G.
(2) Lithium nitrate; [7790-69-4]	Lino <sub>3</sub> ;	J. 0	hem. Soc. Farad	ay Trans. I
<pre>(3) Potassium nitrate [7757-79-1]</pre>	; KNO3;	<u>1973</u>	<b>69, 2019 -</b> 25	•
VARIABLES:		PREPAR	ED BY:	······································
			N. P. B	ansal
	<u> </u>			
EXPERIMENTAL VALUES:				
continued				
Smoothed Data:				
Temperature depend	ence of $x_1$ co	ould be	expressed by eq	uations of the
form: log(x	_/mol fractio	on bar <sup>-1</sup>	(-) = a + b/(T/K)	
The values of the coe	fficients a	and b	of the above	equation for the
two molten mixtures,	alongwith the	enthal	py of solution,	AH, and the
scandard encropy or s	oración, «S ,	, are.		
				· · · · · · · · · · · · · · · · · · ·
Melt composition/ mol% LiNO3	a	ь	۸H/ kJ mol <sup>-1</sup>	۸ S°*/ J K <sup>-1</sup> mol <sup>-1</sup>
	••••••••••••••••••••••••••••••••••••••			
50.0	-4.502 1	L20.5	-3.0	-30.0
<b>a</b> At 623 K				
······································			4710N	
			ATTON	
METHOD/APPAKATUS/PROCEDURE:		SOURCE	AND PURITY OF MAT	ERIALS:
		ESTIM	ATED ERROR:	

REFERENCES:

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<pre>COMPONENTS: (1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	ORIGINAL MEASUREMENTS: Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u> , 69, 2019 - 25.
VARIABLES: $P/kPa = 10^2$ T/K = 510 - 610	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities, $x_1$ , of $CO_2$ in KNO <sub>3</sub> are reported in graphical form of $x_1$ at different temperatures, deare:	the molten equimolar mixture NaNO3 - in the original paper. The values rived from the graph by the compiler,
Melt composition/ mol% NaNO <sub>3</sub> T	$10^{5} x_{1}/$ /K mol fraction bar <sup>-1</sup>
50.0 5: 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	10       2.30         20       2.42         29       2.48         40       2.51         53       2.54         86       2.57         09       2.70
$\log(x_1/mol \text{ fraction bar}^{-1})$ The enthalpy of solution, $^{A}H$ , and $^{A}S^{\circ}$ , are: $^{A}H/kJ \text{ mol}^{-1} = 3.0$ $^{A}S/d$	(1) = -4.284 - 174.5/(T/K) (compiler) If the standard entropy of solution, $J K^{-1} mol^{-1} = -26.0$ (at 623 K)
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique. The experimental details are given elsewhere (1,2). Briefly, the apparatus was evacuated and carbon dioxide was introduced into the system at about one bar pressure. The initial gas pressure was immediately recorded. The melt was vigorously stirred and the fall in gas pressure due to its dissolution in the melt was	High purity quality carbon dioxide (S.I.O., Milan) was dried in dry ice. Reagent grade sodium and potassium nitrates (Carlo Erba, Milan) were used without further purification.
equilibrium was attained. The	ESTIMATED ERROR:
final gas pressure was noted and the Henry's constant was evaluated.	Nothing specified.
	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardetta, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] (3) Rubidium nitrate; RbNO<sub>3</sub>; [13126-12-0]</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N. <b>J. Chem. Eng. Data</b> <u>1981</u> , <b>26</b> , 279 - 81.
VADIABLES ·	DDEDADEN BV.
one temperature: $T/K = 623$ melt comp./mol% NaNO <sub>3</sub> = 0 - 100 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of CO <sub>2</sub> at one at - RbNO <sub>3</sub> melts of different compositi	mosphere pressure and 623K in NaNO <sub>3</sub> lons are:
Melt composition/ mol fraction of NaNO <sub>3</sub>	$\begin{array}{ccc} 10^{6} C_{1} / & 10^{5} x_{1} / \\ mol \ cm^{-3} & mol \ fraction \end{array}$
0.0 0.25 0.50 0.75 1.00	$\begin{array}{ccccccc} 1.88 & 11.30 \\ 1.36 & 7.66 \\ 1.18 & 6.15 \\ 1.07 & 5.27 \\ 1.04 & 4.68 \end{array}$
AUXILIARY	INFORMATION
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured	Carbon dioxide (99.96%) was of superpure grade and free from water. Sodium nitrate and rubidium nitrate were of reagent grade.
with an infrared carbon dioxide analyzer.	ESTIMATED ERROR: Nothing specified.

# REFERENCES:

 Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.

J. Chem. Eng. Data 1980, 25, 45.

	201	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Carbon dioxide; CO <sub>2</sub> ;		
[124-38-9] (2) Sodium fluoride: NaF:	Smith, N. V.; Sheil, R. J.; Evans. R. B.; Watson, G. M.	
[7681-49-4]	U.G. N.E.G. Dent. ODVI: 2021 1060	
(3) Beryllium fluoride; Ber <sub>2</sub> ; [7789-49-7]	35 - 36.	
VARIABLES:	PREPARED BY:	
T/K = 688 - 1073	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
The values of Henry's law constandioxide in the melt NaF - $BeF_2$ (54 temperatures are given in graphical graph, by the compiler, are:	nt, $K_{H}$ , for the solubility of carbon - 43 mol%) as a solvent at different form. The values extracted from the	
t/°C 10 <sup>8</sup> H	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
415	10.35	
500	7.93	
600 700	8.32	
800	10.78	
AUXILIARY	INFORMATION	
AL THOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method. Details not given.	Not described.	
	ESTIMATED ERROR: Nothing specified. REFERENCES:	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ol> <li>Carbon dioxide; CO<sub>2</sub>;</li> </ol>		
[124-38-9] (2) Lithium chloride: LiCl:	Sada, E.; Katoh, S.; Yoshii, H.; Vasuda K	
[7447-41-8]		
(3) Potassium chloride; KCl;	J. Chem. Eng. Data <u>1980</u> , 25,	
[/44/-40-/]		
VARIABLES:	PREPARED BY:	
T/K = 723 - 803	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
The solubilities of $CO_2$ in the mol%) are given as:	molten eutectic LiCl - KCl (58 - 48	
t/°C 10	) <sup>6</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
450	2.4	
530	3.0	
AUXILIA	RY INFORMATION	
AUXILIA METHOD/APPARATUS/PROCEDURE:	RY INFORMATION SOURCE AND PURITY OF MATERIALS:	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassiv chloride were of reagent grade an were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified.	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassiv chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified.	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassiv chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified.	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassit chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified. REFERENCES:	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassiv chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified. REFERENCES:	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassiv chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified. REFERENCES:	
AUXILIA METHOD/APPARATUS/PROCEDURE: Elution technique. The diagram and details of the apparatus and procedure used are given in the original paper. The melt was saturated with carbon dioxide by bubbling the gas through the melt. Dissolved carbon dioxide was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured with an infrared carbon dioxide analyzer.	RY INFORMATION SOURCE AND PURITY OF MATERIALS: Carbon dioxide (99.96%) was of superpure grade and free from wat Lithium chloride and potassit chloride were of reagent grade and were dried in a desiccator for a days followed by in a vacuum over 150 - 200°C for several hours. ESTIMATED ERROR: Nothing specified. REFERENCES:	

	263
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Sodium chloride; NaCl;</pre>	Sada, E.; Katoh, S.; Yoshii, H.; Takemoto, I.; Shiomi, N.
[7647-14-5] (3) Potassium chloride; KCl; [7447-40-7]	<b>J. Chem. Eng. Data <u>1981</u>, 26,</b> 279 - 81.
<pre>VARIABLES: one temperature: T/K = 1273 melt comp./mol% NaCl = 0 - 100 P/kPa: 101.325 (1 atm.)</pre>	PREFARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The gas solubilities at one atmos KCl melts of different compositions	sphere pressure and 1000°C in NaCl - are:
Melt Composition/ mol fraction of NaCl	$\frac{10^7 C_1}{mol cm^{-3}} \frac{10^5 x_1}{mol fraction}$
0.0 0.25 0.50 0.75	9.08       4.85         7.24       3.65         8.17       3.86         9.66       4.23
1.00	9.66     4.23       10.1     4.07
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique. The apparatus and procedure used for solubility measurements was the same as described in (1). The melt was saturated with Carbon dioxide by bubbling the gas through the melt. Carbon dioxide dissolved in the melt was eluted by bubbling nitrogen. The amount of carbon dioxide in the eluted gas mixture was measured	Carbon dioxide (99.96%) was of superpure grade and free from water. Sodium chloride and potassium chloride were of reagent grade.
With an infrared carbon dioxide analyzer.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Sada, E.; Katoh, S.; Beniko, H.; Yoshii, H.; Kayano, M.
	J. Chem. Eng. Data <u>1980</u> , 25, 45.

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COMPONENTS:		ORIGINAL MEASUREMENTS:		
<ol> <li>Carbon dioxide; CO<sub>2</sub>;</li> </ol>				
[124-38-9]		Lukmanova, T. L.; Vil'nyanskii,		
(2) Potassium chloride; KCl; [7447-40-7]		Ya. E.		
(3) Magnesium chlori	de; MgCl <sub>2</sub> ;	Izv. Vyssh. Uc	hebn. Zaved.,	Khim. i
[7786-30-3]		Khim. Tekhnol.	<u>1966</u> , <b>9</b> , 537	- 540.
VARIABLES:		PREPARED BY:		
T/K = 773 -	1173			
P/kPa = 30.398 -	103.352	м.	P. Bansal	
	· · · · · · ·			
EXPERIMENTAL VALUES:				
The solubilities	of CO <sub>2</sub> in molter	n equimolar KCl	- MgCl_ at di	fferent
temperatures as a fu	nction of its pa	artial pressure	are reported	as:
		Solubility of	CO-	
	<u></u>			
	m /	. 104 0 /		
	fraction	10 C <sub>1</sub> / wt%	$x_1/mol$	m-1
500 0.33	<b>2 E1</b>	120	6 22	
0.49	3.30	171	5.66	
0.78	5.11	268	6.37	
1.02	6.19	322	6.01	
· · · · · · ·		·····		
650 0.32	3.65	190	9.58	
0.45	4.56	237	8.84	
0.76	7.51	389	9.22	
	2.30		2.55	
750 0.24	5.06	071	10.00	
/50 0.34	5.26	271	12.32	
0.77	10.28	532	12.50	
1.00	12.74	650	12.74	cont'd.
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY	OF MATERIALS;	
Elution or stripp.	ing method.	The method	of preparatio	on of the
used for gas solubil	the method	heen described	from carnall:	lte has
measurements have be	en described		Curren (1).	
earlier (1). Dry $CO_2$	gas was			
passed through about	100 g of the			
saturation. a portion	of the melt			
was transferred into	the			
desorber and flushed	with			
desorber was passed t	en from the	ESTIMATED PROP-		
desorber was passed through the absorbent and the amount of		ESTIMATED ERKOR:		

Nothing specified.

**REFERENCES:** 

liberated  $CO_2$  was determined by

weighing.

1. Lukmanova, T. L.; Vil'nyanskii, Ya. E.

Izv. Vyssh. Uchebn. Zaved., Khim. i Khim. Tekhnol. <u>1964</u>, 7, 510.

COMPONENTS :		ORIGINAL MEASUREMENTS:		
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Potassium chloride; KCl;</pre>		Lukmanova, T. L.; Vil'nyanskii, Ya. E.		
[7447-40	-7]	N-01	Too March No.	hele dened while i
(3) Magnesiu [7786-30	m chioride; -3]	MgC1 <sub>2</sub> ;	Khim. Tekhnol.	$\frac{1966}{1966}, 9, 537 - 540.$
				·····
VARIABLES:			PREPARED BY:	
P/k = 2	= 773 - 117	3	N	P. Bangal
r/hra = 30		. 352		20 Bumbur
EXPERIMENTAL VALU	ES: cor	tinued		
850	0.34	6.88	376	13.18
	0.48	7.86	409	12.91
	1.01	13.45	699	13.33
	·····			
900	0.30	7.77	401	13.29
	0.47	9.41	469	13.19
	0.78	12.43	648	13.30
	1.00	13.90	740	13.90
Temperatu expressed by l	re dependen the equati og(x <sub>1</sub> /mol f	ice of $x_1$ in the set of the set of $x_1$ in the set of the set	the range $773 -$	1173 K, can be 5.6/(T/K) (compiler)
		sta. de	v = 3% (comp.	ller)
The heat	of solution	, AH, was cal	culated to be:	
		AH/kJ mo	-1 = 15.2 (co)	mpiler)
		- <i>my</i> no mo.	1912 (00.	
		AUXILIARY	INFORMATION	
METHOD/APPARATUS/	PROCEDURE :		SOURCE AND PURITY	OF MATERIALS:
}			ESTIMATED ERROR:	
Į				
1				
Į			REFERENCES :	
			· · · · · · ·	
			}	
			1	

COMPONENTS :	URIGINAL MEASUREMENTS:
<ol> <li>(1) Carbon dioxide; CO<sub>2</sub>;[124-38-9]</li> <li>(2) Calcium oxide; CaO;[1305-78-8]</li> <li>(2) Calcium chloride; CaCl<sub>2</sub>; [10043-52-4]</li> </ol>	Maeda, M.; McLean, A. Iron Steelmaker <u>1986</u> , <b>13</b> , 61 - 65; Trans. Iron Steel Soc., ASME <u>1987</u> , 8, 23 - 27.
VADTABLES	PDEDADED BY.
T/K = 1173 - 1473 Melt comp./mol fraction of CaO $= 0.06 - 0.20$	N. P. Bansal
EXPERIMENTAL VALUES:	
$fig. Solubility of Carbon dioxide fraction of Cao in the melt at various temperatures; p_{co} = 0.2$	$Fig. Temperature dependence of the solubility of CO2 in melts of different compositions; p_{CO_2} = 0.2$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gravimetric method. The slag mixture was cont- ained in a pure nickel combustion boat and placed inside a mullite reation tube. $CO(p_{CO} = 0.02)$ was added to the $CO_2$ - Ar gas mixture to avoid oxidation of the nickel crucible. The gas mixture was passed over the melt at a rate of 60ml/min. After various time in- tervals, the melt was quenched and the weight change was recor- ded. Equilibrium was reached between the gas and the melt within 1hr. The equilibrium concentration of $CO_2$ was obtained	Calcium carbonate and cacium chloride, both of reagent grade (99.9% purity) were vacuum dried for 12h at 120°C. ESTIMATED ERROR: Not specified.
absorption and desorption results. Experiment was repeated 4 - 5 times.	REFERENCES :

	207
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon Dioxide; CO<sub>2</sub>;[124-38-9] (2) Calcium Oxide; CaO;[1305-78-8] (3) Calcium Chloride; CaCl<sub>2</sub>; [10043-52-4]</pre>	Iwase, M.; Iritani, H; Ichise, E.; Shibata, K. <b>Iron Steel Maker</b> <u>1989</u> , <b>16</b> , 67 - 71.
VARIABLES:	PREPARED BY:
T/K = 1173 - 1673 P/kPa = 25.331 - 101.325 X <sub>C=0</sub> /mole fraction = 6 -20	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of CO <sub>2</sub> in the Ca by the expression : $\log \frac{X_{CO_2}(1 + R)}{\log 2} = \log p_{CO_2}^{-1}$	$(6.04 \pm 0.21) + (7630 \pm 270)$
$R - (2R + 1) X_{co}$	Т
where $X_{co_2} = \frac{1}{n_{co_2}}$	$\frac{n_{co}}{n_{cao} + n_{cacl}}$
n denotes the number of moles of	each species,
Xcao	
$R = \frac{1}{v}$	· .
The correlation coefficient of fi	tting, r², was 0.905.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The details of the experimental apparatus consisting of a thermobal- ance, an SiC resistance furnace and the gas trains and the procedure have been described earlier(1). A crucible containing 2-4g of the slag was suspended from the thermob- alance and the weight change monito- red with time. Temperature was Controlled to ±1K. The slag was hea- ted in a stream of purified Ar(200 - 300 ml/min). When the desired	Argon was purified by passing through silica gel, $P_2O_5$ , sodium oxyhydrate, MgClO <sub>4</sub> , and Mg chips (723K). (Ar+CO <sub>2</sub> ) gas mixture was purified over silica gel, MgClO <sub>4</sub> and $P_2O_5$ .
temperature was reached, the gas flow was changed to a $(Ar+CO_2)$ gas mixture. In most cases, the dissolu- tion of CO <sub>2</sub> was completed in 15 - 25 min. A longer time was needed for	ESTIMATED ERROR: Not specified.
desorption of CO <sub>2</sub> in Ar. Reproducibility of the measure- ments was checked by thermal cycling.	REFERENCES: 1.Iwase, M. et al. Iron Steel Maker <u>1987</u> , 15, 77; Trans. Iron Steel Soc. <u>1988</u> , 9, 139.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Carbon Diracial constant of $(1)$		
(1) Carbon Dioxide; $CO_2$ ; [124-38-9] (2) Stroptium Ovide: $SrO_2$ [1214-11-0]	Iwase, M.; Iritani, H; Ichise, E.;	
(3) Strontium Chloride: SrCl <sub>2</sub> :	Shibata, K. Iron Steel Maker 1989 16 67 - 71	
[10476-85-4]	$\frac{1}{100} \frac{1}{1000} \frac{1}{100} \frac{1}{1000} \frac{1}{1000$	
VARIABLES:	PREPARED BY:	
T/K = 1173 - 1673		
P/kPa = 25.331 - 101.325	N. P. Bansal	
$X_{cao}$ /mole fraction = 10 - 50		
EXPERIMENTAL VALUES:		
The solubility of $CO_2$ in the SrO+SrCl <sub>2</sub> melts can be expressed by the relation :		
$X_{co} (1 + R) = \log p_{co} - ($	$5.60 \pm 0.17) + (8650 \pm 260)$	
$\log \frac{100}{100} = 2$		
2	±	
where $R = X_{sno}/X_{snos}$		
2		
	-	
<b>V</b> – p / / p / p		
$X_{co_2} = n_{co_2} / (n_{co_2} + n_{sro} + n_{srcl_2})$		
where n denotes the number of moles	of each species.	
The correlation coefficient of fittin	$a^2$ where 0.006	
the serielation socilitication of fitten	g, 1 , was 0.920.	
AUXILIANI	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The details of the experimental		
ance, an SiC resistance furnace and	Argon was purified by passing	
the gas trains and the procedure have	oxyhydrate, MgClO <sub>4</sub> , and Mg chips	
been described earlier(1).	(723K). (Ar+CO <sub>2</sub> ) gas mixture was	
A crucible containing 2-4g of the	purified over silica gel, MgClO <sub>4</sub>	
slag was suspended from the thermob-	and $P_2O_5$ .	
red with time. Temperature was		
controlled to ±1K. The slag was hea-		
ted in a stream of purified Ar(200 -		
300 ml/min). When the desired		
flow was changed to a (Ar±00) gas	ESTIMATED ERROR:	
mixture. In most cases, the dissolu-	Not specified.	
tion of $CO_2$ was completed in 15 - 25	net spoulitud.	
min. A longer time was needed for		
Reproducibility of the massure-	DEFEDENCES	
ments was checked by thermal cycling.	ALFERENCES:	
	1.Iwase, M. et al.	
	Iron Steel Maker <u>1987</u> , 15, 77;	
	Trans. Iron Steel Soc. <u>1988</u> , <b>9</b> , 139.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon Dioxide; CO<sub>2</sub>;[124-38-9]</li> <li>(2) Barium Oxide; BaO;[1304-28-5]</li> <li>(3) Barium Chloride; BaCl<sub>2</sub>; [10361-37-2]</li> </ul>	Iwase, M.; Iritani, H; Ichise, E.; Shibata, K. Iron Steel Maker <u>1989</u> , <b>16</b> , 67 - 71.
VARIABLES:	PREPARED BY:
T/K = 1173 - 1673 P/kPa = 25.331 - 101.325 X <sub>Bao</sub> /mole fraction = 10 - 40	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of $CO_2$ in the Bather relation : Xer $(1 + R)$ log Prove 7	$40+BaCl_2$ melts can be expressed by $4.55 \pm 1.72$ + (7240 ± 270)
$\log - \frac{100}{2} = 2000$	
$R - (2R + 1) X_{co_2}$	T
where $R = X_{Bac}/X_{Bacl}_{2}$	
$X_{co_2} = n_{co_2} / (n_{co_2} + n_{Bao} + n_{Bacl_2})$	
where n denotes the number of moles	s of each species.
The correlation coerficient of fitth	.ng, r <sup>-</sup> , was 0.805.
	•
AUXILIARY	INFORMATION
MERICA LINE AND	
The details of the experimental apparatus consisting of a thermobal- ance, an SiC resistance furnace and the gas trains and the procedure have been described earlier(1). A crucible containing 2-4g of the slag was suspended from the thermob- alance and the weight change monito- red with time. Temperature was Controlled to ±1K. The slag was hea- ted in a stream of purified Ar(200 - 300 m1/min). When the desired temperature was reached, the gas	Source AND PURITY OF MATERIALS: Argon was purified by passing through silica gel, $P_2O_5$ , sodium oxyhydrate, MgClO <sub>4</sub> and Mg chips(723K). Ar+CO <sub>2</sub> gas mixture was purified over silica gel, MgClO <sub>4</sub> and $P_2O_5$ . BaO powder (99.9% purity, Furu-Uchi Chemical Co.) was heated at 1573K until the weight was unchanged.BaCl <sub>2</sub> (99.9% purity, Nakar- ai Chemical Co. Japan) was mixed with BaO and heated for 10 - 15min. at 1573K and cooled on a water cooled copper plate.
Flow was changed to a $(Ar+CO_2)$ gas mixture. In most cases, the dissolu- tion of $CO_2$ was completed in 15 - 25 min. A longer time was needed for desorption of $CO_2$ in Ar.	ESTIMATED ERROR: Not specified.
Reproducibility of the measure- ments was checked by thermal cycling.	REFERENCES: 1.Iwase, M. et al. Iron Steel Maker <u>1987</u> , 15, 77; Trans. Iron Steel Soc. <u>1988</u> , 9, 139.

;

<pre>1. Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, 19, 13 - 20. 2. Bratland, D.; Krohn, C. Tidsskr. Kjemi, Bergv., Metall. <u>1966</u>, 26, 81 - 4. PREPARED BY: N. P. Bansal</pre>		
N. P. Bansal		
EXPERIMENTAL VALUES: Solubilities of CO <sub>2</sub> at 1030°C in Na <sub>3</sub> AlF <sub>6</sub> - Al <sub>2</sub> O <sub>3</sub> melts of different compositions are presented in the form of log K <sub>H</sub> <u>vs.</u> mol% Al <sub>2</sub> O <sub>3</sub> graph. Values of K <sub>H</sub> derived from the plot at different melt compositions are given below:		
10° K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>		
0.85 ± 0.08 1.16 ± 0.07 2.03 ± 0.21 2.96 ± 0.14		
e results are presented in graphical plot, by the compiler, under e given below: continued		
INFORMATION		
SOURCE AND PURITY OF MATERIALS:		
Sodium fluoride and alumina were of <u>pro analysi</u> quality from Merck AG, Darmstadt, West Germany. Sublimed aluminum fluoride, purity > 99%, was used. The salts were either dried <u>in</u> <u>situ</u> or pre-dried in vacuum for 4 hrs. at 450°C. ESTIMATED ERROR: solubility = ± 10% (authors) REFERENCES:		
COMPONENTS:	1. Bratland, D.: Griotheim, K.:	
---	--	
(1) Carbon dioxide; CO <sub>2</sub> ;	Krohn; C.; Matzfeldt, K.	
[124-38-9] (2) Cryolite, Na.AlF.	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.	
[15096-52-3]	Tidsskr. Kjemi, Bergv., Metall.	
(3) Alumina; Al <sub>2</sub> O <sub>3</sub> ; [1344-28-1]	<u>1966</u> , <b>26</b> , 81 - 4.	
T/K = 1250 - 1380	PREPARED BY:	
melt comp./mol% $Al_2O_3 = 5 - 17.9$ P/kPa: 101.325 (1 atm.)	N. P. Bansal	
EXPERIMENTAL VALUES:		
continued		
conc. of adde t/°C in the melt/	d salt $10^6 K_{H}/$ mol% mol ml <sup>-1</sup> atm <sup>-1</sup>	
1030 0.0	1.16 + 0.07	
1030 5.0% Na	F 1.09 ± 0.09	
7.0% Na 10.0% Na	$\begin{array}{cccc} F & 1.24 \pm 0.04 \\ F & 1.30 \pm 0.13 \end{array}$	
1030 5.0% Ca	$F_2$ 1.25	
7.0% Ca 10.0% Ca	$F_2$ 1.43 ± 0.05 $F_2$ 1.80 ± 0.09	
1030 8.5% Al	$F_3$ 1.55	
8.85% A1	F <sub>3</sub> 1.57	
	continued	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
continued	-	
argon. This method is simpler and more expedient than the others		
while giving comparable or better accuracy.		
	ESTIMATED ERROR:	
	ESTIMATED ERROR:	
	ESTIMATED ERROR:	
	ESTIMATED ERROR: REFERENCES:	
	ESTIMATED ERROR:	

2	7	2

COMPONENTS :		ORIGINAL MEASUREMENTS:
<ul> <li>(1) Carbon dio [124-38-9]</li> <li>(2) Cryolite; [15096-52-</li> <li>(3) Alumina; A</li> </ul>	xide; CO <sub>2</sub> ; Na <sub>3</sub> AlF <sub>5</sub> ; 3] 1 <sub>2</sub> O <sub>3</sub> ; [1344-28-1]	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K. J. Metals <u>1967</u>, 19, 13 - 20.</li> <li>Bratland, D.; Krohn, C. Tidsskr. Kjemi, Bergv., Metall. <u>1966</u>, 26, 81 - 4.</li> </ol>
VARIABLES:		PREPARED BY:
T/K = 1250 - 1380 melt comp./mol% Al <sub>2</sub> O <sub>3</sub> = 5 - 17.9 P/kPa: 101.325 (1 atm.)		N. P. Bansal
EXPERIMENTAL VALUES:		
continued		
_	T/K 10 <sup>6</sup>	K <sub>#</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>
	1252 1257 1289 1328 1378	3.50 3.33 2.98 2.86 2.62
	<u> </u>	
Mannahara	demondence of V more	he was sented by the welsting
Temperature	dependence of NH may	be represented by the relation:
1	og(K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup> )	= -6.749 + 1600.8/(T/K) (compiler)
	std. de	$v_{1} = 1.4\%$ (compiler)
The enthalp	y of solution, AH, is	estimated to be:
	AH/kJ mol	$^{-1} = -30.6$ (compiler)
	AUXILIARY	INFORMATION
METHOD / APPARATUS / PRO	OCEDURE :	SOURCE AND PURITY OF MATERIALS:
]		
		· · ·
		ESTIMATED ERROR:
		REFERENCES :
		1
1		

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Carbon dloxide;CO<sub>2</sub>; [124-38-9] (2) Lithium carbonate: Li<sub>2</sub>CO<sub>2</sub>;</pre>	Dubois. P.	
[554-13-2]		
(3) Sodium carbonate; $Na_2CO_3$ ; [497-19-8]	Ann. Chem. (Paris) <u>1965</u> , 10, 145 - 186.	
<pre>(4) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>;</pre>		
· [584-08-7]		
VARIABLES:	PREPARED BY:	
T/K = 833	N. P. Bansal	
P/kPa = 1.013 - 101.325		
EXPERIMENTAL VALUES:		
The columbility of 00 in the colu	ter entertie Li CO No CO K CO	
The solubility of $CO_2$ in the molten eutectic $Li_2CO_3$ - $Na_2CO_3$ - $K_2CO_3$ has been measured at a single temperature. Its value has been reported as:		
solubility	Solubility/	
t/°C mol liter a	g liter - atm -	
560 0.09 ± 0.03	4.0 ± 0.4	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A thermogravimetric method.	Sodium and potassium carbonates were of pro analysi guality from	
was used to measure the	Merck. Lithium carbonate was obtained	
alkali metal carbonates. The	from Fluka ( <u>purissimum</u> ).	
device used allowed a direct		
of the electrolyte contained in		
an enclosure, when the atmosphere		
to another. The mass was recorded	ļ.	
in the absence of any gas flow.	ESTIMATED ERROR:	
1	Nothing specified.	
	DEFEDENCIC.	
	KEFERENCES:	

274		
<pre>COMPONENTS: (1) Carbon dioxide; CO<sub>2</sub>;[124-38-9] (2) Lithium carbonate; Li<sub>2</sub>CO<sub>3</sub>; [554-13-2] (3) Sodium carbonate; Na<sub>2</sub>CO<sub>3</sub>; [497-19-8] (4) Potassium carbonate; K<sub>2</sub>CO<sub>3</sub>; [584-08-7]</pre>	ORIGINAL MEASUREMENTS: Appleby, A. J.; Van Drunen, C. J. Electrochem. Soc. <u>1980</u> , 127, - 59.	
VARIABLES: T/K = 973 P/kPa: 101.325 (1 atm.)	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES: The solubility of CO <sub>2</sub> in the mel - 25.0 mol%) is reported as:	t Li <sub>2</sub> CO <sub>3</sub> - Na <sub>2</sub> CO <sub>3</sub> - K <sub>2</sub> CO <sub>3</sub> (43.5 -	
t/°C 10 <sup>3</sup> Sol	ubility/mol dm <sup>-3</sup> atm <sup>-1</sup>	
700	3.60	
<sup>∞</sup> Mean value of six readin	gs.	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: Not described.	

The diagram and details of the apparatus used and procedure followed are described in the original paper. Briefly, the melt was saturated by bubbling the gas for 2 - 3 hr. A portion of the saturated melt was transferred into the chilling compartment where it was slowly quenched to allow all the gases to escape. The liberated gas was flushed with a stream of helium into a U - tube containing activated Linde 5A molecular sieve. The contents of the tube, after being allowed to come to room temperature, were flushed with a stream of carrier gas into a Fisher - Hamilton gas partitioner with Linde 5A column and Katharometer detector for analysis. About 8 - 10 independent measurements were made.

ESTIMATED ERROR:

Nothing specified.

1655

31.5

I.

**REFERENCES:** 

	275
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Carbon dioxide; CO<sub>2</sub>; [124-38-9] (2) Lithium fluoride; LiF;</pre>	Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfeldt, K.
[7789-24-4] (3) Aluminum fluoride; AlF <sub>3</sub> ; [7784-18-1]	<b>J. Metals</b> <u>1967</u> , <b>19</b> , 13 - 20.
(4) Alumina; Al <sub>2</sub> O <sub>3</sub> ; [7344-28-1]	
VARIABLES:	PREPARED BY:
T/K = 1203 N. P. Bansal	
P/RPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
Solubility of $CO_2$ in the molten mixture $Li_3AlF_6$ - $Al_2O_3$ (96.9 - 3.1 mol%) at a single temperature is presented in graphical form. Its value derived from the graph, by the compiler, is given below:	
t/°C 10 <sup>6</sup> Sc	plubility/mol ml <sup>-1</sup> atm <sup>-1</sup>
930	2.50 ± 0.15
AUXILIARY	( INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Detailed descriptions of the apparatus and procedure for each method are given in the original paper. <u>Volumetric Method</u> : The change in volume of gas (at constant pres- sure) caused by its dissolution in the melt is directly determined. This is not an accurate method, the estimated uncertainity being about 25%.	Lithium fluoride was obtained from the Lithium Corp. of America. Sublimed aluminum fluoride, purity > 99%, was used. Alumina was of pro analysi quality from Merck AG, Darmstadt, West Germany. The salts were either dried <u>in</u> situ or pre-dried in vacuum for 4 hrs. at 450°C.
in weight of a melt sample due to the dissolution of the gas is using a balance.	ESTIMATED ERROR:
<u>Cnilling Method</u> : The dissolved gas is removed from the melt by freezing the melt. The expelled gas is carried into absorption Vessels containing Ascarite/	solubility = ± 10% (authors) REFERENCES:
Dehydrite by a stream of pure argon. This method is simpler and more expedient than the others while giving comparable or better accuracy.	

COMPONENTS :	ORTGINAL MEASUREMENTS .
(1) Nitrogen dioxide; NO <sub>2</sub> ;	
$\begin{bmatrix} 10102 - 44 - 0 \end{bmatrix}$	Topol, L. E.; Osteryoung, R. A.;
[7631-99-4]	Christie, J. n.
(3) Potassium nitrate; $KNO_3$ ;	J. Phys. Chem. <u>1966</u> , 70, 2857 - 62.
[//3/-/9-1]	
VARIABLES:	PREPARED BY:
one temperature: $T/K = 573$	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of NO2 in molten of 300°C was calculated to be approximated to be approxim	equimolar NaNO <sub>3</sub> - KNO <sub>3</sub> mixture at ately equal to (5 $\pm$ 3) 10 <sup>-6</sup> mol cm <sup>-3</sup> .
AUXILIARY	INFORMATION
METHOD APPARATUS / PROCEDURE .	SOURCE AND DUDITY OF MATERIALS.
INDINODINI I RARIOSI I ROCEDURE.	SOURCE AND FURITI OF PATERIALS;
Cyclic voltammetry and chronopotentiometry.	Matheson NO <sub>2</sub> (99.5% pure) was used without further purification. Sodium and potassium nitrates were dried at 150°C under vacuum.
	1
	ESTIMATED ERROR:
	Nothing specified.
	PEPERENALS.
	REFERENCES:

COMPONENTIAL	ODICINAL ACTIONNES.
confunents:	ORIGINAL MEASUREMENTS:
<pre>(1) Sulfur dioxide; SO<sub>2</sub>;       [7446-09-5]</pre>	Andresen, R. E.
(2) Sodium sulfate; Na₂SO₄; [7757-82-6]	<b>J. Electrochem. Soc.</b> <u>1979</u> , <b>126</b> , 328 - 34.
VARIABLES:	PREPARED BY:
T/K = 1174 - 1293 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	
For the solubility of $SO_2$ in molten sodium sulfate, the values of Henry's law constant, $K_H$ , at different temperatures are:	
t/°C 10 <sup>6</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
901	0.63
901	0.91
902	1.62
961	1.88
961	2.36
955	3.18
1016	3.06
	3.23
Temperature variation of $K_{H}$ for the solubility of SO <sub>2</sub> in molten Na <sub>2</sub> SO <sub>4</sub> is expressed by the relation: continued	
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS.
	SOURCE AND FURTH OF INTERIALD,
Manometric technique. The diagram and details of the apparatus used are given in the original paper. The procedure followed has been described in detail elsewhere (1). In brief, the apparatus was first evacuated and then filled with SO <sub>2</sub> to a pressure of about 1 atm. Due to gas dissolution, the gas pressure	<pre>SO<sub>2</sub> (99.5%) supplied by Linde Gas Company was used directly from the cylinder using Teflon tubing. Na<sub>2</sub>SO<sub>4</sub>, Reagent grade, supplied by Matheson, Coleman and Bell was dried in an oven at about 200°C, then in the furnace at 400°C under vacuum.</pre>
when the pressure did not change	ESTIMATED ERROR:
for about one hour. The volume of the gas dissolved was determined from the initial and final positions of the more maniacure	solubility: ± 20 - 30%
in the manometer. The apparatus	REFERENCES:
Was earlier calibrated using argon. With a cathetometer, pressure changes as small as 0.05 torr could be read.	1. Andresen, R. E.; Paniccia, F.; Zambonin, P. G.; Oye, H. A. Proceedings of the 4th Nordic High Temperature Symposium, Vol. 1 (Tilli, M.; editor), Helsinki <u>1975</u> , 127.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Sulfur dioxide; SO<sub>2</sub>;       [7446-09-5]</pre>	Andresen, R. E.
(2) Sodium sulfate; Na <sub>2</sub> SO <sub>4</sub> ; [7757-82-6]	J. Electrochem. Soc. <u>1979</u> , <b>126</b> , 328 -34.
VARTABLES :	PREPARED BY.
T/K = 1174 - 1293	N. P. Bansal
EXPERIMENTAL VALUES:	<u> </u>
continued	
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -1.592 - 5003/(T/K) (compiler)
std. dev	7. = 9.5% (compiler)
The standard enthalpy, AH°, and s are:	standard entropy, AS°, of dissolution
∆H°/kJ mo	$Dl^{-1} = 124$
^S°/J K <sup>-1</sup> n	$nol^{-1} = 113.2$ (at 1173 K)
	÷
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

	<u> </u>	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Hydrogen fluoride; HF; [7664-39-3]</pre>	Winsor, R. V.; Cady, G. H.	
(2) Cesium fluoride; CsF; [13400-13-0]	J. Amer. Chem. Soc. <u>1948</u> , 70, 1500 - 02.	
VARIABLES:	PREPARED BY:	
	N. P. Bansal	
EXPERIMENTAL VALUES:		
Hydrogen fluoride reacts with cesium fluoride giving rise to formation of four compounds having the compositions: CsF·HF, CsF·2HF, CsF·3HF, and CsF·6HF.		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;	
Cooling and warming curves.	HF was prepared in the vapor	
The details of the method are given in the original paper.	form by distillation of the anhydrous acid from a commercial cylinder. Cesium fluoride was prepared by reaction between cesium carbonate and aqueous hydrofluoric acid followed by evaporation.	
	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	

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4	υ	v

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen fluoride; HF;	Field, P. E.; Shaffer, J. H.
(2) Lithium fluoride; LiF;	J. Phys. Chem. <u>1967</u> , <b>71</b> , 3218 - 22.
(3) Beryllium fluoride; BeF <sub>2</sub> ;	
[7789-49-7]	
VARIABLES: T/K = 773 - 973	PREPARED BY:
P/kPa = 101.325 - 202.650	N. P. Bansal
EVERTMENTAL VALUES.	
Solubilities of HE in molton	Lip - Ber (66 - 34 molt) at different
temperatures are:	bir berz (00 54 mole) at different
	10 <sup>5</sup> Solubility 10 <sup>4</sup> Solubility
molar volum saturating of melt/ t/°C press/atm ml mol <sup>-1</sup>	mol ml <sup>-1</sup> mol mol frac mol ml <sup>-1</sup> atm <sup>-1</sup> frac atm <sup>-1</sup>
500 1.32 16.54	2.68 2.03 4.43 3.36
1.65	3.40 $2.06$ $5.62$ $3.41$
524 1.99 16.63 595 1.24 16.89	1.63 $1.31$ $2.75$ $2.22$
600 1.33 16.90	1.72 1.29 2.90 2.18
1.68	2.06 $1.23$ $3.48$ $2.072.40$ $1.22$ $4.06$ $2.06$
700 1.61 17.29	1.43 0.89 2.48 1.54 1.77 0.89 3.07 1.55
	continued
IXUA	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution technique.	Anhydrous HF (99.9%) supplied by
The diagram and details of the	the Matheson Co., East Rutherford,
apparatus used are given in the	further purification.
original paper. The procedure	The LiF - $BeF_2$ (66 - 34 mol%) mixture was prepared by the Oak Ridge
measurements has been described	National Laboratory. It was treated
was saturated with HF at constant	nt hydrogen at 600°C and with hydrogen
pressure by bubbling the gas	continued
of the saturated melt was	ESTIMATED ERROR.
transferred into the stripping section and flushed with belium	
overnight to liberate the dissolved HF. The HF from the H	solubility = 5% (compiler)
HF gas effluent was absorbed in standard KOH solution and back	a REFERENCES:
titrated with a standard HCl	1. Shaffer J. H. Grimes W. P.
	Watson, G. M.
	J. Phys. Chem. <u>1959</u> , 63, 1999.

	201	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen fluoride; HF;	Field, P. E.; Shaffer, J, H.	
<pre>[/664-39-3] (2) Lithium fluoride; LiF; </pre>	J. Phys. Chem. <u>1967</u> , <b>71</b> , 3218 - 22.	
<pre>(3) Beryllium fluoride; BeF<sub>2</sub>;</pre>		
[//05-49-/]		
$\pi/\kappa = 773 - 973$	FREFARED DI:	
P/kPa = 101.325 - 202.650	N. P. Bansal	
EXPERIMENTAL VALUES: continued		
Values of Henry's law constant an	nd $x_1$ at various temperatures are:	
t/°C 10 <sup>5</sup> K <sub>H</sub> /mol ml <sup>-1</sup> atm <sup>-1</sup>	10 <sup>4</sup> x <sub>1</sub> /mol fraction atm <sup>-1</sup>	
500 2.04 ± 0.07	$3.37 \pm 0.13$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$2.16 \pm 0.05$ 1.51 ± 0.06	
* Colculated by the compiler using	moler volume data of molt	
Smoothed Data: Temperature dependence of Henry's law constant and $x_1$ is expressed by the relations: $\log(K_H/\text{mol ml}^{-1} \text{ atm}^{-1}) = -6.496 + 1399.3/(T/K)$ (compiler) $\log(x_1/\text{mol fraction atm}^{-1}) = -5.176 + 1319.8/(T/K)$ (compiler) std. dev. = 0.3% (compiler) The enthalpy, $\Delta H$ , and entropy, $\Delta S$ , of solution are: $\Delta H/\text{kcal mol}^{-1} = -5.98 \pm 0.19$ $\Delta S/\text{cal K}^{-1} \text{ mol}^{-1} = -7.07 \pm 0.26$ (at 600°C)		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
	continued	
	alone at 700°C to remove the oxides,	
	sulfides and other impurities.	
	ESTIMATED ERROR:	
	REFERENCES:	
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COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen fluoride; HF;	Shaffer, J. H.; Watson, G. M.
(2) Lithium fluoride; LiF; [7789-24-4]	U.S.A.E.C. Rept. ORNL-2931 <u>1960</u> , 31 - 32
<pre>(3) Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</pre>	
VARIABLES: $T/K = 873 - 1073$	PREPARED BY:
melt comp./mol% LiF = 54 - 89	N. P. Bansal
P/kPa = 50.663 - 303.975	
EXPERIMENTAL VALUES:	
Molten salt mixtures of LiF - BeF containing 54 - 89 mol% LiF were emp constants, $K_{H}$ , for the solubility of temperatures are:	P2 of different compositions ployed as solvents. The Henry's law HF in various melts at different
Melt Composition/	10° K <sub>#</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
mol% LiF 60	00°C 700°C 800°C
54	9.4 7.3 5.6
59 1	0.9 7.8 6.0
80 1	.3./ 9.8 /.0 .6.3 <sup>a</sup> 11.7 8.8
89 1	7.3 <sup>a</sup> 13.0 <sup>a</sup> 10.3 <sup>a</sup>
Temperature dependence of Henry's by the relation: log(K <sub>H</sub> /mol cm <sup>-3</sup> at	s law constant, $K_{H}$ , can be expressed $(m^{-1}) = a + b/(T/K)$ continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method.	Not described.
The procedure followed for determining the solubilities has been described earlier (1). Briefly, the method consisted in saturating the melt with HF at known pressure and temperature. A measured portion of the saturated melt was transferred to the stripping section of the	
apparatus. The HF dissolved in	
this melt was stripped by	ESTIMATED ERROR:
this melt was stripped by flushing with helium. The amount	ESTIMATED ERROR: Nothing specified.
this melt was stripped by flushing with helium. The amount of HF evolved was determined by absorption in a standard solution of aqueous KOH and back titration	ESTIMATED ERROR: Nothing specified.
this melt was stripped by flushing with helium. The amount of HF evolved was determined by absorption in a standard solution of aqueous KOH and back titrating with a standard acid solution.	ESTIMATED ERROR: Nothing specified. REFERENCES:
this melt was stripped by flushing with helium. The amount of HF evolved was determined by absorption in a standard solution of aqueous KOH and back titrating with a standard acid solution.	ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Shaffer, J. H.; Grimes, W. R. Watson, G. M.
this melt was stripped by flushing with helium. The amount of HF evolved was determined by absorption in a standard solution of aqueous KOH and back titrating with a standard acid solution.	ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Shaffer, J. H.; Grimes, W. R. Watson, G. M. J. Phys. Chem. <u>1959</u> , <b>63</b> , 1999.

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen fluoride; HF;	Shaffer, J. H.; Watson, G. M.		
[7664-39-3] (2) Lithium fluoride, LiF.	USAFC Port OPNI-2921 1960		
[7789-24-4]	31 - 32.		
(3) Beryllium fluoride; BeF <sub>2</sub> ;			
VADTADIEC.			
VARIADLED:	PREPARED BI:		
	N. F. Dansal		
EXPERIMENTAL VALUES:			
continued			
The values of coefficients, a, and by the compiler) for the molta of di	d b of the above equation (evaluated		
heats of solution, AH, and entropies	of solution, AS, are given below:		
	. , 5		
Melt Composition/ a	b $\Lambda H/ \Lambda S^{e}/$		
mol% LiF	kJ mol <sup>-1</sup> J K <sup>-1</sup> mol <sup>-1</sup>		
54 -6.224 10	49.5 -20.9 -45.2		
59 -6.356 12	15.9 -23.4 -46.9		
69 -6.418 13 80 -6.222 12	153.5 -23.8 -43.9		
89 -5.970 10	55.2 -20.5 -39.3		
Entropies of solution calculated f	or equal concentrations of HF in gas		
and solution phases at 1000 K.			
std. dev. =	0.007 - 1.3% (compiler)		
AUXILIARY	INFORMATION		
Vinena i			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
'			
	ESTIMATED ERROR:		
1			
1	REFERENCES :		
	1		

COMPONENTS:

COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen fluoride; HF; [7664-39-3]	Shaffer, J. H.; Watson, G. M.		
(2) Sodium fluoride; NaF;	U.S.A.E.C. Rept. ORNL-2931 1960,		
[7681-49-4] (3) Bervllium fluoride: BeFa:	31 - 32,		
[7789-49-7]			
VARIABLES: T/K = 873 - 1073	PREPARED BY:		
melt comp./mol% NaF = $49 - 75$	N. P. Bansal		
P/kPa = 50.663 - 303.975			
EXPERIMENTAL VALUES:			
Molten salt mixtures of NaF - BeF containing 49 - 75 mol% NaF were emp constants, K <sub>H</sub> , for the solubility of temperatures are:	2 of different compositions loyed as solvents. The Henry's law HF in various melts at different		
Melt Composition/	$10^6 \text{ K}_{H}/\text{mol cm}^3 \text{ atm}^1$		
mol% NaF 600	°C 700°C 800°C		
49 18	.8 13.1 10.0		
58 26	.7 18.0 13.9		
66 49 70 107	.2 31.2 21.8 .1 55.2 34.3		
75 179	.0 <sup>a</sup> 93.0 <sup>a</sup> 55.1		
Smoothed Data: The temperature dependence of Henry's law constant, $K_H$ , can be expressed by the relation: $log(K_H/mol \ cm^{-3} \ atm^{-1}) = a + b/(T/K)$ continued			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Stripping method.	Not described.		
The procedure followed for solubility measurements has been described in detail elsewhere (1). Briefly, the method consisted in saturating the melt with HF at known pressure and temperature. A measured portion of the saturated melt was transferred to the stripping section of the apparatus. The HF dissolved in			
this melt was stripped by flushing	ESTIMATED ERROR:		
evolved was determined by absorption in a standard solution of aqueous KOH and back titrating	solubility = + 10%		
with a standard acid solution.	REFERENCES :		
	<ol> <li>Shaffer, J. H.; Grimes, W. R.; Watson, G. M.</li> </ol>		
	J. Phys. Chem. <u>1959</u> , 63, 1999.		
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MPONENTS:		ORIGIN	ORIGINAL MEASUREMENTS:			
<ol> <li>Hydrogen fluoride; HF; [7664-39-3]</li> <li>Sodium fluoride; NaF; [7681- [7681-49-4]</li> <li>Beryllium fluoride; BeF<sub>2</sub>; [7789-49-7]</li> </ol>		Shaf U.S. 31 -	Shaffer, J. H.; Watson, G. M. U.S.A.E.C. Rept. ORNL-2931 <u>1960</u> , 31 - 32.			
VARIABLES:		PREPAR	ED BY:			
			N. P	. Bansal		
EXPERIMENTAL VALUES:		<u>l</u>				
continued						
Values of coefficient, the compiler) for the me of solution, AH, and ent	s, a, and lts of di ropies of	b of th fferent solutio	e above equation a composition a $n, \Delta S$ , are g	tion (evaluated by along with the heats iven below:		
Melt Composition/ mol% NaF	a	b	∆H/ kJ mol <sup>-⊥</sup>	^ S*/ J K <sup>-1</sup> mol <sup>-1</sup>		
49	-6 201	1286 5	-22.2	_22 2		
58	-6.105	1333.3	-23.0	-20.1		
66 70	-6.207 -6.634	1657.3	-28.5	-21.8		
75	-6.495	2398.5	-42.3	-26.8		
	AUXILI	ARY INFORM	ATION			
METHOD/APPARATUS/PROCEDURE:		SOURC	E AND PURITY OF	MATERIALS:		
		ESTIM	ATED ERROR:			
		REFER	RENCES:			

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<ul> <li>(1) Hydrogen fluoride; HF; [7664-39-3]</li> <li>(2) Sodium fluoride; NaF; [7681-49-4]</li> <li>(3) Zirconium fluoride; ZrF<sub>4</sub>; [7783-64-4]</li> </ul>	Shaffer, J. H.; Grimes, W. R.; watson, G. M. J. Phys. Chem. <u>1959</u> , 63, 1999 - 2002.		
VARIABLES: P/kPa = 50.663 - 303.975 T/K = 823 - 1073 melt comp./mol% NaF = 45 - 80.5	PREPARED BY: N. P. Bansal		
EXPERIMENTAL VALUES:	••••••••••••••••••••••••••••••••••••••		
Solubilities of HF in molten NaF temperatures and various saturating	- ZrF₄ (53 - 47 mol%) at different pressures are:		
saturating 10 t/°C pressure/atm	<sup>5</sup> Solubility 10 <sup>5</sup> K <sub>H</sub> / mol cm <sup>-3</sup> mol cm <sup>-3</sup> atm <sup>-1</sup>		
550 2.09 2.56 2.96	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
600 0.494 0.550 0.565 1.05 1.05 1.34 1.50 1.55 2.05 2.05 2.52 2.52 2.52 2.53 2.95	$Avg = 1.38 \pm 0.02$ 0.57 1.16 0.66 1.19 0.69 1.23 1.39 1.32 1.33 1.27 1.62 1.21 1.75 1.17 1.92 1.24 2.72 1.33 2.45 1.19 3.07 1.22 3.02 1.20 3.11 1.23 3.52 Avg = 1.23 \pm 0.04 continued		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE: Stripping method. The details about the apparatus used and the procedure followed for solubility measurements are given in the original publication and also in (1,2). In brief, the melt was saturated by sparging with HF at the desired pressure for 6 hrs. About one - half of the melt was transferred from the saturator to the stripping section by destroying the frozen seal. The	Hydrogen fluoride (99.9%) from cylinders supplied by Harshaw Chemical Company, Cincinnati was used without further purification. The HF vapors contained less than 0.2 mol% gases insoluble in aqueous KOH. Sodium fluoride was of reagent grade. ZrF <sub>4</sub> was prepared by continued ESTIMATED ERROR:		
dissolved HF in the salt was stripped by bubbling helium and absorbed in a standard aqueous solution of KOH. The amount of absorbed HF was determined by back titration with a standard acid solution.	Nothing specified. REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u> , <b>62</b> , 862. 2. Blander, M.; Grimes, W. R.; Smith, N. V.		
	Ibid. <u>1959</u> , 63, 1164.		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Hydrogen fluoride · HF ·			
(1) inverse intervalue, int, $[7664-30-2]$	Shaffor J H. Grimon W D		
	Sharrer, J. H.; Grimes, W. R.;		
(2) Sodium fluoride; NaF;	Watson, G. M.		
[7681-49-4]			
(3) Zirconium fluoride; ZrF <sub>4</sub> ;	J. Phys. Chem. <u>1959</u> , 63, 1999 -		
[7783-64-4]	2002.		
VARIABLES $P/kPa = 50,663 - 303,975$	PREPARED BY:		
T/K = 823 - 1073			
melt comp./mol% NaF = $45 - 80.5$	N. P. Bansal		
EXPERIMENTAL VALUES: continued			
Concinaca			
saturating 10	5 Solubility 105 K /		
t/80 program (atm	$mol \ cm^{-3} \qquad mol \ cm^{-3} \ otherwise \ mol \ otherwise \ mol \ cm^{-3} \ otherwise \ otherwise \ mol \ cm^{-3} \ otherwise \ mol \ otherwise $		
t/ t pressure/atim			
	1 10		
050 0.43			
1.03	1.02 1.00		
1.47	1.49 1.01		
2.14	2.20 1.03		
2.36	2.41 1.02		
2.74	2.81 1.03		
	Avg = 1.03 + 0.02		
700 0.62	0 59 0 03		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
1.10	1.08 0.93		
1.40	1.32 0.95		
1.79	1.68 0.94		
1.86	1.80 0.97		
2.75	2.42 0.88		
	$Avg = 0.93 \pm 0.02$		
750 0.83	0.73 0.88		
1,15	1.00 0.87		
1 96	1 63 0 84		
1.90			
	$AVg = 0.86 \pm 0.02$		
800 0.42	0.31 0.74		
0.84	0.62 0.74		
1.51	1.14 0.75		
2.18	1.54 0.73		
2.48	1.75 0.71		
	$Avg = 0.73 \pm 0.01$		
	THEODIAMYON		
AUXILIARY	INFORMATION		
METHOD /APPARATUS /PROCEDURE .	SOURCE AND PURITY OF MATERIALS.		
- INOD/AFTRAATOS/TROCEDORE.	SOURCE AND FURITI OF MATERIALS;		
,	continued		
	hydrofluorination of ZrCl <sub>4</sub> at 450°C		
	in nickel equipment. The solvent		
	mixture was purified as described		
	Alsouhoro (1)		
	ESTIMATED ERROR:		
1			
	REFERENCES:		
1			
}			

ORIGINAL MEASUREMENTS: COMPONENTS: (1) Hydrogen fluoride; HF; Shaffer, J. H.; Grimes, W. R.; Watson, G. M. [7664-39-3] (2) Sodium fluoride; NaF; J. Phys. Chem. 1959, 63, 1999 -[7681-49-4] (3) Zirconium fluoride; ZrF<sub>4</sub>; 2002. [7783-64-4] VARIABLES: PREPARED BY: T/K = 823 - 1073P/kPa = 50.663 - 303.975 Melt comp. NaF/mol% = 45 - 80.5 N. P. Bansal EXPERIMENTAL VALUES: continued The values of Henry's law constant,  $K_{H}$ , in melts of different compositions are:  $10^{5} K_{H}/mol cm^{-3} atm^{-1}$ Melt Composition/ mol% NaF 550 600 650 700 750 800 45 0.78 0.65 0.51 53 1.38° 1.23\* 1.03° 0.93° 0.86ª 0.73\* 1.53 60 1.03 0.81 2.17\* 65 1.46 1.06 7.20\* 12.80\* 80.5 4.43 \* Value ± 0.02, \* Value ± 0.04, \* Value ± 0.01. " Values extrapolated from measurements at higher temperatures, by the authors. Smoothed Data: Temperature dependence of the Henry's law constant,  $K_{H}$ , can be expressed by the equation:  $\log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = a + b/(T/K)$ continued AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES :

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		ORICINA	I. MEASUREMENTS .		
COMPONENTS:		Choff	ORIGINAL MEASUREMENTS:		
(1) Hydrogen fluoride; HF; [7664-39-3]		Watsc	on, G. M.	35, W. R.;	
<pre>(2) Sodium fluoride; NaF; [7681-49-4]</pre>	1	J. Ph	ys. Chem. <u>1959</u> ,	<b>63,</b> 1999 -	
(3) Zirconium fluoride; Z	lrF₄;	2002.	-		
[7763-04-4]		}			
VARIABLES:		PREPAR	ED BY:		
			N. P. Ba	nsal	
EXPERIMENTAL VALUES:					
continued					
Values of parameters,	a, and bo	f the a	bove equation (	evaluated by the	
compiler) for various mel solution, AH and entropie	lt composit es of solut	ions al ion. As	ong with the en 5. as calculated	thalpies of by the authors	
are:			,		
Melt Composition/			٨٢/	۸ S#/	
mol% NaF	a	b	kcal mol-1	eu	
		<u> </u>			
45	-6.083	857.5	-3.85	-5.2	
60	-6.311 1	300.6	-5.80	-6.2	
65 80,5	-6.334 1	458.3	-6.60 -9.70	-6.4	
and liquid phases at 10	Calculated	for equ ors).	al concentratio	ns of HF in gas	
		_ ) =9	(commiler)		
std. dev. = 0.05 - 2.5% (compiler)					
				<u></u>	
	AUXILIA	RY INFOR	MATION		
METHOD/APPARATUS/PROCEDURE:		SOURC	E AND PURITY OF MAT	ERIALS:	
1					
			MATED EPROP.		
		ESTI	TAILD LKKUK:		
		REFE	RENCES :		
-		1			

COMPONENTS: (1) Hydrogen fluoride.HF. [7664-39-3]	ORIGINAL MEASUREMENTS:		
(2)Lithium fluoride;LiF; [7789-24-4] (3)Bervllium fluoride:BeF-	Shaffer, J. H.; Watson, G. M.		
[7789-49-7] (4)Zirconium fluoride; ZrF <sub>4</sub> ;	U.S.A.E.C. Rept. O.R.N.L3127 <u>1960</u> , 13 - 16.		
[7783-64-4] (5)Thorium fluoride;ThF <sub>4</sub> ;[13709-59-6			
(6)Uranium fluoride;UF <sub>4</sub> ;[10049-14-6]			
VARIABLES: $\pi/\kappa = 772 = 072$	PREPARED BY:		
P/kPa = 141.855 - 243.18	N. P. Bansal		
	<u> </u>		
EXPERIMENTAL VALUES:			
The values of Henry's law constant, $K_{H}$ , for the solubility of HF in the molten salt solvent LiF - BeF <sub>2</sub> - ZrF <sub>4</sub> - ThF <sub>4</sub> - UF <sub>4</sub> (65 - 28 - 5 - 1 - 1 mol%) at different temperatures and pressures ranging from 1.4 to 2.4 atm are:			
t/°C 10	<sup>5</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
500	17.0		
550	13.3		
700	8.0		
Smoothed Data: Temperature dependence of K <sub>H</sub> can	n be expressed by the relation:		
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	= -6.365 + 1228.7/(T/K)  (compiler)		
std. de	ev. = 0.9% (compiler)		
The enthalpy of solution, AH, in	n the temperature range 500 - 700°C is:		
AH/kcal I	$nol^{-1} = -5.65$		
AUXILIA	NY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Not described.	Not described.		
	ESTIMATED ERBOR		
	BILLED ERICK.		
	Nothing specified.		
	REFERENCES:		

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PONENTS :	ORIGINAL MEASUREMENTS:
(1) Deuterium fluoride; DF;	Field, P. E.; Shaffer, J. H.
<ul> <li>(2) Lithium fluoride; LiF;</li> <li>[7789-24-4]</li> <li>(3) Beryllium fluoride; BeF<sub>2</sub>;</li> <li>[7789-49-7]</li> </ul>	J. Phys. Chem. <u>1967</u> , 71, 3218 - 22.
IABLES: P/kPa = 101.325 - 202.650 T/K = 773 - 973	PREPARED BY: N. P. Bansal
ERIMENTAL VALUES: Solubilities of DF in molten Lif cemperatures are:	F - BeF <sub>2</sub> ( 66 - 34 mol%) at different
saturating molar volum t/°C pressure/atm of melt/ml mo	ne 10 <sup>5</sup> solubility/ 10 <sup>4</sup> solubility pl <sup>-1</sup> mol ml <sup>-1</sup> mol fraction
500 1.24 16.54 1.62 1.93	2.21 3.66 2.88 4.76 3.52 5.81
600 1.27 16.90 1.61	1.37 $2.321.70$ $2.87$
700 1.70 17.29	1.25 $2.15$ $1.48$ $2.54$
	continued.
Elution technique. The diagram of the apparatus used has been given in the origin- al paper. The procedure followed for solubility measurements has been described elsewhere(1). In brief, the melt was saturated with DF by bubbling the gas, at const- ant temperature, through it for about 6hrs. A part of the saturated melt was transferred into the stripping section and flushed with helium overnight to remove the dissolved effluent Was absorbed in a standard KOH solution and back titrated with a standard HCl solution.	Anhydrous DF was prepared by the Technical Division, Oak Ridge Gaseo- ous Diffusion Plant, by reaction of elemental deuterium and fluorine. The LiF - BeF <sub>2</sub> (66-34 mol%) mix- ture was prepared by the Oak Ridge National Laboratory. It was treated with a mixture of 10 mol% HF in H <sub>2</sub> at 600°C and with H <sub>2</sub> alone at 700°C to remove the oxides, sulfides and other impurities. ESTIMATED ERROR: Solubility = ± 5% (authors) REFERENCES: 1. Shaffer, J. H.; Grimes, W. R.; Watson, G. M.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Deuterium fluoride; DF;	Field, P. E.; Shaffer, J. H.		
(2) Lithium fluoride; LiF; [7789	J. Phys. Chem. <u>1967</u> , <b>7</b> 1, 3218 - 22.		
-24-4] (3) Beryllium_fluoride; BeF <sub>2</sub> ;			
[7789-49-7]			
VARIABLES: $T/K = 773 - 973$	PREPARED BY:		
P/kPa = 101.325 - 202.650	N. P. Bansal		
EXPERIMENTAL VALUES: (Continued) The values of Henry's law constar temperatures are:	nt and solubility at various		
t/°C 10 <sup>5</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	10 <sup>4</sup> x <sub>1</sub> /mol fraction atm <sup>-1</sup>		
500 1.79 ± 0.04	2.96 ± 0.07		
600         1.08 ± 0.02           700         0.72 ± 0.02	$1.83 \pm 0.03$ $1.25 \pm 0.03$		
Smoothed Data: Temperature dependence of Henry's law constant and solubility is expressed by the relations: $log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -6.671 + 1487.8/(T/K)$ (compiler) std. dev. = 0.08% (compiler)			
The enthalpy, AH, and entropy, AS	5. of solution are:		
$\Lambda H/kcal mol^{-1}$	= -6.43 + 0.11		
$\frac{1}{100} = -0.43 \pm 0.11$			
Calculated by the compiler using m	nolar volume data of melt.		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
	ESTIMATED ERROR:		
	REFERENCES:		

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	293		
Components :	ORIGINAL MEASUREMENTS:		
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Ukshe, E. A., Devyatkin, V. N.		
(2) Lithium chloride; LiCl; [7447-41-8]	<pre>Zh. Fiz. Khim. 1965, 39, 2288 - 90; Russ. J. Phys. Chem. (Eng. Transl.) 1965, 39, 1222 - 23. (*).</pre>		
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:		
T/K = 973 - 1073	N. P. Bansal		
EXPERIMENTAL VALUES: The solubilities of hydrogen chlo in molten LiCl at different temperat	oride, at one atmosphere gas pressure, cures are:		
t/°C 10 <sup>6</sup>	$x_1/(mol fraction) atm-1$		
700	9.86		
750 800	14.72 20.33		
Temperature dependence of $x_1$ , in the range 700 - 800°C, is given by the expression: $log(x_1/mol \ fraction \ atm^{-1}) = -1.6276 - 3285.4/(T/K)$ (compiler) std. dev. = 0.8% (compiler) The heat of solution, $\Delta H$ , is given by: $\Delta H/kJ \ mol^{-1} = + 57.3$			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE: Elution or stripping technique. The method used was essentially the same as reported by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was passed through the melt for 30 - 40 min. and allowed to equilibrate for 3 - 5 min. A part of the melt was isolated and flushed with argon. The liberated hydrogen chloride was absorbed in distilled water and titrated against a standard alkali solution.	SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Grade A argon was passed over phos- phorous pentoxide. Traces of moisture from the two gases were further remo- ved by passing them through a trap cooled in a mixture of alcohol and solid carbon dioxide ESTIMATED ERROR: Nothing specified REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. <u>1962</u> , 7, 565.		

COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Sodium chloride; NaCl; EVALUATOR: N. P. Bansal National Aeronautics and Space Administration Lewis Research Center

CRITICAL EVALUATION:

[7647-14-5]

Six investigations are available (1 - 6) for the solubility of hydrogen chloride in molten NaCl. Novozhilov et al. (3,4) employed a volumetric technique while an elution method was employed by the other investigators. Smoothed data at various temperatures from the different reports are compared below:

Cleveland, Ohio, 44135, U. S. A. December, 1989.

T/K	Ref.1ª	Ref.2	Ref.3	Ref.4	Ref.5ª	Ref.6"
1100	(7.17)		12.94	(13.68)	(93.6)	-
1120	7.64		13.17	13.58	79.49	(8.96)
1140	8.11		13.40	13.48	67.88	(9.32)
1180	9 10		13 84	13.39	(50.28)	10 03
1200	9.60	10.00 <sup>b</sup>	14.05	13.22	(43.57)	10.38
1220	10.11		14.26	13.14	,,	10.72
1240	10.63		14.47	13.06		11.07
1260	11.15		14.67	12.99		11.40
1280	11.68		(14.87)	12.91		11.74
1300	12.20		(15.07)	(12.04)		(12.07)
H/kJ mol <sup>-</sup>	·1 36.0	-	9.04	-3.7	-79.9	24.3

data from Janz, G. J. "Molten Salts Handbook", Academic Press, New York, <u>1967</u>.

ъ At 1203 К

References:

- Ukshe, E. A.; Devyatkin, V. N. Russ. J. Phys. Chem. <u>1965</u>, 39, 1222, 1641.
- 2. Devyatkin, V. N.; Ukshe, E. A. J. Appl. Chem. U.S.S.R. 1965, 38, 1574.
- Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I. Russ. J. Phys. Chem. <u>1972</u>, 46, 1066.
- 4. Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I. Russ. J. Phys. Chem. <u>1972</u>, **46**, 1398.
- 5. Lukmanova, T. L.; Vil'nyanskii, Ya. E. Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Tekhnol. <u>1964</u>, 7, 510.
- 6. Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I. H. Tr. Inst. Elektrokhim. Akad. Nauk. SSSR Ural. Fil. <u>1970</u>, 14, 3.

COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Sodium chloride; NaCl; [7647-14-5]	EVALUATOR: N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A.
[/64/-14-5]	December, 1989.

CRITICAL EVALUATION:

An examination of the preceding table shows that the results of Lukmanova and Vil'nyanskii (5) are too high and are thus rejected. The values of Novozhilov et al. (3,4) also are about 10 - 50% higher than those of other workers (1,2,6) and the data in (3,4) are also rejected. The data from (1,2,6) are in good agreement with each other, and the mean values from (1,2,6) are designated as **recommended** values. These recommended values are given in Table 1 and Fig. 1.



Table 1 - Recommended Numerical Values

200	
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Ukshe, E. A.; Devyatkin, V. N.
(2) Sodium chloride; NaCl; [7647-14-5]	Zh. Fiz. Khim. <u>1965</u> , 39, 2288 - 90; Russ. J. Phys. Chem. (Eng. Transl.) <u>1965</u> , 39, 1222 23. (*).
VARIABLES: T/K = 1113 - 1300 P/kPa = 101.325 (atm)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The solubilities of hydrogen chlo in molten NaCl at various temperatur	oride, at one atmosphere gas pressure, res are:
t/°C 10 <sup>6</sup> :	$x_1/(mol fraction) atm^{-1}$
840 880 915 925 963 995 1020 1030	32.0 32.81 30.50 36.50 42.19 46.75 49.72 52.35
Smoothed Data: Temperature dependence of x1, in expressed by the relation:	the interval 840 -1030°C, is
$log(x_1/mol fraction atm^{-1}) =$	2.8914 -1836.9/(T/K) (compiler)
Std. development for the heat of solution, $\Delta H$ , is: $\Delta H/kJ$ mol	v. = 3.9% (compiler) <sup>-1</sup> = +36.0

## AUXILIARY INFORMATION

	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
•	Elution or stripping technique. The method used was essentially the same as reported by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was passed through the melt for 30 - 40 min. and allowed to equilibrate for 3 - 5 min. A part of the melt was separated and sparged with argon.	Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Grade A argon was passed over phosphorous pentoxide. Traces of moisture from the two gases were further removed by passing them through a trap cooled in a mixture of alcohol and solid carbon dioxide.
	was absorbed in distilled water	ESTIMATED ERROR:
	solution.	Nothing specified
		REFERENCES:
		<ol> <li>Ryabukhin. Yu. M. Russ. J. Inorg. Chem. <u>1962</u>, 7, 565.</li> </ol>

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen chloride; HCl; [7647-01-0]	Devyatkin, V. N.; Ukshe, E. A.
(2) Sodium chloride; NaCl; [7647-14-5]	<pre>Zh. Prikl. Khim. <u>1965</u>, 38, 1612 - 14; J. Appl. Chem. U.S.S.R.(Eng. Transl.) <u>1965</u>, 38, 1574 - 75. (*).</pre>
VADTADIEC.	
one temperature: T/K = 1203 P/kPa = 25.331 - 101.325	N. P. Bansal
EXPERIMENTAL VALUES:	
The value of the Henry's law con in molten NaCl at a single temperat	stant, $K_{\mu}$ , for the solubility of HCl ure is:
t/°C 10	7 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
930	10
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution Method. The method used was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon for 1/2 hour through the melt. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The hydrogen chloride which was carried along with the argon was	Hydrogen chloride and argon were dried by passing through strong sulfuric acid and over phosphorous pentoxide, respectively. The traces of moisture were further removed by passing the two gases through a coil cooled in a mixture of alcohol and solid carbon dioxide.
absorbed in distilled water.	ESTIMATED ERROR:
	Nothing specified
	REFERENCES :
	1. Ryabukhin, Yu. M.
	<b>Russ. J. Inorg. Chem.</b> <u>1962</u> , <b>7</b> , 565.

COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Hydrogen chloride, HCl.	Novozhilov A L. Downstkhin V N		
[7647-01-0]	Gribova, E. I.		
(2) Sodium shlewida. Nagla	Zh. Fiz. Khim. <u>1972</u> , <b>46</b> , 1856 - 57;		
(2) Sodium chioride; Naci; [7647-14-5]	Russ. J. Phys. Chem. (Eng. Transl.) 1972. 46, 1066 - 67. (*).		
• • • • • • •			
VARIABLES:	PREPARED BY:		
T/K = 1093 - 1270 P/kPa = 101.325(1 atm)	N. P. Bansal		
EXPERIMENTAL VALUES:			
The values of Henry's law constan	t, $K_{H}$ , for the solubility of HCl in		
molten NaCl as a function of tempera	ture are:		
T/K 10 <sup>-7</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		
1093			
1123	13.23		
1167	13.67		
1213	13.11		
1270	12.97		
Smoothed Data:			
Temperature dependence of $K_{H}$ in t	he range 1093 - 1213 K is expressed		
$\log(K_{\mu}/mol \ cm^{-3} \ atm^{-1}) =$	-5.457 - 474.3/(T/K) (compiler)		
std. dev	. = 0.08% (compiler)		
The optical state of colution All with	bin the temperature intermed 1002		
1213 K, and the entropy change durin	g dissolution, $\Delta S$ , are:		
$\Delta H/KU MOI = 9.04 \Delta S/C$	J K - MOI - = 7.7 (at 1173 K)		
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Volumetric method.	HCI was prepared by reacting fused NaCl with concentrated sulfuric		
	acid. The gas was purified by		
A modification of the experimental method described by	fractional condensation.		
Bratland et al. (1) was used.	grade NaCl was fused in a guartz		
	container in a stream of dry chlorine.		
	for about 2 hours. Then the melt was		
	slowly crystallized under chlorine		
	atmosphere. Only transparent crystals		
	were used for the experiment.		
	ESTIMATED ERROR:		
	solubility = ± 1% (authors)		
	REFERENCES		
	I. Bratland, D.; Grjotheim, K.; Krohn, C.: Matzfield, K.		
	Acta Chem. Scand. <u>1966</u> , 20, 1811.		

	299
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0] (2) Sodium chloride; NaCl;</pre>	Novozhilov, A. L.; Devyatkin, V. N.; Gribova, E. I. Zh. Fiz. Khim. <u>1972</u> , <b>46</b> , 2433 - 36; Russ. J. Phys. Chem. (Eng. Transl.)
[7647-14-5]	<u>1972</u> , <b>46</b> , 1398 - 1400. (*).
VARIABLES:	PREPARED BY:
T/K = 1123 - 1295 No information on pressure	N. P. Bansal
EXPERIMENTAL VALUES: The solubilities of HCl in molter	n NaCl at different temperatures are:
т/к	107 soly/mol cm <sup>-3</sup>
1123	13.42
1167	13.56
1215	12.84
Smoothed Data.	
Smoothed Data:	
Temperature dependence of soly 18	3 given by the expression:
$\log(soly/mol \ cm^{-3}) =$	-6.042 + 195.9/(T/K) (compiler)
std. dev	1. = 0.7% (compiler)
The heat of solution, $\Delta H$ , is est	imated to be:
$\Delta H/kJ mol^{-1} = -$	3.7 (compiler)
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Volumetric method.	Condensation method was employed
The diagram and details of the	for drying gases.
apparatus used and procedure followed are described in the	
original publication. The melt is	
A part of the saturated melt is	
either flushed with argon or the	
salt evacuated. The volume of	
Liberated HCl is then measured With a gas burette	ECTIMATED EDDAD.
	ESTIMATED ERROR.
	solubility = ± 1% (authors)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Lukmanova, T. L.; Vil'nyanskii, Ya. E
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Izv. Vyssh. Ucheb. Zaved., Khim. 1 Khim. Technol. <u>1964</u> , 7, 510 - 13.
VARIABLES:	PREPARED BY:
T/K = 1113 - 1173	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The solubilities of hydrogen in molten NaCl at two temperatur	chloride, under one atmosphere pressure, res are:
<b>i</b> .	

(mol fraction) atm<sup>-1</sup>

840	3.15
900	1.89

Smoothed Data:

Temperature dependence of  $x_1$  in the range 840 - 900°C is expressed by the relation:

 $\log(x_1/mol \ fraction \ atm^{-1}) = -7.25 + 4180/(T/K)$ 

The heat of solution, AH, is given as:

 $AH/kJ mol^{-1} = -79.9$ 

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated  $\ensuremath{\mathtt{N_2}}$  . The liberated HCl was absorbed in water and determined by titration.

SOURCE AND PURITY OF MATERIALS: C. P. grade Sodium chloride

was used.

ESTIMATED ERROR:

Nothing specified

**REFERENCES:** 

Grimes, W. R.; Smith, N. V.; Watson, G. M.

J. Phys. Chem. 1958, 62, 862.

Components :	OKIGINAL MEASUREMENTS:	
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I, M.	
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Tr. Inst. Elektrokhim. Akad. Nauk. SSSR Ural. Fil. <u>1970</u> , 14, 3 - 9.	
VARIABLES: $p/kp_{2} = 0.912$	PREPARED BY:	
T/K = 1151 - 1283	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of hydrogen chloride in molten NaCl at different temperatures are reported to be:		
t/°C 104	$x_1/(mol fraction) atm^{-1}$	
878	40	
900	44 42	
920	44	
925	46.5	
950	47	
963	48	
986	51	
1010	53	
Temperature dependence of $x_1$ is expressed by the relation: $log(x_1/mol \ fraction \ atm^{-1}) = -1.29 - 1261/(T/K)$ The heat of solution, $\Lambda H$ , and entropy of solution, $\Lambda S$ , are: $\Lambda H/kJ \ mol^{-1} = 24.3$ $\Lambda S/J \ K^{-1} \ mol^{-1} = -24.7$		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE ·		
- THODAL PRATOS / PROCEDURE.	SURCE AND FURIT OF PAILKING.	
Elution or stripping method. Diagram and details of the apparatus used and procedure followed for gas solubility are given in the original publication. The salt was heated, fused and held under vacuum. The tube was filled with purified HCl gas. After saturation, the melt was flushed with argon. The HCl	Sodium chloride was dried in vacuum for 10 hours with a gradual temperature rise from 200 - 400°C. HCl gas was purified by passing through concentrated H <sub>2</sub> SO <sub>4</sub> and an acetone dry ice trap. Argon was dried and purified to remove oxygen and other impurities.	
liberated was absorbed in	ESTIMATED ERROR:	
measuring the pH of the solution.	Nothing specified	
	REFERENCES :	
	l	

302

COMPONENTS:			EVALIAT	OB •	
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>		N. H Nati Admi	N. P. Bansal National Aeronautics and Space Administration		
(2) Potassium [7447-40-	chloride; 1 7]	KCl;	Lewi	ls Research veland, Ohio	Center , 44135. U.S.A.
			Dece	emper, 1989.	
CRITICAL EVALUATION:					
Five studi	es have been	n reported (	1 - 5) f	for the solu	bility of
volumetric me	thod while	ten KCL. Nov the other in	vestigat	et al. (3) ions were c	used a arried out
employing the	elution tec	chnique. Smo	othed da	ata at vario	us temperatures
trom the diff	erent studio	es are compa	red ber	JW :	
		·····- <u>-</u>			
		10 <sup>7</sup> K <sub>H</sub> /	mol cm <sup>-3</sup>	' atm <sup>-1</sup>	
T/K	Ref.1ª	Ref.2	Ref.3	Ref.4ª	Ref.5 <sup>°</sup>
1060	(23.12)		35.90	(53.67)	
1080 1100	(23.54)		35.82	49.24	
1120	24.32			41.79	
1140 1160	24.69 25.04		34.78	38.65	(21 82)
1180	25.37	24.05	33.75	(33.28)	22.74
1200	25.69		24 10	(30.98)	23.66
1220	26.29		34.10		24.58
1260	26.56		33.88		26.40
1270	26.69		-		26.86
∆H/kJ mol-1	12.1	-	-3.8	-33.9	26.8
<ul> <li>Values in (mol cm<sup>-3</sup> atm<sup>-1</sup>) calculated by the evaluator using density data from Janz, G. J. "Molten Salts Handbook", Academic Press, New York, <u>1967</u>.</li> <li>At 1173 K</li> </ul>					
measurement	s; extrapola	ated by the	evaluato	r.	encar
References:					
<ol> <li>Ukshe, E. A.; Devyatkin, V. N. Russ. J. Phys. Chem. <u>1965</u>, 39, 1222, 1641.</li> </ol>					
2. Devyatkin,	2. Devyatkin, V. N.; Ukshe, E. A. J. Appl. Chem. U.S.S.R. <u>1965</u> , 38, 1574.				
<ol> <li>Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I. Russ. J. Phys. Chem. <u>1972</u>, 46, 1066.</li> </ol>					
4. Lukmanova, T. L.; Vil'nyanskii, Ya. E. Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Teknol. <u>1964</u> , 7, 510.					
5. Krasilnokova, N. A.; Smirnov, M. V.; Ozeryanaya, I. H. Tr. Inst. Elektrokhim. Akad. Nauk SSSR Ural. Fil. <u>1970</u> , 14, 3.					
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COMPONENTS:	EVALUATOR:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	N. P. Bansal National Aeronautics and Space Administration
<pre>(2) Potassium chloride; KCl; [7447-40-7]</pre>	Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

## CRITICAL EVALUATION:

An examination of the preceding table shows that the values of Lukmanova and Vil'nyanskii (4) are too high and are thus rejected. The results of Novozhilov et al. (3) also are 30 - 70% higher than those of references (1) and (5) and the data of (3) are also rejected. The reults of Ukshe and Devyatkin (1) are in agreement with those of Krasilnikova et al. (5), with a maximum difference of 12% at 1180 K. However, the heat of solution of Krasilnikova (5) is more than twice the value reported by Ukshe and Devyatkin (1). The mean values from (1,5) are designated as tentative values. These tentative values are given in Table 1:

Т/К	$10^7 K_H/mol cm^{-3} atm^{-1}$
1140	22.8
1160	23.4
1180	24.1
1200	24.7
1220	25.3
1240	25.9
1260	26.5
1270	26.8

Table 1 - Tentative Solubilities as a Function of Temperature

2	2	Λ
J	υ	4

COMPONENTS .	ORTGINAL MEASUREMENTS:	
COTF ORENTS .		
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Ukshe, E. A.; Devyatkin, V. N.	
(2) Potassium chloride; KCl; [7447-40-7]	<pre>Zh. Fiz. Khim. <u>1965</u>, <b>39</b>, 2288 - 90; Russ. J. Phys. Chem. (Eng. Transl.) <u>1965</u>, <b>39</b>, 1222 - 23. (*).</pre>	
VARIABLES: D(LDos 101 325 (1 atm.)	PREPARED BY:	
T/K = 1113 - 1273	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubilities of hydrogen chlo pressure, in molten KCl at vario	oride, under one atmosphere gas ous temperatures are:	
t/°C 10 <sup>6</sup> X <sub>1</sub> /	(mol fraction) atm <sup>-1</sup>	
840	125.5	
870	117.3	
900 950	120.3	
970	138.3	
1000	145.5	
by the expression: $log(x_1/mol \text{ fraction atm}^{-1}) = -3.3138 - 685.5/(T/K)  (compiler)$ std. dev. = 2.2% (compiler) The heat of solution, $\Delta H$ , is: $\Delta H/kJ \text{ mol}^{-1} = + 12.1$		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Elution or stripping technique. The method used was essentially the same as reported by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. press -ure was passed through the melt for 30 - 40 min. and allowed to equilibrate for 3 - 5 min. A part of the melt was isolated and sparged with argon. The liberated	Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Grade A argon was passed over phosphorous pentoxide. Traces of moi- sture from the two gases were further removed by passing them through a cold trap immersed in a mixture of alcohol and solid carbon dioxide. ESTIMATED ERROR:	
hydrogen chloride was absorbed in distilled water and titrated		
against a standard alkali solution.	Nothing specified	
	REFERENCES :	
	1. Ryabukhin, Yu. M.	
	Russ. J. Inorg. Chem. <u>1962</u> , 7, 565.	

	305
COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Hydrogen chloride; HCl; [7647-01-0]</li> <li>Potassium chloride; KCl; [7447-40-7]</li> </ol>	Devyatkin, V. N. Ukshe, E. A. Zh. Prikl. Khim. <u>1965</u> , 38, 1612 - 14; J. Appl. Chem. U.S.S.R.(Eng. Transl.) <u>1965</u> , 38, 1574 - 75. (*).
VARIABLES: P/kPa = 20.265 - 101.325 one temperature: T/K = 1173	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The value of Henry's law constant molten KCl at a single temperature i	:, $K_{H}$ , for the solubility of HCl in Ls:
t/°C 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
900	24
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution method. The method used was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and and argon. After equilibration, the melt was flushed with dry argon to liberate the dissolved HCl. The freed HCl, which was	Hydrogen chloride was dried by passing through concentrated sulfuric acid and argon by passing over phosphorous pentoxide. The traces of moisture were further removed by passing the two gases through a coil cooled in alcohol - solid carbon dioxide mixture.
carried along with the argon, was absorbed in distilled water.	ESTIMATED ERROR:
	Nothing specified
	REFERENCES:
	<ol> <li>Ryabukhin, Yu. M.</li> <li>Russ. J. Inorg. Chem. <u>1962</u>, 7, 565.</li> </ol>

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Hydrogen chloride; HCl; [7647-01-0]	Novozhilov, A. L.; Devyatkin, V. N.; Gribova E. J
	Zh. Fiz. Khim. <u>1972</u> , <b>46</b> , 1856 - 57;
(2) Potassium chloride; KCl; [7447-40-7]	Russ. J. Phys. Chem. (Eng. Transl.) 1972. <b>46</b> . 1066 - 67. (*).
	<u> </u>
VARIABLES:	PREPARED BY:
T/K = 1062 - 1260	N. P. Bansal
P/kPa = 101.325 (1 atm)	
EXPERIMENTAL VALUES:	
The values of Henry's law	constant, $K_{H}$ , for the solubility of HCl in
molten KCl at various tempera	tures are:
T/K	$10' K_H/$ mol cm <sup>-3</sup> atm <sup>-1</sup>
1062	35.87
1078 1109	35.83 35.80
1144	34.75
1181	33.77 34.06
1260	33.88
Smoothod Data.	
Smoothed Data:	
The enthalpy of solution, $\Delta$ dissolution, $\Delta$ S, are:	$\Delta$ H, and the change in entropy during
ΔΗ	$/kJ mol^{-1} = -3.8$
Δ\$/	$J K^{-1} mol^{-1} = -3.5$ (at 1150 K)
IA	XILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Volumetric method.	HCl was prepared by reacting
	sulfuric acid. The gas was purified
experimental method described	by Recrystallized "chemically pure"
Bratland et al. (1) was used it	for grade KCl was fused in a stream of
solubility measurements.	with chlorine for about 2 hours.
	Then the melt was slowly crystallized
	transparent crystals were used for
	ESTIMATED ERROR:
	solubility = $\pm$ 1% (authors)
	REFERENCES :
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfield, K.</li> </ol>
	Acta Chem. Scand. 1966. 20. 1811.
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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Lukmanova, T. L.; Vilnyanskii, Ya. E.
(2) Potassium chloride; KCl; [7447-40-7]	Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Tekhnol. <u>1964</u> , 7, 510 - 13.
VADIADIEC.	DDEDADED BV.
T/K = 1073 - 1173	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	I
The solubilities of hydrogen chlo in molten KCl at various temperature	oride, under one atmosphere pressure, es are:
t/°C 104 x1.	(mol fraction) atm <sup>-1</sup>
800 840 900	2.50 2.15 1.75
Smoothed Data:	
Temperature dependence of $x_1$ , in by the equation:	the range 800 - 900°C, is expressed
$log(x_1/mol \ fraction \ atm^{-1}) =$	-5.419 + 1950.4/(T/K) (compiler)
std. dev	r = 0.05% (compiler)
The best of colution the is sin	(Comp1201)
The heat of solution, AH, is give	in as:
AH/kJ mol	-1 = -33.89
<u> </u>	
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution or stripping method.	C. P. grade Potassium chloride
The diagram and details of the	
apparatus used and the procedure followed for the gas solubility	
measurements have been described	
apparatus used was similar to	
that described by Grimes et al.	
through the melt at a pressure	
Close to atmospheric. After the melt was saturated, the gas	ESTIMATED ERROR:
supply was turned off. About half	
desorber and sparged with dry,	Nothing specified
deoxygenated $N_2$ . The liberated HCl was absorbed in water and	
determined by titration.	REFERENCES :
	I. Grimes, W. R.; Smith, N. V.; Watson, G. M.
	J. Phys. Chem. <u>1958</u> , 62, 862.

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Hydrogen chloride; HCl;   [7647-01-0]</pre>	Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I. M.		
(2) Potassium chloride; KCl; [7447-40-7]	Tr. Inst. Elektrokhim. Akad. Nauk. SSSR Ural. Fil. <u>1970</u> , 14, 3 - 9.		
VARIABLES:	PREPARED BY:		
T/K = 11/3 - 12/3	N. P. Bansal		
P/kPa = 0.912			
EXPERIMENTAL VALUES: Solubilities of hydrogen chloride in molten KCl at different temperatures are reported as:			
t/°C 10⁴ x	1/(mol fraction) atm <sup>-1</sup>		
900	126.2		
912	129.7		
925			
958	145.2		
1000	150.0		
	150.2		
Smoothed Data: Temperature dependence of $x_1$ is expressed by the relation: $log(x_1/mol \text{ fraction } atm^{-1}) = -0.71 - 1392/(T/K)$ The heat of solution, $AH$ , and the entropy of solution, $AS$ , are: $AH/kJ mol^{-1} = 26.8$ $AS/J K^{-1} mol^{-1} = -13.6$			
METHOD /APPARATUS /PROCEDURE :	SOURCE AND PURITY OF MATERIALS.		
Elution or stripping method. Diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original publication. The salt was heated, fused and held under vacuum. The tube was filled with purified HCl gas. After saturation, the melt was sparged with argon. The HCl liberated was absorbed in	Potassium chloride was dried in vacuum for 10 hours with a gradual temperature rise from 200 - 400°C. HCl gas was purified by passing through concentrated sulfuric acid and an acetone - dry ice trap. Argon was dried and purified to remove oxygen and other impurities.		
distilled water and determined by	ESTIMATED ERROR:		
measuring the pH of the solution.	Nothing specified		
	DEFEDENCES .		
	ALFLKENUES;		

COMPONENTS:	EVALUATOR:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	N. P. Bansal National Aeronautics and Space Administration.
<pre>(2) Rubidium chloride; RbCl; [7791-11-9]</pre>	Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

### CRITICAL EVALUATION:

Four investigations (1 - 4) have been reported for the solubility of hydrogen chloride in molten RbCl. Novozhilov et al. (3) used a volumetric method while the elution technique was employed in the other studies (1,2,4). Smoothed data at different temperatures from the various reports are compared below:

T/K	Ref. 1 <sup>b</sup>	Ref. 2	Ref. 3	Ref.4 <sup>b</sup>
1000	(47.0)			19.6
1030	45.0		55.9	21.8
1060	43.1		54.2	24.0
1100	40.9	42.0*	52.3	27.0
1120	39.8		51.3	28.6
1150	38.3		50.1	31.0
1180	36.9		48.9	33.4
1200	36.0		48.1	35.0
1230	34.8		47.1	(37.5)

<sup>a</sup> At 1103 K

<sup>b</sup> Values in (mol cm<sup>-3</sup> atm<sup>-1</sup>) calculated by the evaluator using density data from Janz, G. J., "Molten Salts Handbook", Academic Press, New York, <u>1967</u>. Values in ( ) outside temperature interval of experimental

measurements; extrapolated by the evaluator.

The value of  $\triangle H$  reported by Krasilnikova et al. (4) is not only quite high, but also opposite in sign than the other two studies (1,3) whose values are in excellent agreement with each other. But the values of  $K_{H}$  of Ukshe et al. (1) are 20 - 25% smaller in comparison to those of Novozhilov et al. (3).

Further caréful work is needed before recommended values can be advanced for this system.

#### References:

- 1. Ukshe, E. A.; Devyatkin, V. N. Russ. J. Phys. Chem. <u>1965</u>, 39, 1222.
- Devyatkin, V. N.; Ukshe, E. A. J. Appl. Chem. U.S.S.R. <u>1965</u>, 38, 1574.
- 3. Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I. Russ. J. Phys. Chem. 1972, 46, 1066.
- 4. Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I. H. Tr. Inst. Elektrokhim. Akad. Nauk SSSR Ural. Fil. 1970, 14, 3.

COMPONENTS:			
	ORIGINAL MEASUREMENTS:		
(1) Hydrogen chloride; HCl;	Ukshe, E. A.; Devyatkin, V. N.		
[/64/-01-0]	7h Fig Khim 1965 30 2299 - 00.		
(2) Rubidium chloride: RbCl:	Russ. J. Phys. Chem. (Eng. Transl.)		
[7791-11-9]	<u>1965</u> , <b>39</b> , 1222 - 23. (*).		
VARIABLES:	PREPARED BY:		
T/K = 1033 - 1233	N. P. Bansal		
P/kPa: 101.325 (1 atm )			
1, Mai 1011020 (1 adm.)			
EXPERIMENTAL VALUES:			
The solubilities of hydrogen chloride, at one atmosphere gas pressure,			
in molten RbCl at various temperatures are:			
$t/^{\circ}C$ 10 <sup>6</sup> x <sub>2</sub> /(mol fraction) atm <sup>-1</sup>			
760	240.5		
825	232.U 221 4		
940	202.8		
960	202.0		
Creathed Date .			
Temperature dependence of x., in	the range $760 - 960$ °C is expressed		
by the equation:	the range for 500 c, is expressed		
$log(x_1/mol fraction atm^{-1}) =$	-4.1108 + 515.4/(T/K) (compiler)		
std dev	r = 0.98 (compiler)		
	(compile)		
The heat of solution, $\Delta H$ , is:			
	-1 0.0		
∆H/kJ mo]	-1 = -9.2		
AUXILIARI	INFORMATION		
	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS:		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method.	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method.	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid.		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois -ture from the two gases were further		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was bubbled through the melt for 30 -	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois -ture from the two gases were further removed by passing them through a trap cooled in a mixture of alcohol		
METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was bubbled through the melt for 30 - 40 min. and then allowed to	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois -ture from the two gases were further removed by passing them through a trap cooled in a mixture of alcohol and solid carbon dioxide.		
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METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was bubbled through the melt for 30 - 40 min. and then allowed to equilibrate for 3 - 5 min. A part of the melt was separated and purged with argon. The liberated hydrogen chloride was absorbed in distilled water and then titrated	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois -ture from the two gases were further removed by passing them through a trap cooled in a mixture of alcohol and solid carbon dioxide. ESTIMATED ERROR: Nothing specified		
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METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The method employed was essentially the same as described by Ryabukhin (1). Argon was bubbled through the melt for 20 min. and then evacuated. Hydrogen chloride at 1 atm. pressure was bubbled through the melt for 30 - 40 min. and then allowed to equilibrate for 3 - 5 min. A part of the melt was separated and purged with argon. The liberated hydrogen chloride was absorbed in distilled water and then titrated against a standard alkali solution.	INFORMATION SOURCE AND PURITY OF MATERIALS: Hydrogen chloride was prepared by mixing hydrochloric and sulfuric acids. It was dried by passing through concentrated sulfuric acid. Quality A argon was passed over phosphorous pentoxide. Traces of mois -ture from the two gases were further removed by passing them through a trap cooled in a mixture of alcohol and solid carbon dioxide. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg. Chem. <u>1962</u> , 7,		
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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Devyatkin, V. N.; Ukshe, E. A.
(2) Rubidium chloride; RbCl; [7791-11-9]	<pre>Zh. Prikl. Khim. 1965, 38, 1612 - 14; J. Appl. Chem. U.S.S.R.(Eng. Transl.) 1965, 38,1574 - 75. (*).</pre>
VARIABLES:	PREPARED BY:
one temperature: T/K = 1103 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	
The value of the Henry's law cons in molten RbCl at one temperature is	stant, $K_{H}$ , for the solubility of HCl s:
t/°C 10	07 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
830	42
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution technique. The method employed was basically similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was sparged with dry argon to liberate the dissolved HCl. The freed HCl,	Hydrogen chloride was dried by passing through concentrated sulfuric acid and argon by passing over phosphorous pentoxide. Traces of moisture were further removed by passing the two gases through a coil cooled in alcohol - solid carbon dioxide mixture.
argon, was absorbed in distilled	ESTIMATED ERROR:
Water.	Nothing specified
	REFERENCES:
	1. Ryabukhin. Yu. M.
	<b>Russ. J. Inorg. Chem.</b> <u>1962</u> , 7, 565.
	<u> </u>

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen chloride; HCl;	Novozilov, A. L.; Devyatkin, V. N.;	
[7647-01-0]	Gribova, E. I.	
• • • • •	Zh. Fiz. Khim. 1972, 46, 1856 - 57;	
(2) Rubidium chloride; RbCl;	Russ. J. Phys. Chem. (Eng. Transl.)	
[7791-11-9]	1972. <b>46</b> . 1066 - 67. (*).	
	<u> </u>	
VARIABLES: $T/K = 995 - 1245$	PREPARED BY: N. P. Bansal	
P/kPa = 101.325 (1 atm)		
1/114 201020 (1 40)		
The values of Henry's law constant	t. K., for the solubility of HCl in	
molten RbCl at different temperature	s are:	
ጥ/ የ 107	$K/mol \ cm^{-3} \ a+m^{-1}$	
1/1 10		
005	FC 33	
2666	56.15	
1041	20.12	
1078	55.75	
1113	52.82	
1132	49.86	
1166	47.81	
1245	46.88	
Smoothed Data:		
Temperature dependence of K., is e	expressed by the relation:	
$\log(K/mol \ cm^{-3} \ atm^{-1}) =$	$-5.711 + 472.1/(\pi/K)$ (compiler)	
$109(R_{\rm H})$ mor cm a cm $) =$	-5.711 + 472.17(1/R) (complet)	
and down	r = 1 (generation)	
std. dev. = 1.4% (compiler)		
The enthalpy of solution, $\Delta H$ , and	the entropy change of dissolution,	
The enthalpy of solution, $\Delta H$ , and $\Delta S$ , are:	the entropy change of dissolution,	
The enthalpy of solution, $\Delta H$ , and $\Delta S$ , are:	the entropy change of dissolution,	
The enthalpy of solution, $\Delta H$ , and $\Delta S$ , are: $\Delta H/kJ \text{ mol}^{-1} = -9.3 \qquad \Delta S/J$	the entropy change of dissolution, $K^{-1} \text{ mol}^{-1} = -8.4$ (at 1110 K)	
The enthalpy of solution, $\Delta H$ , and $\Delta S$ , are: $\Delta H/kJ \text{ mol}^{-1} = -9.3 \qquad \Delta S/J$	the entropy change of dissolution, $K^{-1} \text{ mol}^{-1} = -8.4  (\text{at 1110 } K)$	
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	31:
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanya, I. M.
<pre>(2) Rubidium chloride; RbCl; [7791-11-9]</pre>	Tr. Inst. Elektrokhim. Akad. Nauk. SSSR Ural. Fil. <u>1970</u> , 14, 3 - 9.
VARIABLES: D/HD2 - 0.912	PREPARED BY:
T/K = 991 - 1215	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of hydrogen chloride temperatures are reported as:	e in molten RbCl at different
t/°C 10	$x_1/(mol fraction) atm-1$
718 754 800 840 850 942	111.0 127.5 153.8 174.7 191.2 226.4
The heat of solution, AH, and the AH/kJ mol AS/J K <sup>-1</sup> r	e entropy of solution, AS, are: . L <sup>-1</sup> = 32.6 mol <sup>-1</sup> = -4.5
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution or stripping technique. Diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. The salt was heated, fused and held under vacuum. The tube was filled with purified HCl gas. After saturation, the melt was sparged with argon	Rubidium chloride was dried in vacuum for 10 hours with a gradual temperature rise from 200 - 400°C. HCl gas was purified by passing through concentrated sulfuric acid and an acetone - dry ice trap. Argon was dried and purified to remove oxygen and other impurities.
The HCl liberated was absorbed in distilled water and estimated by	ESTIMATED ERROR:
measuring the pH of the solution.	Nothing specified
	REFERENCES:

COMPONENTS:	EVALUATOR:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	N. P. Bansal National Aeronautics and Space Administration
(2) Cesium chloride; CsCl; [7647-17-8]	Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

Two investigations (1,2) are available for the solubility of hydrogen chloride in molten CsCl. Novozhilov et al. (1) used a volumetric method while Krasilnikova (2) employed an elution technique. The values of thermodynamic parameters, AH and AS, for the dissolution process, reported by the two groups are not only quite different in magnitude but also opposite in sign. Smoothed data at different temperatures from the two sources are compared below:

	$10^7 \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$	
T/K	Novozhilov et al. (1)	Krasilnikova et al. (2)*
940	104.3	16.0
970	96.0	19.0
1000	88.8	22.3
1030	82.5	26.0
1060	77.0	29.9
1100	70.6	35.7
1130	66.5	40.4
1160	62.8	45.3
1190	59.4	(50.5)
1220	56.4	(56.0)

Values in (mol cm<sup>-3</sup> atm<sup>-1</sup>) calculated by the evaluator using density data from Janz, G. J., Molten Salts Handbook", Academic Press, New York, <u>1967</u>.

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

Results of the two studies are seen to be quite different. Further investigations are needed before recommended values can be advanced.

References:

- 1. Novozhilov, A. L.; Devyatkin, V. N.; Grilova, E. I. Russ. J. Phys. Chem. <u>1972</u>, 46, 1066.
- Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I. H. Tr. Inst. Elektrokhim. Akad. Nauk SSSR Ural. Fil. <u>1970</u>, 14, 3.

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Hydrogen chloride; HCl; [7647-01-0]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> </ul>	Novozhilov, A. L.; Devyatkin, V. N.; Gribova, E. I.; Zh. Fiz. Khim. (Eng. Transl.) <u>1972</u> , 46, 1856 - 57; Russ. J. Phys. Chem. <u>1972</u> , 46, 1066 - 67. (*).
VARIABLES:	PREPARED BY:
P/KPa = 23.305 T/K = 942 - 1218	N. P. Bansal
EXPERIMENTAL VALUES:	
The values of Henry's law constant molten CsCl at different temperature	nt, $K_{H}$ , for the solubility of HCl in es are:
т/к 10	$7 K_{H}/mol cm^{-3} atm^{-1}$
942 978 1038 1073 1130 1167 1218	103.19 95.36 84.32 71.65 64.92 61.07 58.63
Smoothed Data: Temperature dependence of $K_{H}$ is a $\log(K_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}) =$ std. dev The enthalpy of solution, $\Delta H$ , an are: $\Delta H/kJ \text{ mol}^{-1} = -20.9$	given by the equation: -6.145 + 1093.5/(T/K) (compiler) v. = 1.5% (compiler) d the entropy change of solution, $\Delta S$ , $\Delta S/J K^{-1} mol^{-1} = -19.4$ (at 1078 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Volumetric method. A modification of the experimental technique described by Bratland et al. (1) was used for solubility measurements.	SOURCE AND PURITY OF MATERIALS: HCl was prepared by reacting molten NaCl with concentrated sulfuric acid. The gas was purified by fractional condensation. Recrystallized "chemically pure" CsCl was fused in a stream of dry chlorine. The melt was purged with chlorine for about 2 hours. Then the melt was slowly crystallized under chlorine atmosphere. Only transparent crystals were used for the experiment
	ESTIMATED ERROR: solubility = ± 1% (authors)
	<pre>REFERENCES: 1. Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfield, K. Acta Chem. Scand. <u>1966</u>, 20, 1811.</pre>

COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Hydrogen chloride; HCl;    [7647-01-0]</pre>	Krasilnikova, N. A.; Smirnov, M. V.; Ozeryanaya, I. H.		
(2) Cesium chloride; CsCl; [7647-17-8]	Tr. Inst. Elektrokhim. Akad. Nauk SSSR Ural. Fil. <u>1970</u> , 14, 3 - 9.		
VARIABLES: P/kPa = 0.912	PREPARED BY:		
T/K = 937 - 1158	N. P. Bansal		
EVDEDTMENTAL VALUES.			
Solubilities of hydrogen chloride in molten CsCl at different temperatures are reported to be:			
t/°C 104 x <sub>1</sub>	/(mol fraction) atm <sup>-1</sup>		
664	100		
710	139 180		
784	211		
816	248		
885	315		
log(x <sub>1</sub> /mol fraction atm <sup>-1</sup> ) = 0.71 - 2517/(T/K) The heat of solution, $\Lambda$ H, and entropy of solution, $\Lambda$ S, are: $\Lambda$ H/kJ mol <sup>-1</sup> = 48.1 $\Lambda$ S/J K <sup>-1</sup> mol <sup>-1</sup> = +13.6			
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Elution or stripping method. Diagram and details of the apparatus used and procedure followed for gas solubility measurements are given in the original paper. The salt was heated, fused and held under vacuum. The tube was filled with purified HCl gas. After saturation, the melt was flushed with argon. The HCl liberated was absorbed in distilled water and determined by measuring the pH of the solution.	Cesium chloride was dried in vacuum for 10 hours with a gradual temperature rise from 200 - 400°C. HCl gas was purified by passing through concentrated H <sub>2</sub> SO <sub>4</sub> and an acetone - dry ice trap. Argon was dried and purified to remove oxygen and other impurities. ESTIMATED ERROR: Nothing specified.		

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Hydrogen chloride; HCl; [7647-01-0]</li> <li>(2) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</li> </ul>	Novozhilov, A. L. Zhur. Neorg. Khim. <u>1983</u> , 29, 218-221.	
VARIABLES:	PREPARED BY:	
P/KPA = 62.622 T/K = 990 - 1177	N. P. Bansal	
EXPERIMENTAL VALUES:		
Applicability of Henry's law was checked at only one value of $P_{HCl} = 0.62atm$ . Values of Henry's Law constant $K_H$ (mol cm <sup>-3</sup> atm <sup>-1</sup> ) at various temperatures are listed below. The data obeyed the equation: $\Delta H \qquad \Delta S = -\log K_H R'T = \frac{\Delta H}{2.303PT} = \frac{2.303}{2.303}$		
as the plot of $-\log K_{H}R'T$ against $1/T$ was linear. Here R and R' are the gas constants in $JK^{-1}mol^{-1}$ and in $cm^{3}atm K^{-1}mol^{-1}$ , respectively and $\Delta H$ and $\Delta S$ are the changes in enthalpy and entropy caused by the introduction of HCl molecules in the melt.		
т/к 10 <sup>7</sup> К <sub>н</sub> /	mol cm <sup>-3</sup> atm <sup>-1</sup>	
990	6.94	
1026	7.25	
1136	8.10	
1177	8.38	
Values of $\Delta H$ and $\Delta S$ of the dissolution process, evaluated from linear least - squares, are: $\Delta H/kJ \text{ mol}^{-1} = 18.7$ $\Delta S/JK^{-1} \text{ mol}^{-1} = -5.02$		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Gas solubilities were determined using a volumetric method as descri- bed earlier(1).	MgCl <sub>2</sub> was prepared from subli- med magnesium and doubly distilled "chemically pure" grade hydrochloric acid and purified in the molten state using a special procedure as described in the original paper.	
	ESTIMATED ERROR:	
	Solubility = ± 1.5 - 2% (authors)	
[	REFERENCES :	
	<ol> <li>Novozhilov, A. L; Devyatkin, V. P; Gribova, E. I. Zhur. Fiz. Khim. <u>1972</u>, 46, 1856.</li> </ol>	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Wednesses shlewide, WOL		
[7647-01-0]	Lukmanova, T. L.; Viinyanskii, Ya. E.	
<pre>(2) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</pre>	Izv. Vyssh. Zaved., Khim. i Khim. Tekhnol. <u>1964</u> , 7, 510 - 13.	
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:	
T/K = 1023 - 1113	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubilities of hydrogen chloride, under one atmosphere pressure, in molten $MgCl_2$ at various temperatures are:		
t/°C 104	$x_1/(mol fraction) atm^{-1}$	
750	28.1	
800	27.0	
040	23.0	
Smoothed Data:		
Temperature dependence of $x_1$ , in expressed by the relation:	the interval 750 - 840°C, is	
$log(x_1/mol fraction atm^{-1}) =$	-3.162 + 627.8/(T/K) (compiler)	
std. dev	. = 1.0% (compiler)	
The heat of solution. AH, is give	n as:	
	1 - 0 41	
	0.41	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution or stripping method. The diagram and details of the apparatus used and procedure followed for the gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined	MgCl <sub>2</sub> was C. P. grade and was dehydrated in two steps; first in the drying oven at 280°C in the presence of C. P. NH <sub>4</sub> Cl and then in a quartz tube by heating to 800°C in a stream of HCl gas until the basicity of the melt, as determined by titration, was equal to zero. ESTIMATED ERROR: Nothing specified REFERENCES:	
	<pre>1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</pre>	

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Hydrogen chloride; HCl; [7647-01-0]</li> <li>(2) Calcium chloride; CaCl<sub>2</sub>;</li> </ul>	Novozhilov, A. L.; Gribova, E. I.; Devyatkin, V. N. Zh. Neorg. Khim. <u>1972</u> , <b>17</b> , 2570 - 71; Russ. J. Inorg. Chem. (Eng. Transl.)	
[10043-52-4]	$\frac{1972}{1}$ , 17, 1345 - 46. (*).	
VARIABLES:	PREPARED BY:	
P/kPa = 60.795 - 101.325	N. P. Bansal	
17K = 1053 = 1273	n. r. punsur	
EXPERIMENTAL VALUES:		
The values of Henry's law constant, $K_{H}$ , for the solubility of HCl in molten CaCl <sub>2</sub> at different temperatures are:		
т/к 1	$0^7 \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-1}$	
1093	2.82	
1143	3.45	
1275	4.42	
Smoothed Data:		
The temperature dependence of K	$\mathbf{x}_{\mathbf{H}}$ is given by the expression:	
$\log(K/mol \ cm^{-3} \ atm^{-1})$	= -5.216 - 1445/(T/K) (compiler)	
	= 5.210  1445/(1/R)  (complete)	
sta. d	ev. = 1.63 (complet)	
The heat of solution, $\Delta H$ . and the $\Delta S$ , are:	the entropy change during dissolution,	
ΔH/kJ r	$nol^{-1} = 27.9$	
ΔS/J K <sup>-3</sup>	$mol^{-1} = 25.4$ (at 1097 K)	
AUXILIA	RY INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Volumetric method (1).	HCl was prepared by the reaction of fused NaCl with concentrated sulfuric acid. It was purified by fractional condensation. Recrystallized "chemically pure" grade calcium chloride was dried for several days by gradual heating. Then it was melted and treated with chlorine and transferred to the satu- ration vessel under a stream of dried and purified argon.	
	ESTIMATED ERROR:	
	solubility = ± 3% (authors)	
	REFERENCES:	
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfield, K.</li> </ol>	
	Acta Chem. Scand. <u>1966</u> , 20, 1811.	
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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0] (2) Strontium chloride; SrCl<sub>2</sub>; [10476-85-4]</pre>	Novozhilov, A. L.; Gribova, E. I.; Devyatkin, V. N. Zh. Neorg. Khim. <u>1972</u> , <b>17</b> , 2570 - 71; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1972</u> , <b>17</b> , 1345 - 46. (*).
VARTABLES: D/I D	PREPARED RV.
p/kpa = 60.795 - 101.325	
T/K = 1163 - 1295	N. P. Bansal
EXPERTMENTAL VALUES.	1
The values of Henry's law con molten SrCl <sub>2</sub> at various temperat	stant, $K_{H}$ , for the solubility of HCl in ures are:
T/K	107 $K_{H}$ /mol cm <sup>-3</sup> atm <sup>-1</sup>
1163	1 85
1204	2.14
1238	2.38
Smoothed Data:	
The temperature dependence of	$K_{H}$ is expressed by the relation:
log(K <sub>w</sub> /mol cm <sup>-3</sup> atm <sup>-</sup>	$(2)^{1} = -4.997 - 2016/(T/K)$ (compiler)
sta.	dev. = 0.3% (compiler)
The heat of solution, $\Delta H$ , and the entropy change during dissolution,	
$\Delta S$ , are: $\Delta H/kJ \text{ mol}^{-1} = 37.9$	
$AC/T V^{-1} m (-1) = (-1) (-1) (-1) (-1) (-1) (-1) (-1) (-1)$	
AUXILIARY INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SQUECE AND PUBLITY OF MATERIALS:
Volumetric technique (1).	HCl was prepared by the reaction of fused NaCl with concentrated sulfuric acid. It was purified by fractional condensation. Recrystallized "chemically pure" grade strontium chloride was dried for several days by gradual heating. It was melted and treated with chlorine and transferred to the saturation vessel under a stream of dry and pure argon.
	ESTIMATED ERROR:
	<pre>solubility = ± 3% (authors)</pre>
	REFERENCES :
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfield, K.</li> </ol>
	Acta Chem. Scand. <u>1966</u> , 20, 1811.

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Hydrogen chloride; HCl; [7647-01-0]</li> <li>(2) Barium chloride; BaCl<sub>2</sub>; [10361-37-2]</li> </ul>	Novozhilov, A. L.; Gribova, E. I.; Devyatkin, V. N. Zh. Neorg. Khim. <u>1972</u> , <b>17</b> , 2570 - 71 Russ. J. Inorg. Chem. (Eng. Transl.) <u>1972</u> , <b>17</b> , 1345 - 46. (*).	
VARIARIES.		
P/kPa = 60.795 - 101.325	FREFARED BI:	
T/K = 1253 - 1351	N. P. Bansal	
EXPERIMENTAL VALUES:	I	
The values of Henry's law constant, $K_{H}$ , for the solubility of HCl in molten BaCl <sub>2</sub> at different temperatures are:		
T/K 107	K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	
1253 1295 1351	1.59 1.88 2.17	
Smoothed Data:		
The terrenture dependence of V	in minun has the second states	
$log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -4.941 - 2319/(T/K)  (compiler)$ std. dev. = 1.1% (compiler) The heat of solution, $\Delta H$ , and the entropy change during dissolution, $\Delta S$ , are: $\Delta H/kJ \ mol^{-1} = 42.1$ $\Delta S/J \ K^{-1} \ mol^{-1} = 32.5  (at \ 1295 \ K)$		
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Volumetric technique (1).	HCl was prepared by reaction of fused NaCl with concentrated sulfuric acid. It was purified by fractional condensation. Recrystallized "chemically pure" grade barium chloride was dried for several days by gradual heating. It was melted and treated with chlorine and transferred to the saturation vessel under a stream of dried and purified argon	
	ESTIMATED ERROR:	
	solubility = ± 3% (authors)	
	REFERENCES :	
	<ol> <li>Bratland, D.; Grjotheim, K.; Krohn, C.; Matzfield, K.</li> </ol>	
	Acta Chem. Scand. <u>1966</u> , 20, 1811.	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Howald, R. A.; Willard, J. E. J. Amer. Chem. Soc. <u>1955</u> , 77, 2046 -	
(2) Tin chloride; SnCl <sub>4</sub> ; [7646-78-8]	49.	
VARIABLES:	PREPARED BY:	
T/K = 273 - 300	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EVERTAGINAL VALUES.		
The solubilities of HCl in SnCl <sub>4</sub>	liguid at two temperatures are:	
t/°C 10 <sup>5</sup> x <sub>3</sub>	/mol fraction mm <sup>-1</sup>	
0 27	6.6 ± 0.5 5.2 ± 1.0	
METHOD /APPARATUS /PROCEDURE ·	SOURCE AND PURITY OF MATERIALS.	
Pressure measurement. The solubility of HCl in SnCl <sub>4</sub> was measured by determining the the pressure exerted by a known amount of HCl metered into a flask of definite volume containing a known amount of SnCl <sub>4</sub> .	Tank HCl from Matheson was was passed through a column containing phophorous pentoxide. "C. P. analyzed anhydrous SnCl <sub>4</sub> was distilled through a P <sub>2</sub> 0 <sub>5</sub> column under vacuum and stored.	
	ESTIMATED ERROR:	
	Nothing specified	
	REFERENCES:	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Claes, P. F; Coppe, C. R; Simonis, L. A; Glibert, J. E.
<pre>(2) N-Methylpyridinium chloride; CH<sub>3</sub>·C<sub>5</sub>H<sub>5</sub>N·Cl; [7680-73-1]</pre>	<b>J. Chem. Eng. Data <u>1987</u>, 32,</b> 70 - 72.
VARIABLES:	PREPARED BY:
T/K = 443 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubility of HCl at 1 atm pres	ssure is given below
Т/К С <sub>в</sub>	mol lit <sup>-1</sup>
443	7.47 ± 0.28
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Solubility was determined by saturating the melt by bubbling HCl for 3h. The saturated melt was que- nched, dissolved in distilled water, and the excess of KI and KIO <sub>3</sub> were added to the solution which generat- ed an equivalent amount of $I_2$ according to the reaction:	Purum grade hydrogen chloride from Fluka was used. In some cases, HCl was prepared by reacting H <sub>2</sub> SO <sub>4</sub> (96% from Carlo Erba) of RPE grade with NaCl and bubbled through sulfuric acid. N-Methylpyridinium chloride was synthesized as described earlier(1).
6H <sub>3</sub> O <sup>+</sup> +IO <sup>-</sup> <sub>3</sub> +5I <sup>-</sup> -> 9H <sub>2</sub> O+3I <sub>2</sub> .	
The liberated $I_2$ was estimated by titration with a standard Solution of $Na_2S_2O_3$ .	ESTIMATED ERROR:
	Not specified.
	REFERENCES:
	1. Simonis, L; Coppe, C; Glibert, J; Claes, P. Thermochim. Acta <u>1986</u> , <b>99</b> 223.

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0]</pre>	Claes, P. F; Coppe, C. R; Simonis, L. A; Glibert, J. E.
(2) N-Ethylpyridinium bromide; C <sub>2</sub> H <sub>5</sub> · C <sub>5</sub> H <sub>5</sub> N · Br; [1906-79-2]	<b>J. Chem. Eng. Data <u>1987</u>, 32,</b> 70 - 72.
VARIABLES:	PREPARED BY:
T/K = 393 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubility of HCl at 1 atm pres	sure is given below
T/K C <sub>HCl</sub> /mol lit <sup>-1</sup>	
393	6.10
• • • • • • • • • • • • • • • • • • •	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Solubility was determined by saturating the melt by bubbling HCl for 3h. The saturated melt was que- nched, dissolved in distilled water, and the excess of KI and KIO <sub>3</sub> were added to the solution which generat- ed an equivalent amount of $I_2$ according to the reaction: $6H_3O^++IO^3+5I^- \rightarrow 9H_2O+3I_2$ . The liberated $I_2$ was estimated	Purum grade hydrogen chloride from Fluka was used. In some cases, HCl was prepared by reacting H <sub>2</sub> SO <sub>4</sub> (96% from Carlo Erba) of RPE grade with NaCl and bubbled through sulfuric acid. N-Ethylpyridinium bromide was synthesized from 99.6% pyridine(Carlo Erba) and 99% ethyl bromide (U. C. B) of P. A grade. For details see the original paper.
by titration with a standard solution of $Na_2S_2O_3$ .	ESTIMATED ERROR:
	Not specified.
	REFERENCES :

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COMPONENTS:	EVALUATOR:
<ol> <li>(1) Hydrogen chloride; HCl; [7647-01-0]</li> <li>(2) Lithium chloride; LiCl; [7447-41-8]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ol>	N. P. Bansal National Aeronautics and Space Administration Lewis research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

#### CRITICAL EVALUATION:

Two investigations have been reported for the solubility of hydrogen chloride in molten LiCl - KCl eutectic, using the elution technique. Smoothed data from the two studies at different temperatures are compared below:

107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>		cm <sup>-3</sup> atm <sup>-1</sup>
т/к	Ref. 1	Ref. 2
680	(9.5)	10.5
710	(10.4)	11.8
740	(11.3)	13.1
770	12.2	14.4
800	13.1	(15.8)
830	14.0	(17.2)
860	14.9	(18.6)
890	15.7	(20.0)
920	16.6	(21.5)
950	17.4	(22.9)
AH/kJ mol-1	14.64	15.6

Values in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

There is good agreement between the values of  $\Delta H$  of the two studies, but the solubility values of Van Norman and Tivers (1) are 10 - 30% lower than those of Minh and Welch (2).

Further experimental studies are needed before recommended values can be advanced for this system.

References:

- Van Norman, J. D.; Tivers, R. J. J. Electrochem. Soc. <u>1971</u>, 118, 258.
- 2. Minh, N. Q.; Welch, B. J. Aust. J. Chem. 1975, 28, 965.

COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Lithium chloride: LiCl;	ORIGINAL MEASUREMENTS: Van Norman, J. D.; Tivers, R. J.		
<pre>(2) Dichical onicide; Dici, [7447-41-8] (3) Potassium chloride; KCl; [7447-40-7]</pre>	<b>J. Electrochem. Soc.</b> <u>1971</u> , <b>118</b> , 258 - 59.		
VARIABLES:	PREPARED BY:		
T/K = 763 - 948 P/kPa: 101.325 (1 atm.)	N. P. Bansal		
EXPERIMENTAL VALUES:			
The values of Henry's law constant, K <sub>H</sub> , for the solubility of hydrogen chloride in molten eutectic LiCl - KCl, under gas pressure of 1 atm., at three temperatures are:			
t/°C $10^{6} K_{H}/mol \ cm^{-3} \ atm^{-1}$	10 <sup>5</sup> X <sub>1</sub> /(mol fraction) atm <sup>-1</sup>		
4901.20 ± 0.145701.44 ± 0.106751.74 ± 0.11	4.11 5.05 6.31		
Smoothed Data: Temperature dependence of $K_{H}$ is expressed by the relation: $log(K_{H}/mol \ cm^{-3} \ atm^{-1}) = -5.094 - 631.1/(T/K)$ (compiler) std. dev. = 0.06% (compiler) The heat of solution, $\Delta H$ , is given as: $\Delta H/kJ \ mol^{-1} = 14.64$			
AUXILIARY	INFORMATION		
METHOD /APPARATUS /PROCEDURE :	SOURCE AND PURITY OF MATERIALS.		
Elution or stripping method.	Reagent grade LiCl and KCl were used.		
The method employed for gas solubility measurements was the same as described elsewhere (2). The melt was first saturated with hydrogen chloride by bubbling the gas through it at a particular gas pressure. A known part of the saturated melt is isolated and flushed with argon to free the	was prepared by following the method of Laitinen et al. (1).		
aissoived HCI Which is collected in water. The HCl solution in	ESTIMATED ERROR:		
water is titrated with a standard NaOH solution.	solubility ± 10% (authors)		
	REFERENCES: 1. Laitinen, H. A.; Ferguson, W. S.; Osteryoung, R. A. J. Electrochem. Soc. <u>1957</u> , <b>104</b> , 516. 2. Van Norman, J. D.; Tivers, R. J. "Molten Salts: Characterization and Analysis", (Mamentov, G. ed.), Marcel Dekker, New York, <u>1969</u> , 509.		

	327
<pre>COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Lithium chloride; LiCl; [7447-41-8] (3) Potassium chloride; KCl; [7447-40-7]</pre>	ORIGINAL MEASUREMENTS: Minh, N. Q.; Welch, B. J. Aust. J. Chem. <u>1975</u> , 28, 965 - 73.
VARIABLES: T/K = 677 - 793	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of HCl in molter for an HCl pressure of 101.3kPa at t	1 LiCl - KCl eutectic (59 - 41 mol%) :hree temperatures are:
т/к	10 <sup>6</sup> K <sub>H</sub> /mol cm <sup>-3</sup>
677 735 793	1.04 1.27 1.56
Smoothed Data:	
Iog(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> ) = std. dev The heat of solution, AH, is esti AH/kJ mol	<pre>: -4.783 - 814.3/(T/K) (compiler) r. = 0.7% (compiler) .mated to be: .<sup>-1</sup> = 15.6 (compiler)</pre>
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Elution technique. The melt was saturated with hydrogen chloride by bubbling the gas through it. A known portion of the saturated melt was isolated and sparged with argon to liberate the dissolved HCl. The HCl, which was carried out along with argon, was absorbed in water and determined by	SOURCE AND PURITY OF MATERIALS: HCl gas was prepared by the action of concentrated sulfuric acid on concentrated HCl solution. It was dried by passing through concentrated sulfuric acid scrubbers and demisted by passing through a glass wool filter.
Solution.	ESTIMATED ERROR: solubility = ± 10% (authors)
	REFERENCES:

		THAT HATTON			
COMPONENTS:	DNENTS:		EVALUATOR:		
(1) Hydrogen Chiorid	[7647-01-0]		N. P. Bansal National Aeronautics and Space		
(2) Sodium chloride; NaCl;		Administra	Administration		
[7647-14-5]		Lewis Rese	Lewis Research Center		
[7447-40-71]	Ide; KCI;	December.	1989.		
••••••	[/44/-40-/]				
RITICAL EVALUATION:					
All the three st	udies for the s	olubility of hyd	rogen chloride in		
molten NaCl - KCl h	ave employed th	e same experimen	tal (elution)		
containing 25, 50,	d Devyatkin (1) 75 mol% KCl whi	le Lukmanova et	al. (3) have used only		
the equimolar melt.	Smoothed data	at different tem	peratures from the		
three investigation	s in the equimo	lar melt are com	pared below:		
<u></u>					
	10 <sup>5</sup>	$x_1$ /mol fraction <sup>-</sup>	<sup>1</sup> atm <sup>-1</sup>		
T/K	Ref. 1	Ref. 2	Ref. 3		
			(00.0)		
980 1020	8.89	8.98*	(98.0)		
1060	8.21	0.00	46.7		
1100	7.93		33.6		
1140	7.43		(18.6)		
1220	7.22		(,		
1250	7.08				
AH/kJ mol <sup>-1</sup>	-8.6		-78.45		
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
- At 1023 K					
Values in ( ) o	outside tempera	ture interval of	experimental		
measurement; e:	strapolated by	the evaluator.			
Populta of Ilkabo	and Downstkin	(1, 2) are guite	different than these		
of Lukmanova et al.	(3).	(1,2) ale guile	different than those		
Further experiment	ntal measuremen	ts are required	before recommended		
values can be advand	ced for this sy	stem.			
Poforongos					
Actelences.			han 1005 <b>20</b> 1041		
I. UKSNE, E. A.; Dev	Vyatkin, V. N.	Russ. J. Phys. C	nem. <u>1965</u> , 39, 1641.		
2. Devyatkin, V. N. 1574.	; Ukshe, E. A.	J. Appl. Chem. U	.S.S.R. <u>1965</u> , 38,		
3. Lukmanova, T. L.; Vil'nyanskii, Ya. E. Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Tekhnol. <u>1964</u> , 7, 510.					

	020
COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Sodium chloride; NaCl; [7647-14-5] (3) Potassium chloride; KCl; [7447-40-7] VARIABLES: T/K = 973 - 1273	ORIGINAL MEASUREMENTS: Ukshe, E. A.; Devyatkin, V. N. Zh. Fiz. Khim. <u>1965</u> , <b>39</b> , 3074 - 75; Russ. J. Phys. Chem. (Eng. Transl.) <u>1965</u> , <b>39</b> , 1641 - 42. (*). PREPARED BY:
Melt composition/mol% KCl = 25-75 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of HCl in the m mol% KCl) at different temperatures	olten mixtures NaCl - KCl (25, 50, 75 are:
Melt Composition/mol% KCl	t/°C 10 <sup>6</sup> Soly/mol fraction
25	80037.784540.087542.192042.495045.099046.6
50	70088.072586.580083.385083.990076.194567.997074.498068.7
	continued
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Elution or stripping technique. The method used was the same as described earlier (1). Argon was bubbled through the melt followed by evacuation. Hydrogen chloride at 1 atm. pressure was then passed through the melt and allowed to equilibrate. A part of the molten solution was isolated and purged With argon The liberated bydrogen	Hydrogen chloride, prepared by mixing hydochloric and sulfuric acids, was dried by passing through concentrated sulfuric acid. Grade A argon was passed over phosphorous pentoxide. Traces of moisture from the two gases were further removed by passing through a cooled trap immersed in a mixture of alcohol and solid carbon dioxide.
chloride was absorbed in distilled water and titrated against an alkali solution.	ESTIMATED ERROR: std. dev. = ± 0.7, ± 2.1, ± 1.0% for 25, 50 and 75 mol % KCl,
	respectively (compiler)
1	ALTERENCES:
	1. Ukshe, E. A.; Devyatkin, Yu. M.
	Russ. J. Phys. Chem. <u>1965</u> , <b>39</b> , 1222.

330	
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Hydrogen chloride; HCl; [7647-01-0] (2) Sodium chloride: NaCl;</pre>	Ukshe, E. A.; Devyatkin, V. N.
<pre>[7647-14-5] (3) Potassium chloride; KCl; [7447-40-7]</pre>	<b>Zh. Fiz. Khim.</b> <u>1965</u> , <b>39</b> , 3074 - 75; <b>Russ. J. Phys. Chem.</b> (Eng. Transl.) <u>1965</u> , <b>39</b> , 1641 - 42. (*).
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
Melt Composition/mol% KCl	t/°C 10 <sup>6</sup> Soly/mol fraction
75	750109.8825110.8875109.8906106.61000112.8
<pre>Smoothed Data: Temperature variation of solubil equation: log(soly/mol fraction) = Values of the coefficients a and dissolution, △H, in the three molt are:</pre>	ity in the ranges studied, obeyed the a + b/(T/K) b, along with the enthalpies of en mixtures (calculated by the compiler)
Melt composition/mol% KCl	a b ∆H/kJ mol <sup>-1</sup>
25 50 75	-3.8279 -637.5 12.2 -4.5062 448.7 -8.6 -3.9335 -28.56 0.55
AUXILIAR	RY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:

WRONEWTS:       ORIGINAL MEASURMENTS:         (1) Hydrogen chloride; HCl; [7647-04-0]       Devyatkin, V. N.; Ukshe, E. A.         (2) Sodium chloride; NaCl; [7647-14-5]       Devyatkin, V. N.; Ukshe, E. A.         (3) Potassium chloride; KCl; [7647-40-7]       Devyatkin, V. N.; Ukshe, E. A.         (1) Hydrogen chloride; KCl; [7647-40-7]       PREPARED BY:         ARIABLES:       P/kPa = 20.265 - 101.325         one temporature; T/K = 1023       N. P. Bansal         WFERMENTAL VALUES:       N. P. Bansal         The value of Henry's law constant, K., for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is:         t/*C       10° K <sub>k</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> 750       21         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * THOO/APPARATUS/FROCEDURE:       SOURCE AND PUBLIY OF MATEMIALS:         The method employed was essentially similar to that moltin makture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved1. The freed HCl, Mich was carried along with argon, was absorbed in distilled water.       SOURCE AND PUBLIY OF MATEMIALS:         ESTIMATED ERKOK:       ESTIMATED ERKOK:         Nothing specified       Nothing specified		331
<pre>(1) Hydrogen chloride; HCl; [7647-04-0] (2) Sodium chloride; NaCl; [7447-40-7] (3) Potassium chloride; KCl; [7447-40-7] (4) ARLAELES: P/KPa = 20.265 - 101.325 one temperature: T/K = 1023 MRTABLES: P/KPa = 20.265 - 101.325 one temperature: T/K = 1023</pre>	COMPONENTS :	ORIGINAL MEASUREMENTS:
ARIABLES: P/KPa = 20.265 - 101.325 one temperature: T/K = 1023 MPERIMENTAL VALUES: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: The value of Henry's law constant, K <sub>n</sub> , for the solubility of HCl in The method by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data <u>1975</u> , 4, 871. BUILIANY INFORMATION BUILIANY INFORMATION	<ol> <li>Hydrogen chloride; HCl; [7647-01-0]</li> <li>Sodium chloride; NaCl; [7647-14-5]</li> <li>Potassium chloride; KCl; [7447-40-7]</li> </ol>	Devyatkin, V. N.; Ukshe, E. A. <b>Zh. Prikl. Khim.</b> <u>1965</u> , <b>38</b> , 1612 - 14 <b>J. Appl. Chem. U.S.S.R.</b> (Eng. Transl. <u>1965</u> , <b>38</b> , 1574 - 75. (*).
ATTELLARY INFORMATION         AUXILLARY INFORMATION         AUXILLARY INFORMATION         AUXILLARY INFORMATION         AUXILLARY INFORMATION         BETHOD/APPARATUS/PROCEDURE:         Elution technique.         The method employed was         ressentially similar to that         Gescribed by read with HCl by         Public in a mixture of hydrogen         chisologic to in biscure were further removed by         method and argon. After         equilibration, the method in distilled         which was carried along with         argon, was absorbed in distilled         Water.	VARIABLES: $P/kPa = 20.265 - 101.325$ one temperature: T/K = 1023	PREPARED BY: N. P. Bansal
The value of Henry's law constant, K <sub>H</sub> , for the solubility of HCl in molten NaCl - KCl (50 - 50 mol%) at one temperature is: t/*C 10 <sup>7</sup> K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> 10 <sup>5</sup> x <sub>1</sub> /mol fraction atm <sup>-2</sup> 750 21 8.98* * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data <u>1975</u> , 4, 871. AUXILLARY INFORMATION RETHED/AFPARATUS/PROCEDURE: Elution technique. The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water. The value of Horide and argon with distilled water. The method engloyed in distilled water. The method engloyed in distilled water. The method engloyed was essentially similar to that dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water. The method engloyed in distilled REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.	XPERIMENTAL VALUES:	I
t/°C       107 K <sub>M</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup> 105 x <sub>1</sub> /mol fraction atm <sup>-1</sup> 750       21       8.98 <sup>a</sup> * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         * MUXILIARY INFORMATION         * ETHOD/APPARATUS/PROCEDURE:         Elution technique.         The method employed was         essentially similar to that         described by Ryabukhin (1). The         melt was saturated with HCl by         bubbling a mixture of hydrogen         chloride and argon, After         equilibration, the melt was purged         with dry argon to liberate the         dissolved HCl. The freed HCl,         which was carried along with         argon, was absorbed in distilled         water.         Nothing specified         REFERENCES:         1. Ryabukhin, Yu. M.         Russ. J	The value of Henry's law constan molten NaCl - KCl (50 - 50 mol%) at	t, K <sub>H</sub> , for the solubility of HCl in one temperature is:
750       21       8.98*         * calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.         AUXILIARY INFORMATION         AUXILIARY INFORMATION         ETHOD/APPARATUS/PROCEDURE:         Source AND PURITY OF MATERIALS:         Hydrogen chloride was dried by passing through concentrated sulfuri acid and argon by passing through concentrated sulfuri acid and argon by passing through concentrated sulfuri acid and argon by passing through a coll coled in alcohol - solid carbon dioxide mixture.         Which was carried along with argon, was absorbed in distilled water.       Source AND PURITY OF MATERIALS:         Hydrogen chloride was dried by passing through concentrated sulfuri acid and argon by passing the two gases through a coll coled in alcohol - solid carbon dioxide mixture.         ESTIMATED ERROR:         REPERENCES:         I. Ryabukhin, Yu. M.	t/°C 107 K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>	1 10 <sup>5</sup> x <sub>1</sub> /mol fraction atm <sup>-1</sup>
<ul> <li>calculated by the compiler using density data from Janz, G. J., et al. J. Phys. Chem. Ref. Data 1975, 4, 871.</li> <li>AUXILIARY INFORMATION</li> <li>ETHOD/APPARATUS/PROCEDURE:</li> <li>Elution technique.</li> <li>The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water.</li> <li>Source AND PURITY OF MATERIALS:         <ul> <li>Hydrogen chloride was dried by passing through concentrated sulfuri acid and argon by passing through concentrated sulfuri acid and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled</li> <li>ESTIMATED ERROR:</li></ul></li></ul>	750 21	8.98*
AUXILIARY INFORMATION ETHOD/APPARATUS/PROCEDURE: Elution technique. The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water. ESTIMATED ERROR: REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.		
ETHOD/APPARATUS/PROCEDURE: Elution technique. The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water. ESTIMATED ERROR: REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.	AUXILIARY	INFORMATION
Elution technique. The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with argon, was absorbed in distilled water. Hydrogen chloride was dried by passing through concentrated sulfuri acid and argon by passing over phosphorous pentoxide. Traces of moisture were further removed by passing the two gases through a coil cooled in alcohol - solid carbon dioxide mixture. ESTIMATED ERROR: REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Argon, was absorbed in distilled Water. Nothing specified REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.	Elution technique. The method employed was essentially similar to that described by Ryabukhin (1). The melt was saturated with HCl by bubbling a mixture of hydrogen chloride and argon. After equilibration, the melt was purged with dry argon to liberate the dissolved HCl. The freed HCl, which was carried along with	Hydrogen chloride was dried by passing through concentrated sulfuria acid and argon by passing over phosphorous pentoxide. Traces of moisture were further removed by passing the two gases through a coil cooled in alcohol - solid carbon dioxide mixture.
REFERENCES: 1. Ryabukhin, Yu. M. Russ. J. Inorg Chem. <u>1962</u> , 7, 565.	argon, was absorbed in distilled water.	Nothing specified
1. Ryabukhin, Yu. M. <b>Russ. J. Inorg Chem. <u>1962</u>, 7,</b> 565.		REFERENCES:
Russ. J. Inorg Chem. <u>1962</u> , 7, 565.		1. Ryabukhin, Yu. M.
		Russ. J. Inorg Chem. <u>1962</u> , 7, 565.

COMPONENTS		
(CONFORENTS:	ORIGINAL MEASUREMENTS:	
(1) Hydrogen chloride; HCl;		
[7647-01-0]	Lukmanova, T. L.; Vilnyanskii, Ya. E.	
(2) Sodium chloride; NaCl;	The three is the last provide the last state of	
[704/-14-5]	Vhim Wokhnel 1064 7 510 12	
(3) Potassium chioride; KCI; $(7447-40-7)$	Knim. Teknol. $1964$ , 7, 510 - 13.	
[/44/-40-/]		
VARIABLES:	PREPARED BY.	
T/K = 1023 - 1113	N. P. Bansal	
P/kPa: 101.325 (1 atm.)		
EVDEDIMENTAL VALUES.		
EXPERIMENTAL VALUES.		
The solubilities of hydrogen chloride, under one atmosphere pressure, in molten mixture, NaCl - KCl (50 - 50 mol%) at different temperatures are:		
t/°C 104 x	/(mol fraction) atm <sup>-1</sup>	
750	6.24 ± 0.36	
800	4.56 ± 0.43	
840	2.88 ± 0.24	
······································		
Smoothed Data:		
Temperature dependence of $x_1$ , in the range 750 - 840°C, is expressed by the relation: $log(x_1/mol \ fraction \ atm^{-1}) = -7.273 + 4179/(T/K)$ (compiler) std. dev. = 4.7% (compiler)		
The heat of solution. At is given as:		
The heat of bolacion, and is given as.		
	en as:	
AH/kJ mol	n as: <sup>1</sup> = -78.45	
AH/kJ mol	en as: <sup>1</sup> = -78.45	
AH/kJ mol	en as: <sup>-1</sup> = -78.45	
AH/kJ mol	n as: <sup>1</sup> = -78.45	
∧H/kJ mol	en as: <sup>1</sup> = -78.45	
AH/kJ mol	n as: <sup>1</sup> = -78.45 INFORMATION	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE:	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS:	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE:	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS:	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method.	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method.	n as: = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the	n as: = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described	n as: = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al.	en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the	n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used.	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated. the gas	en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR:	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry,	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified DEFEDENCE:</pre>	
AUXILIARY AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES:</pre>	
AUXILIARY AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration.	<pre>m as: = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES: Grimes. W. R.: Smith. N. V.</pre>	
AUXILIARY AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration.	<pre>en as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson. G. M.</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration.	<pre>en as: '' = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M.</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration.	<pre>n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</pre>	
AH/kJ mol AUXILIARY METHOD/APPARATUS/PROCEDURE: Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original paper. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl gas was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was cut off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titration.	<pre>n as: <sup>1</sup> = -78.45 INFORMATION SOURCE AND PURITY OF MATERIALS: C. P. grade sodium and potassium chlorides were used. ESTIMATED ERROR: Nothing specified REFERENCES: 1. Grimes, W. R.; Smith, N. V.; Watson, G. M. J. Phys. Chem. <u>1958</u>, 62, 862.</pre>	

2010 automation 1	
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen Chioride; HCI;	Tukmanova T. L. Vilnvanskiji Va F.
(2) Potassium chloride: KCl.	Luxinanova, 1. 1., viinyanskii, ia. E.
[7447-40-7]	Izv. Vyssh. Ucheb. Zaved., Khim. i
(3) Magnesium chloride; MgCl <sub>2</sub> ;	Khim. Tekhnol. 1964, 7, 510 - 13.
[7786-30-3]	
VARIABLES:	PREPARED BY:
T/K = 773 - 1113	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The solubilities of hydrogen chlo in the molten mixture KCl - MgCl <sub>2</sub> ( are:	oride, under one atmosphere pressure, 50 -50 mol%) at different temperatures
t/°C 104 x	/(mol fraction) atm <sup>-1</sup>
500	27.65 ± 0.25
550	24.73 ± 0.27
600	24.10 ± 0.10
650	
700	$20.96 \pm 0.01$
800	$18.98 \pm 0.02$
840	17.95 ± 0.65
std. dev The heat of solution, AH, is give AH/kJ mol	v. = 0.7% (compiler) en as: L <sup>-1</sup> = -9.08
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Elution or stripping method. The diagram and details of the apparatus used and procedure followed for gas solubility measurements have been described in the original publication. The apparatus used was similar to that described by Grimes et al. (1). Dry HCl was passed through the melt at a pressure close to atmospheric. After the melt was saturated, the gas supply was turned off. About half of the melt was transferred to the desorber and sparged with dry, deoxygenated N <sub>2</sub> . The liberated HCl was absorbed in water and determined by titeration	Potassium and magnesium chlorides were of C. P. grade. Magnesium chloride was first dried in an oven at 280°C in the presence of C. P. NH₄Cl and then in a guartz tube by heating to 800°C in a stream of HCl gas until the basicity of the melt, as determined by titration, was equal to zero. ESTIMATED ERROR: Nothing specified REFERENCES:
Sourcermined by titration.	<ol> <li>Grimes, W. R.; Smith, N. V.; Watson, G. M.</li> <li>J. Phys. Chem. <u>1958</u>, 62, 862.</li> </ol>

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen chloride; HCl;	
[/64/-01-0] (2) Potassium chloride, KCl.	Lukmanova, T. L.; Vilnyanskii, Ya. E.
[7447-40-7]	Izv. Vyssh. Ucheb. Zaved., Khim. i
(3) Magnesium chloride; MgCl <sub>2</sub> ;	Khim. Tekhnol. <u>1966</u> , <b>9</b> , 537 - 540.
[7786-30-3]	
VARIABLES: $T/K = 773 - 1113$	PREPARED BY:
P/kPa = 30.398 - 103.352	N. P. Bansal
EXPERIMENTAL VALUES:	
700 and 840°C are presented in the f pressure. It is not possible to read the figure. The solubility values ar elsewhere by the same workers (1).	orm of a figure as a function of precise values of solubility from e approximately the same as reported
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Division on stuisming wether	
Elucion of stripping method.	anhydrous melt from carnallite has
The apparatus and the method	been described earlier (1).
used for gas solubility measurements have been described	
earlier (1). Dry HCl gas was	
passed through about 120g of the	
saturation, a portion of the	
melt was transferred into the	1
aesorper and flushed with nitrogen. The HCl gas liberated	
was absorbed in distilled water	ESTIMATED ERROR:
and determined by titration.	Nothing specified
	DEFEDENCYS .
	NEFERENCES;
	1. Lukmanova, T. L.; Vilnyanskii, Ya. E.
	Izv. Vyssh. Ucheb. Zaved., Khim. i Khim. Tekhnol. <u>1964</u> , 7, 510.

COMPONENTS :			ORIGINAL	MEASUREMENTS :		
<pre>(1) Hydrogen chloride; HCl; [7647-01-0] (2) Potassium chloride; KCl; [7447-40-7]</pre>		ORIGINAL MEASUREMENTS: Novozhilov, A. L. Zhur. Neorg. Khim. <u>1983</u> , <b>29</b> , 218-221.				
(3) Magnesium [7786-30-3	] chloride; MgC ]	12				
VARIABLES:	770 - 1190		PREPARED	BY:		
MgCl <sub>2</sub> /	mol = 13 - 73			N. P. Ba	ansal	
<b>EXPERIMENTAL VALUES:</b> Applicability of Henry's law was checked at $P_{Hcl}=0.62atm$ Values of Henry's Law Constant at various temperatures are listed below.			el=0.62atm. ed below.			
The data obeye	d the equation	n: - log F	$K_{H}R'T = -$			 
as the plot of constants in J are the change molecules in t	-logK <sub>H</sub> R'T aga K <sup>-1</sup> mol <sup>-1</sup> and s in enthalpy he melt.	ainst 1/T in cm <sup>3</sup> atm and entro	was ling K <sup>-1</sup> mol <sup>-1</sup> opy cause	ear. Here R a , respective ed by the int	and R' aly and roduct	are the gas $\Delta H$ and $\Delta S$ ion of HCl
	Composition of	of KCl - M	IgCl <sub>2</sub> me	Lt/mol % MgCl	-2	73
	· · · · · · · · · · · · · · · · · · ·			30		/3
$\begin{array}{c} 1/K & 10^{\circ} K_{H}/m \\ cm^{-3} atm \end{array}$	ol T/K	10' K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-3</sup>		$10^{\circ} K_{H}/mol$ cm <sup>-3</sup> atm <sup>-1</sup>	T/K	cm <sup>-3</sup> atm <sup>-1</sup>
999 34.86 1035 34.20	778 833	32.82 31.50	923 970	22.55 22.60	923 975	12.74 12.88
1068 33.60	896	30.09	1015	21.76	1021	12.90
1180 31.72	1028	27.46	11074	20.75	1124	13.00
	1123	25.81	1148	19.60	1153	13.10
Values of least squares	$\Delta H$ and $\Delta S$ of are :	the disso	lution p	process, eval	uated f	rom linear
Parameter	13 mol% MgCl <sub>2</sub>	33 mol%	MgCl <sub>2</sub>	50 mol% MgC	212 73	3 mol% MgCl <sub>2</sub>
$\Delta H/kJ mol^{1}$ $\Delta S/JK^{1} mol^{1}$	3.93 -6.48	2 -9	.67	1.35 -12.88		9.45 -9.20
		AUXILIARY	INFORMATI	ON		
METHOD/APPARATUS/P	ROCEDURE:		SOURCE A	ND PURITY OF MA	TERIALS:	<u></u>
Gas solubi using a volume bed earlier(1)	lities were de tric method as	etermined 5 descri-	Magnes "chemi acid a state For de	gCl <sub>2</sub> was prep sium metal an ically pure" and purified using a spec etails see th	pared find doub grade l in the sial pro- ne origi	rom sublimed ly distilled hydrochloric molten ocedure. inal paper.
			ESTIMATE	D ERROR:		
			Solu	ubility = ± 1	5 - 29	{ (authors)
			REFERENC	ES:	·	
			1.Novoz Griba Zhura	zhilov, A. L; ova, E. I. . <b>Fiz. Khim.</b>	Devyat <u>1972</u> , 4	ckin, V. P; <b>46</b> , 1856.

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COMPONENTS :	ORIGINAL MEASUREMENTS:		
<ol> <li>Hydrogen chloride; HCl; [7647-01-0]</li> <li>Zinc chloride; ZnCl<sub>2</sub>; [7646-85-7]</li> <li>N-Methylpyridinium Chloride; CH<sub>3</sub>·C<sub>5</sub>H<sub>5</sub>N·Cl; [7680-73-1]</li> </ol>	Claes, P. F; Coppe, C. R; Simonis, L. A; Glibert, J. E. J. Chem. Eng. Data <u>1987</u> , 32, 70 - 72.		
VARIABLES: T/K = 443 P/kPa: 101.325 (1 atm.) ZnCl <sub>2</sub> /mol fraction = 0.0 - 0.703	PREPARED BY: N. P. Bansal		
EXPERIMENTAL VALUES:			
Solubilities of HCl in melts of va and 1 atm pressure are listed below	arious compositions measured at 443K		
Melt composition/ C <sub>HC1</sub> /mol lit <sup>-1</sup> mole frac. of ZnCl <sub>2</sub>	Melt composition/ $C_{HCl}/mol lit^{-1}$ mole frac. of ZnCl <sub>2</sub>		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Solubility was determined by saturating the melt by bubbling HCl for 3h. The saturated melt was que- nched, dissolved in distilled water, and the excess of KI and KIO <sub>3</sub> were added to the solution which generat- ed an equivalent amount of $I_2$ according to the reaction: $6H_3O^++IO^3+5I^- \rightarrow 9H_2O+3I_2$ .	Purum grade hydrogen chloride from Fluka was used. In some cases, HCl was prepared by reacting H <sub>2</sub> SO <sub>4</sub> (96% from Carlo Erba) of RPE grade with NaCl and bubbled through sulfuric acid. The origin of ZnCl <sub>2</sub> was described elsewhere(1). The synthesis of N-Methylpyridinium chloride was described earlier(1).		
The liberated $I_2$ was estimated	ESTIMATED ERROR:		
solution of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> .	Not specified.		
	REFERENCES :		
	1. Simonis, L.; Coppe, C.; Glibert, J.; Claes, P.		
	Thermochim. Acta <u>1986</u> , <b>99</b> , 223.		

COMPONENTS: (1) Hydrogen chloride; HCl; [7647-01-0] (2) Zinc chloride; ZnCl <sub>2</sub> ; [7646-85-7] (3) N-Ethylpyridinium bromide; $C_{2H_5} \cdot C_{5H_5} N \cdot Br$ ; [1906-79-2] VARIABLES: T/K = 393 P/kPa: 101.325 (1 atm.) ZnCl <sub>2</sub> /mol fraction = 0.0 - 0. EXPERIMENTAL VALUES: Solubilities of HCl in n 393K and 1 atm pressure are 1 Melt composition mole frac. of Zr 0.000 0.187 0.200 0.249 0.300 0.380 0.400 0.500 0.600 0.700	ORIGINAL MEASUREMENTS: Claes, P. F; Coppe, C. R; Simonis, L. A; Glibert, J. E. J. Chem. Eng. Data <u>1987</u> , 32, 70 - 72. PREPARED BY: N. P. Bansal 70 m/ C <sub>HCl</sub> /mol lit <sup>-1</sup> C <sub>HCl</sub> /mol lit <sup>-1</sup> 6.10 5.63 4.77 3.25 3.29 2.32 1.37 0.39 0.34 0.22 0.21 0.09
AU	KILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE: Solubility was determined by saturating the melt by bubbling for 3h. The saturated melt was nched, dissolved in distilled w and the excess of KI and KIO <sub>3</sub> w added to the solution which gen ed an equivalent amount of $I_2$ according to the reaction: $6H_3O^++IO^3+5I^- \rightarrow 9H_2O+3I_2$ . The liberated $I_2$ was estimated	SOURCE AND PURITY OF MATERIALS: Purum grade hydrogen chloride from Fluka was used. In some cases, HCl Was prepared by reacting H <sub>2</sub> SO <sub>4</sub> (96% from Carlo Erba) of RPE grade with ater, NaCl and bubbled through sulfuric acid. The origin of ZnCl <sub>2</sub> was described elsewhere(1). N-Ehtylpyridinium bromide was syn- thesized from 99.6% pyridine (Carlo Erba) and 99% ethyl bromide(U.C.B) of P. A. grade. For details see the original paper.
by titration with a standard solution of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> .	ESTIMATED ERROR: Not specified.
	REFERENCES: 1. Simonis, L; Coppe, C; Glibert, J; Claes, P. Thermochim. Acta <u>1986</u> , <b>99</b> , 223.

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
[7647-01-0]	Minh, N. Q.; Welch, B. J.		
(2) Lithium chloride; LiCl;	J. Electroanal. Chem. <u>1978</u> , <b>92</b> , 179 -		
continued			
VARIABLES:	PREPARED BY:		
T/K = 668 - 773 Melt comp./mol% 2nCl_ = 0 - 17 4	N. P. Bansal		
P/kPa: 101.325 (1 atm.)			
EVERTAGENTAL VALUES.			
EXPERIMENTAL VALUES:			
The solubilities of HCl in LiC compositions at 723 K, for an HCl	pressure of 101.3 kPa (1 atm.) are:		
Melt Composition/mol% ZnC	$1_2$ 10 <sup>6</sup> soly/mol cm <sup>-3</sup>		
	1 34		
3.4	1.49		
4.7	1.63		
8.2	1.78 2.03		
13.5	2.10		
17.4	2.19		
Values of soly in the melt containing 11.9 mol% ZnCl <sub>2</sub> at three temperatures for the HCl pressure of 101.3 kPa are:			
T/K 1	0° soly/mol cm <sup>-3</sup> atm <sup>-1</sup>		
668	2.14		
723	2.03		
//3	T.02		
	continued		
AUXILI	ARY INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Plution toobsis	Analysian and Buch Co		
ELUTION TECNNIQUE.	Analytical grade ZnCl <sub>2</sub> from May and Baker Limited was used.		
The melt was saturated with	Great care was taken in		
An hydrogen chloride by bubbling the gas through it. A known portion	preparing the melts. Purity of the melts was checked voltammetrically		
of the saturated melt was	MELLS WAS SUGGRED VOILBUILBUILCAILY.		
isolated and flushed with argon			
The HCL, which was carried out			
along with argon, was absorbed in			
water and determined by titration against a standard NaOH			
solution.	ESTIMATED ERROR:		
	solubility = t 10% (authors)		
	REFERENCES :		
1			

	339
Components :	ORIGINAL MEASUREMENTS:
(3) Potassium chloride; KCl;	Minh, N. Q.; Welch, B. J.
(4) Zing chlorido, ZnCl .	J. Electroanal. Chem. <u>1978</u> , <b>92</b> , 179 -
[7646-85-7]	<b>69</b> .
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
Smoothed Data:	
Temperature dependence of soly is is expressed by the relation:	n the melt containing 11.9 mol% $ZnCl_2$
log(soly/mol cm <sup>-3</sup> atm <sup>-1</sup> )	= -6.154 + 326.9/(T/K) (compiler)
std. de	v. = 1.2% (compiler)
The heat of solution, $^{A}H$ , is est	imated to be:
∆H/kJ mo	$1^{-1} = -6.3$ (compiler)
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
, ,	
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Nitric acid; HNO <sub>3</sub> ; [7697-37-2]	Haug, H.; Albright, L. F.			
<pre>(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]</pre>	Ind. Eng. Chem. Proc. Des. Dev.			
<pre>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<u>1965</u> , <b>4</b> , 241 - 49.			
VARIABLES: P/kPa: 101.325 (1 atm.)	PREPARED BY:			
T/K = 480 - 523	N. P. Bansal			
EXPERIMENTAL VALUES:				
The simultaneous solubilities of nitric acid and water at 1 atm. total vapor pressure under different partial pressures of nitric acid in the vapor phase have been measured in the molten mixture NaNO <sub>3</sub> - KNO <sub>3</sub> (54.3 - 45.7 mol%). The results are reported in graphical form only. The values derived from the graph at different temperatures are:				
Partial Pressure 10 <sup>2</sup>	Solubility/ 10 <sup>5</sup> K <sub>H</sub> /			
of $HNO_3$ in Vapor T/K Phase/torr	mol mol fraction torr <sup>-1</sup>			
480 152	0.54 3.55			
523 152 485 289	0.27 1.76 0.98 3.39			
523 289	0.40 1.38			
Smoothed Data: The temperature dependence of $x_1$ is given by the expression: $log(x_1/mol \ fraction \ torr^{-1}) = -8.92 + 2152/(T/K)$ (compiler) The heat of solution, $\Delta H$ , is: $\Delta H/kJ \ mol^{-1} = -41.2$ (compiler)				
AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Stripping method.	Not described.			
The melt was saturated with vapors of nitric acid. The vapors dissolved in the melt were stripped with a stream of nitrogen and absorbed in tubes containing sodium hydroxide solution.				
	ESTIMATED ERROR:			
	Data not very precise because of the decomposition of nitric acid.			
	REFERENCES :			

COMPONENTS: (1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4] EVALUATOR: N. P. Bansal National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

Two experimental studies are available (1,2) for the solubility of water in molten lithium nitrate. Data from the two reports are compared below, at the same temperatures:

	10 <sup>5</sup> $x_1$ /mol fraction torr <sup>-1</sup>		
T/K	Peleg (1)	Bertozzi (2)	
538 553	(19.3) 14.6	23.2 16.5	

Value in ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

The results of Peleg (1) are about 15 - 20% lower than those of Bertozzi (2). The former worker has employed the rotating microelectrode voltammetric technique which is not as accurate as the gravimetric method used by the latter. In view of this, the results of Bertozzi (2) may be preferred at least tentatively. However, further studies are needed to resolve this system.

References:

1. Peleg, M. J. Phys. Chem. <u>1967</u>, 71, 4553.

2. Bertozzi, G. Z. Naturforsch. 1967, 22A 1748.

COMPONENTS .	ORIGINAL MEASUREMENTS .		
	ORIGINAL MEASUREMENTS:		
(1) Water; H <sub>2</sub> O; [7732-18-5]	Peleg, M.		
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	<b>J. Phys. Chem. <u>1967</u>, 71,</b> 4553 - 56.		
MADIANI BO.	DERIND NY.		
VARIABLES:	PREPARED BY:		
T/K = 548 - 608	N. P. Bansal		
The solubility of water in molter	1 LiNO <sub>3</sub> at different temperatures are:		
t/°C 10 <sup>5</sup> >	t/°C $10^5 x_1$ /mol fraction mm <sup>-1</sup>		
275	16.1		
295	11.0		
310	8.7 5.9		
std. dev. = 0.6% (compiler) The enthalpy of solution, AH, is given as: AH/kJ mol <sup>-1</sup> = -39.1			
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Voltammetric method. The melt was obtained in a dry state by evacuation for a long time at a temperature above the experimental temperature. Water vapors at a known pressure were then allowed to enter the system and the melt stirred. The concentration of water in the melt was determined by running a	Not described.		
	ESTIMATED ERROR:		
	solubility: ± 2% (author)		
	REFERENCES:		
	0+0		
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COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Water; H <sub>2</sub> O; [7732-18-5]	Bertozzi, G.		
(2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	<b>Z. Naturforsch.</b> <u>1967</u> , <b>22A</b> , 1748 - 51.		
VARIABLES:	PREPARED BY:		
T/K = 538 - 553 P/kPa = 0.667 - 4.000	N. P. Bansal		
EXPERIMENTAL VALUES:			
The solubility of water vapor in temperatures are:	n molten LiNO <sub>3</sub> at two different		
t/°C 10⁵ x₁	/mol fraction torr <sup>-1</sup>		
265 280	23.2 16.5		
AUXILIAR	( INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Gravimetric method. A crucible containing 3 - 5 g of the salt is placed on the balance and the system evacuated. The temperature of the salt is slowly raised beyond its melting point and brought to the desired temperature. The melt is kept under high vacuum for many hours. The vacuum is removed and water vapors are allowed to enter into the system. The system is allowed to equilibrate for a few hours and weighed. The increase in weight directly gives the amount of water dissolved in the melt.	Not described. ESTIMATED ERROR: Nothing specified. REFERENCES:		

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; H₂O; [7732-18-5]	Peleg, M.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	J. Phys. Chem. <u>1967</u> , 71, 4553 - 56.
VARIABLES:	PREPARED BY:
T/K = 583 - 615 P/kPa = 4.00	N. P. Bansal
EXPERIMENTAL VALUES:	· · · · · · · · · · · · · · · · · · ·
The solubility of water vapor in are:	molten NaNO <sub>3</sub> at different temperatures
t/°C 10 <sup>5</sup> ;	$x_1/mol fraction mm^{-1}$
310 333 342	2.2 1.7 1.5
Smoothed Data	
The terrent deve lange of	
The competature dependence of x1	can be expressed by the relation:
log(x <sub>1</sub> /mol fraction mm <sup>-</sup>	(T) = -7.80 + 1838/(T/K) (compiler)
std. dev	·. = 1.4%
The enthalpy of solution, AH, is	given as:
∧H/kJ mol	$-^{-1} = -34.1$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Voltammetric method. The melt was prepared in a dry state by evacuation for a long time at a temperature above the experimental temperature. Water vapors at a known pressure were then allowed to enter the system and the melt stirred. The water concentration in the melt was determined by recording a voltammogram.	Not described.
	ESTIMATED ERROR:
	solubility: ± 20% (author)
	REFERENCES:

	345
COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES: P/kPa = 2.133 - 2.800 one temperature: $T/K = 579.8$	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water in molter of 16 - 21 mm Hg is given as:	n NaNO <sub>3</sub> under the water vapor pressure
t/°C 1	$10^4 x_1/mol fraction$
306.8	14.1 ± 1.0
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Cryoscopic method. A modified 'form of the Previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in	SOURCE AND PURITY OF MATERIALS: NaNO <sub>3</sub> containing less than 0.0003% of cation and 0.001% of anion impurities was air dried at 240°C for several days and then by the thermal shock technique (1). The salt was melted and the system evacuated or a slow stream of dry nitrogen was passed through the melt for 24 hr.
freezing point depression.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Rhodes, E.; Ubbelohde, A. R. <b>Proc. Royal Soc. <u>1959</u>, 251A,</b> 156.
	2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.
	2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.

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346 COMPONENTS: EVALUATOR: (1) Water; H<sub>2</sub>O; [7732-18-5] N. P. Bansal National Aeronautics and Space (2) Potassium nitrate; KNO<sub>3</sub>; Administration [7757-79-1] Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989. CRITICAL EVALUATION: Four experimental studies (1 - 4) are available for the solubility of water in molten KNO3. Their results are compared below:  $10^5 x_1$ /mol fraction torr<sup>-1</sup> T/K Ref. 1 Ref. 2 Ref. 3 Ref. 4 608  $2.1 \pm 0.5$ 2.1 610 0.20 619  $0.70 \pm 0.04$ 633 1.6 638  $0.51 \pm 0.04$ Peleg (2) has pointed out that the results of their study are not correct. Details of the method used by Pchelina and Novozhilov (3) are not available. Although the work of Frame et al. (1) is only of preliminary nature, their results are in good agreement with those of Haug and Albright (4). The values of ref. (4) may be preferred at least tentatively. However, additional detailed studies are needed to evaluate this system properly.

References:

- Frame, J. P.; Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1961</u>, 57, 1075.
- 2. Peleg, M. J. Phys. Chem. 1967, 71, 4553.
- 3. Pchelina, E. I.; Novozhilov, A. L. Russ. J. Phys. Chem. <u>1976</u>, 50, 1792.
- 4. Haug, H.; Albright, L. F. Ind. Eng. Chem. Proc. Des. Dev. <u>1965</u>, 4, 241.

	347
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Water; H₂O; [7732-18-5]</li> <li>(2) Potassium nitrate; KNO₃; [7757-79-1]</li> </ul>	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES: P/kPa = 2.133 - 2.800 one temperature: T/K = 605.05	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water in molte of 16 - 21 mm Hg is given as:	n KNO $_3$ under the water vapor pressure
t/°C	10 <sup>4</sup> x <sub>1</sub> /mol fraction
335.05	3.9 ± 1.0
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopic method. A modified form of the previously described (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial Drossures of unter Schubblith	KNO <sub>3</sub> containing less than 0.0003% of cation and less than 0.001% of anion impurities was air dried at 240°C for several days and then by the thermal shock technique (1). The salt was melted and the system evacuated or a slow stream of dry nitrogen was passed through the melt for 24 hr.
Water in the melt was calculated	ESTIMATED ERROR:
depression.	Nothing specified.
	REFERENCES :
	<ol> <li>Rhodes, E.; Ubbelohde, A. R.</li> <li>Proc. Royal Soc. <u>1959</u>, 251A, 156.</li> <li>Rhodes, E.; Ubbelohde, A. R.</li> <li>Trans. Faraday Soc. 1959, 55, 1705.</li> </ol>
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COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Peleg, M.
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<b>J. Phys. Chem.</b> <u>1967</u> , <b>71</b> , 4553 - 56.
VARIABLES: $P/kPa = 4.00$	PREPARED BY:
one temperature: $T/K = 610$	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water in molter	n KNO3 at a single temperature is:
t/°C 10 <sup>5</sup> :	$x_1/mol$ fraction $mm^{-1}$
337	0.20
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Voltammetric method. The melt was obtained in a drv	Not described.
state by evacuation for a long time at a temperature above the	
experimental value. Water vapors at a known pressure were then	
allowed to enter the system and the melt stirred. The water	
concentration in the melt was determined by recording a	
voltammogram.	ESTIMATED ERROR:
	The results are incorrect (authors)
	ine results are incorrect (authors)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Pchelina, E. I.; Novozhilov, A. L.
<pre>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	Zh. Fiz. Khim. <u>1976</u> , <b>50</b> , 3004. Russ. J. Phys. Chem. (Eng. Transl.) <u>1976</u> , <b>50</b> , 1792. (*).
VARIABLES:	PREPARED BY:
T/K = 619 - 638	N. D. Dancel
P/kPa = 6.666	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water vapors in molten $KNO_3$ at two different temperatures are given as:	
t/°C 1	$0^5 x_1/mol fraction$
346 365	0.70 ± 0.04 0.51 ± 0.04
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The method was based on the displacement of the dissolved water vapors with an inert gas. Details of the method are not available.	Not described.
	ESTIMATED ERROR:
	solubility: ± 2% (authors)
	REFERENCES :
	1

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Water; H <sub>2</sub> O; [7732-18-5]	Haug, H.; Albright, L. F.	
(2) Potassium nitrate; KNO₃; [7757-79-1]	Ind. Eng. Chem. Proc. Des. Dev. <u>1965</u> , <b>4</b> , 241 - 49.	
VARIABLES: - ()	PREPARED BY:	
P/kPa: 101.325 (1 atm.)	N. D. Dongol	
1/K - 000 & 035	N. P. Dalisal	
EXPERIMENTAL VALUES:		
The solubilities of water vapor at 1 atm. pressure in molten $KNO_3$ at two different temperatures are reported in graphical form only. The values derived from the graph by the compiler are:		
T/K 10 <sup>2</sup> x <sub>1</sub> /mol fraction atm <sup>-:</sup>	10 <sup>5</sup> x <sub>1</sub> /mol fraction torr <sup>-1</sup>	
608 1.6 633 1.2	2.1 1.6	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method.	Not described.	
The melt was saturated with pure steam. The water dissolved in the melt was stripped with a stream of nitrogen and absorbed in tubes containing concentrated $H_2SO_4$ .		
	ESTIMATED ERROR:	
	solubility: ± 2% (authors)	
	REFERENCES :	

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	351	
COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ol> <li>Water, H₂O; [7732-18-5]</li> <li>Cesium nitrate; CsNO₃; [7789-18-6]</li> </ol>	Frame, Ĵ. P.; Rhodes, E.; Ubbelohde, A. R.	
	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.	
VARIABLES: D/kp. = 2 122 = 2 800	PREPARED BY:	
one temperature: $T/K = 679$	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubility of water in molten $CsNO_3$ under the water vapor pressure of 16 - 21 mm Hg is given as:		
t/°C 10	$0^4 x_1/mol fraction$	
405.74	9.2 ± 1.0	
AUXILIARY INFORMATION		
THOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Cryoscopic method. A modified version of the previously described (2) Cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point lowering.	CSNO <sub>3</sub> containing less than 0.1% of all impurities was dried for several days in air at 240°C and then by the thermal shock technique (1). The salt was melted and the system evacuated or a slow stream of dry nitrogen was passed through the melt for 24 hr.	
	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES :	
	1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , <b>251A</b> , 156.	
	2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Water; H <sub>2</sub> O; [7732-18-5]	Kozlowski, T. R.; Bartholomew, R. F.	
<pre>(2) Sodium nitrite; NaNO<sub>2</sub>;   [7632-00-0]</pre>	<b>J. Electrochem. Soc.</b> <u>1967</u> , <b>114</b> , 937 - 40.	
VARIABLES: water vapor pressure/mm Hg	PREPARED BY:	
= 0.143 - 5.053	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubility of water in molten sodium nitrite at the freezing point of NaNO <sub>2</sub> is given as:		
t/°C $10^5 x_1$ /mol fraction mm Hg <sup>-1</sup>		
281.5 <sup>-</sup> 8.0		
Freezing point of NaNO <sub>2</sub> .		
The maximum solubility of water in s $31.4 \times 10^{-4}$ mol fraction.	odium nitrite at 281.5°C was	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Cryoscopic method. The diagram and details of the	Baker's "Analyzed" reagent grade sodium nitrite was dried to constant	
arrangement and procedure employed are given in the original paper.	weight in a vacuum oven at 110°C for 7 - 10 days.	
Depression in the freezing point		
various vapor pressures of water		
were obtained using the cooling		
curve method.		
	ESTIMATED ERROR:	
	REFERENCES :	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> </ul>	Novozhilov, A. L.; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1984</u> , 58, 781-783. Russ. J. Phys. Chem. (Eng. Transl.). <u>1984</u> , 58, 477-478. (*).	
VARIABLES: $P/kPa = 6.666$ T/K = 1095 - 1265	PREPARED BY: N. P. Bansal	
Puppersonal Marine		
EXPERIMENTAL VALUES: Values of Henry's Law constant K <sub>H</sub> (mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility of water vapors, at various temperatures are given below. The data obeyed the equation:		
∆н	Δs	
$-\log K_{H}R'T = \frac{1}{2.303RT}$	2.303R	
as the plot of $-\log K_{H}R'T$ against 1/T was linear. Here R and R' are the gas constants in $JK^{-1}mol^{-1}$ and in $cm^{3}atm K^{-1}mol^{-1}$ , respectively and $\Delta H$ and $\Delta S$ are the changes in enthalpy and entropy caused by the introduction of water molecules in the melt.		
T/K 107 K	/mol cm <sup>-3</sup> atm <sup>-1</sup>	
1095 1116 1174 1220 1265	127.4 115.6 94.7 84.3 74.4	
Values of the thermodynamic parameters of the dissolution process, evaluated from linear least squares, are $-\Delta H/kJ \text{ mol}^{-1} = 25.2$ $-\Delta S/JK^{-1} \text{ mol}^{-1} = 22.0$		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The method of purification of the salt and the experimental tech - nique were the same as described elsewhere(1,2). Special care was taken to allow for possible hydroly- sis effects on the measured solubil- ity. The strong interaction between the dissolved water molecules and products of hydrolysis could lead to erroneously high solubilities. To suppress hydrolysis, hydrogen chlor- ide was introduced into the vapor -	Not specified.	
gas mixture of the experiments $(Ar - H_2O at P_{H_2O} = 50mm Hg)$	ESTIMATED ERROR:	
2	Not specified.	
	<pre>REFERENCES: 1. Novozhilov, A. L; Pchelinia, E. I.; Zhur. Fiz. Khim. <u>1976</u>, 50, 3005. 2. Novozhilov, A. L; Devyatkin, V. N; Gribova, E. I. Zhur. Fiz. Khim. <u>1972</u>, 46, 1856.</pre>	

354	
COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Bretsznajder, S.
(2) Sodium chloride, NaCl; [7647-14-5]	Roczn. Chem. <u>1930</u> , <b>10</b> , 729 - 35.
VARIABLES:	PREPARED BY:
one temperature: T/K = 1023	N. P. Bansal
EXPERIMENTAL VALUES:	
Water reacted with molten NaCl at NaOH + HCl. The value of the equilibrat 750°C is 1.6 x $10^{-7}$ , where K <sub>P</sub> is	ccording to the reaction, NaCl + $H_2O$ = prium constant, $K_P$ , for this reaction defined as:
$K_{P} = \frac{P_{HCl} \times P_{NaOH}}{\dots}$	
P <sub>N</sub>	xcl X P <sub>H 2</sub>

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium study.	Not described.
	ESTIMATED ERROR: Nothing specified. REFERENCES:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Potassium cloride; KCl;</pre>	Novozhilov, A. L.; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1984</u> , <b>58</b> , 781-783. Russ. J. Phys. Chem. (Eng. Transl.).
[7447-40-7]	<u>1984</u> , 58, 477-478. (*).
VARIABLES: P/kPa = 6.666	PREPARED BY:
T/K = 1086 - 1222	N. P. Bansal
EXPERIMENTAL VALUES: Values of Henry's Law constant K, of water vapors, at various temperatu The data obeyed the equation:	(mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility ares are given below.
Дана страна с	Δs
$-\log K_{H}R'T = $	2.303R
as the plot of $-\log K_{H}R'T$ against $1/T$ gas constants in $JK^{-1}mol^{-1}$ and in cm <sup>3</sup> and $\Delta S$ are the changes in enthalpy a of water molecules in the melt.	was linear. Here R and R' are the <sup>3</sup> atm K <sup>-1</sup> mol <sup>-1</sup> , respectively and $\Delta$ H nd entropy caused by the introduction
T/K 107 K	"/mol cm <sup>-3</sup> atm <sup>-1</sup>
1086	137.4
1098	132.1
1170	108.3
	93.0
Values of the thermodynamic parameter evaluated from linear least squares, $- \Delta H/kJ \text{ mol}^{-1} = 21.0$ $- \Delta S/JK^{-1} \text{ mol}^{-1} = 17.7$	eters of the dissolution process, are
AUXILIARY	INFORMATION
ME THOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The method of purification of the salt and the experimental tech - nique were the same as described elsewhere(1,2). Special care was taken to allow for possible hydroly- sis effects on the measured solubil- ity. The strong interaction between the dissolved water molecules and products of hydrolysis could lead to erroneously high solubilities. To suppress hydrolysis, hydrogen chlor- ide was introduced into the vapor -	Not specified.
(Ar - $H_2O$ at $P_{H_1O} = 50$ mm Hg)	ESTIMATED ERROR:
	Not specified.
	<pre>REFERENCES: 1. Novozhilov, A. L; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1976</u>, 50, 3005. 2. Novozhilov, A. L; Devyatkin, V. N; Gribova, E. I. Zhur. Fiz. Khim. <u>1972</u>, 46, 1856.</pre>

356	
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H₂O; [7732-18-5] (2) Rubidium chloride; RbCl;     [7791-11-9]</pre>	Novozhilov, A. L.; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1984</u> , 58, 781-783. Russ. J. Phys. Chem. (Eng. Transl.). <u>1984</u> , 58, 477-478. (*).
VARIABLES: P/kPa = 6.666 T/K = 1026 - 1198	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: Values of Henry's Law constant K <sub>r</sub> of water vapors, at various temperatu The data obeyed the equation:	(mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility ares are given below.
$-\log K_{H}R'T = \frac{\Delta H}{2.303RT}$	
as the plot of $-\log K_{H}R'T$ against $1/T$ was linear. Here R and R' are the gas constants in $JK^{-1}mol^{-1}$ and in $cm^{3}atm K^{-1}mol^{-1}$ , respectively and $\Delta H$ and $\Delta S$ are the changes in enthalpy and entropy caused by the introduction of HCl molecules in the melt.	
T/K 10 <sup>7</sup> K <sub>F</sub>	/mol cm <sup>-3</sup> atm <sup>-1</sup>

T/K	10' K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-1</sup>
1026	171.8
1075	151.6
1124	136.3
1161	126.3
1198	109.2

Values of the thermodynamic parameters of the dissolution process, evaluated from linear least squares, are  $- \Delta H/kJ \text{ mol}^{-1} = 16.2$ 

$-\Delta S/JK^{-1} mol^{-1} = 12.6$	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The method of purification of the salt and the experimental tech - nique were the same as described elsewhere(1,2). Special care was taken to allow for possible hydroly- sis effects on the measured solubil- ity. The strong interaction between the dissolved water molecules and products of hydrolysis could lead to erroneously high solubilities. To suppress hydrolysis, hydrogen chlor- ide was introduced into the vapor - gas mixture of the experiments (Ar - H <sub>2</sub> O at P <sub>H_0</sub> = 50mm Hg)	SOURCE AND PURITY OF MATERIALS: Not specified. ESTIMATED ERROR:
	<pre>REFERENCES: 1. Novozhilov, A. L; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1976</u>, 50, 3005. 2. Novozhilov, A. L; Devyatkin, V. N; Gribova, E. I. Zhur. Fiz. Khim. 1972, 46, 1856.</pre>

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ol> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Cesium chloride; CsCl;</li> </ol>	Novozhilov, A. L.; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1984</u> , 58, 781-783. Russ. J. Phys. Chem. (Eng. Transl.)
[7647-17-8]	<u>1984</u> , <b>58</b> , 477-478. (*).
VARIABLES: P/kPa = 6.666	PREPARED BY:
T/K = 974 - 1173	N. P. Bansal
EXPERIMENTAL VALUES:	
Values of Henry's Law constant K, of water vapors, at various temperat The data obeyed the equation:	(mol cm <sup>-3</sup> atm <sup>-1</sup> ), for the solubility cures are given below.
Δн	ΔS
$-\log K_{\rm H} R'T = -2.303 RT$	2.303R
as the plot of $-\log K_{H}R'T$ against $1/T$ gas constants in $JK^{-1}mol^{-1}$ and in cm <sup>2</sup> $\Delta S$ are the changes in enthalpy and entry water molecules in the melt.	was linear. Here R and R' are the $^{3}$ atm K <sup>-1</sup> mol <sup>-1</sup> , respectively and $\Delta$ H and ntropy caused by the introduction of
T/K 107 K	/mol cm <sup>-3</sup> atm <sup>-1</sup>
974	195.2
1023	178.4
1078	159.1 147.1
1173	134.9
Values of the thermodynamic parameters of the thermodynamic parameters of the thermodynamic parameters $-\Delta H/kJ \text{ mol}^{-1}$ - $\Delta S/JK^{-1} \text{ mol}^{-1}$	ers of the dissolution process, are = 8.8 -1 = 5.3
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The method of purification of	Not specified.
The salt and the experimental tech -	
elsewhere(1,2). Special care was	
taken to allow for possible hydroly-	
ity. The strong interaction between	
the dissolved water molecules and	
Products of hydrolysis could lead to	
Suppress hydrolysis, hydrogen chlor-	
Ide was introduced into the vapor -	
$(Ar - H_2O at P_2 = 50mm H_3)$	ESTIMATED ERROR:
	Not specified.
	REFERENCES :
	1. Novozhilov, A. L; Pchelinia, E. I. Zhur. Fiz. Khim. <u>1976</u> , 50, 3005.
	2. Novozhilov, A. L; Devyatkin, V. N; Gribova, E. I. Zhur. Fiz. Khim. <u>1972</u> , 46, 1856.

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COMPONENTS: ORIGINAL MEASUREMENTS: (1) Water; H<sub>2</sub>O; [7732-18-5] Novozhilov, A. L. Zhur. Fiz. Khim. <u>1985</u>, **59**, 1008-1009; Russ. J. Phys. Chem. (Eng. Transl.) (2) Sodium Bromide; NaBr; [7647 - 15 - 6]<u>1985, 59, 586 - 587. (\*).</u> VARIABLES: PREPARED BY: T/K = 1053 - 1220N. P. Bansal . EXPERIMENTAL VALUES: Solubility of water in the melt was directly proportional to its partial pressure in the gaseous mixture indicating the applicability of Henry's law under the experimental conditions. Henry's Law constants  $K_{\rm H}$ (mole cm<sup>-3</sup>atm<sup>-1</sup>) at various temperatures, measured at  $P_{H_0} = 187.5$ mm Hg, are given below. The data obeyed the equation:  $-\Delta H^{\circ}$ ΔS°  $\log K_{H}R'T =$ 2.303RT 2.303R where R and R' are the gas constants in  $JK^{-1}mol^{-1}$  and in  $cm^{3}atm K^{-1}mol^{-1}$ , respectively and  $\Delta H^{\circ}$  and  $\Delta S^{\circ}$  are the standard enthalpy and entropy changes accompanying the transfer of 1 mole of water vapors from the gas phase to the bromide melt. T/K  $10^{7} K_{H}/mol cm^{-3} atm^{-1}$ 1053 187.1 1097 152.7 1132 138.9 1181 113.6 1220 100.0 Values of the thermodynamic parameters are :  $-\Delta H^{\circ}/kJ \text{ mol}^{-1} = 30.9$  $-\Delta S^{\circ}/JK^{-1}$  mol<sup>-1</sup> = 25.3 AUXILIARY INFORMATION SOURCE AND PURITY OF MATERIALS: METHOD/APPARATUS/PROCEDURE: "Chemically pure" or "analytical grade salt was recrystallized twice Water solubility was determined by a procedure involving displacefrom doubly distilled water, dried ment by an inert gas, as described in vacuum at a steadily increasing earlier(1). temperature and then fused. The last A gaseous mixture of  $H_2O + Ar(P_{H_0O})$ operations were repeated twice = 50 - 200mm Hg) was bubbled immediately before the measurements. through the melt. To prevent HBr was prepared as described hydrolysis of the melt, HBr was introduced into the gas mixture to earlier(2), and was sublimed in vacuum at liquid nitrogen temperata partial pressure of 15mm Hq. ture. ESTIMATED ERROR: Solubility = 3 - 5% (authors) **REFERENCES:** 1.Pchelinia, E. I.; Novozhilov, A. L; Zhur. Fiz. Khim. 1976, 50, 3005. 2.Muller, G.; Gnauk, G. "High Purity Gases", <u>1968</u>.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Potassium Bromide; KBr; [7758-02-3]</li> </ul>	Novozhilov, A. L. Zhur. Fiz. Khim. <u>1985</u> , <b>59</b> , 1008-1009; Russ. J. Phys. Chem. (Eng. Transl.) <u>1985</u> , <b>59</b> , 586-587. (*).
VARIABLES:	PREPARED BY:
T/K = 1041 - 1211	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubility of water in the melt partial pressure in the gaseous mixtu Henry's law under the experimental co (mole cm <sup>-3</sup> atm <sup>-1</sup> ) at various temperatu are given below. The data obeyed the equation	was directly proportional to its are indicating the applicability of onditions. Henry's Law constants $K_{H}$ ares, measured at $P_{H_{2}O} = 187.5$ mm Hg,
-∆H°	ΔS°
$\log K_{\rm HR} T = \frac{1}{2.303 \rm RT}$	+ 2.303R
where R and R' are the gas constants respectively and $\Delta H^{\circ}$ and $\Delta S^{\circ}$ are the accompanying the transfer of 1 mole of the bromide melt.	in JK <sup>-1</sup> mol <sup>-1</sup> and in cm <sup>3</sup> atm K <sup>-1</sup> mol <sup>-1</sup> , standard enthalpy and entropy changes of water vapors from the gas phase to
	$m_{0} cm^{-3} atm^{-1}$

T/K	$10^7 \text{ K}_{H}/\text{mol cm}^{-3} \text{ atm}^{-3}$
1041	206.9
1086	183.3
1123	162.9
1176	129.0
1211	115.9

Values of the thermodynamic parameters are :  $- \Delta H^{\circ}/kJ \text{ mol}^{-1} = 26.0$  $- \Delta S^{\circ}/JK^{-1} \text{ mol}^{-1} = 20.3$ 

,

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Water solubility was determined by a procedure involving displaceme- nt by an inert gas, as described earlier(1). A gaseous mixture of $H_2O + Ar(P_{H_O} = 50 - 200mm Hg)$ was bubbled <sup>2</sup> through the melt. To prevent hydrolysis of the melt, HBr was introduced into the gas mixture to a partial pressure of 15mm Hg.	"Chemically pure" or "analytical grade salt was recrystallized twice from doubly distilled water, dried in vacuum at a steadily increasing temp- erature and then fused. The last two operations were repeated twice immediately before the measurements. HBr was prepared as described earlier(2), and was sublimed in vacuum at liquid nitrogen temperat- ure.
	ESTIMATED ERROR:
	Solubility = 3-5 % (authors)
	REFERENCES:
	<ol> <li>Pchelina, E. I.; Novozhilov, A. L. Zhur. Fiz. Khim. <u>1976</u>, 50, 3005.</li> <li>Muller, G.; Gnauk, G. "High Purity Gases", <u>1968</u>.</li> </ol>

COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Rubidium Bromide; RbBr; [7789-39-1]</li> </ul>	Novozhilov, A. L. Zhur. Fiz. Khim. <u>1985</u> , <b>59</b> , 1008-1009; Russ. J. Phys. Chem. (Eng. Transl.) <u>1985</u> , <b>59</b> , 586-587. (*).
VARIABLES :	PREPARED BY:
T/K = 1001 - 1204	N. P. Bansal
EXPERIMENTAL VALUES: Solubility of water in the melt was directly proportional to its partial pressure in the gaseous mixture indicating the applicability of Henry's law under the experimental conditions. Henry's Law constants $K_{\rm H}$ mole cm <sup>-3</sup> atm <sup>-1</sup> ) at various temperatures, measured at $P_{\rm H_{2}O} = 187.5$ mm Hg, are given below. The data obeyed the equation:	
- AH°	۵S°
$10G K_{H}R^{+}T =$	2.303R
where R and R' are the gas constants respectively and $\Delta H^\circ$ and $\Delta S^\circ$ are the accompanying the transfer of 1 mole of the bromide melt.	in JK <sup>-1</sup> mol <sup>-1</sup> and in cm <sup>3</sup> atm K <sup>-1</sup> mol <sup>-1</sup> , standard enthalpy and entropy changes of water vapors from the gas phase to
т/к 10 <sup>7</sup> к <sub>н</sub> /	mol cm <sup>-3</sup> atm <sup>-1</sup>
1001 1043 1118 1177 1204 Values of the thermodynamic parame $- \Delta H^{\circ}/kJ \text{ mol}^{-1} =$ $- \Delta S^{\circ}/JK^{-1} \text{ mol}^{-1}$	241.1 208.9 165.4 140.1 130.5 ters are : = 21.2 = 15.5
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
Water solubility was determined by a procedure involving displaceme- nt by an inert gas, as described earlier(1). A gaseous mixture of $H_2O + Ar(P_{H O} = 50 - 200 \text{mm Hg})$ was bubbled <sup>2</sup> through the melt. To prevent hydrolysis of the melt, HBr was introduced into the gas mixture to a partial pressure of 15mm Hg.	"Chemically pure" or "analytical grade salt was recrystallized twice from doubly distilled water, dried in vacuum at a steadily increasing tem- perature and then fused. The last two operations were repeated twice immediately before the measurements. HBr was prepared as described earlier(2), and was sublimed in vacuum at liquid nitrogen temperat- ure.
	ESTIMATED ERROR:
	Solubility = 3-5 % (authors)
	<pre>REFERENCES: 1. Pchelina, E. I.; Novozhilov, A. L; Zhur. Fiz. Khim. <u>1976</u>, 50, 3005. 2. Muller, G.; Gnauk, G. "High Purity Gases", <u>1968</u>.</pre>

<ol> <li>Water; H<sub>2</sub>O; [7732-18-5]</li> <li>Cesium Bromide; CsBr; [7787-69-1]</li> </ol>	Novozhilov, A. L. Zhur. Fiz. Khim. <u>1985</u> , <b>59</b> , 1008-1009 Russ. J. Phys. Chem. (Eng. Transl.) <u>1985</u> , <b>59</b> , 586-587. (*).
VARIABLES:	PREPARED BY:
T/K = 923 - 1173	N. P. Bansal
EXPERIMENTAL VALUES: Solubility of water in the melt partial pressure in the gaseous mixtu Henry's law under the experimental co mole cm <sup>-3</sup> atm <sup>-1</sup> ) at various temperatur are given below. The data obeyed the equation:	was directly proportional to its are indicating the applicability of onditions. Henry's Law constants $K_{H}$ ces, measured at $P_{H_2O} = 187.5$ mm Hg,
$\log K_{H}R'T = \frac{-\Delta H^{\circ}}{2.303RT}$	ΔS° 2.303R
where R and R' are the gas constants respectively and $\Delta H^\circ$ and $\Delta S^\circ$ are the accompanying the transfer of 1 mole of the bromide melt.	in JK <sup>-1</sup> mol <sup>-1</sup> and in cm <sup>3</sup> atm K <sup>-1</sup> mol <sup>-1</sup> , standard enthalpy and entropy changes of water vapors from the gas phase to
Т/К 107 К <sub>н</sub> /	mol cm <sup>-3</sup> atm <sup>-1</sup>
923 981 1027 1108 1173	318.7 289.0 225.0 178.3 150.9
Values of the thermodynamic paramet $- \Delta H^{\circ}/kJ \text{ mol}^{-1} =$ $- \Delta S^{\circ}/JK^{-1} \text{ mol}^{-1}$	ers are : = 18.3 = 12.5
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Water solubility was determined by a procedure involving displaceme- nt by an inert gas, as described earlier(1). A gaseous mixture of $H_2O + Ar(P_{H_0} = 50 - 200mm Hg)$ was bubbled <sup>2</sup> through the melt. To prevent hydrolysis of the melt, HBr was introduced into the gas mixture to a partial pressure of 15mm Hg.	"Chemically pure" or "analytical grade salt was recrystallized twice from doubly distilled water, dried in vacuum at a steadily increasing tem- perature and then fused. The last two operations were repeated twice immediately before the measurements. HBr was prepared as described earlier(2), and was sublimed in vacuum at liquid nitrogen temperat- ure.
	ESTIMATED ERROR:
	Solubility = 3-5 % (authors)
	REFERENCES:
	1.Pchelinia, E. I.; Novozhilov, A. L; Zhur. Fiz. Khim. <u>1976</u> , 50, 3005. 2.Muller, G.; Gnauk, G. " High Purity Gases ", <u>1968</u> .

ORIGINAL MEASUREMENTS:

COMPONENTS:

ORIGINAL MEASUREMENTS:	
Duke, F. R.; Doan, Jr., A. S.	
<b>Iowa State Coll. J. Sci.</b> <u>1958</u> , <b>32</b> , 451 - 53.	
PREPARED BY:	
N. P. Bansal	
s a linear function of its pressure. olten LiClO4 at different temperatures	
l(mol of Li <sup>+</sup> ) <sup>-1</sup> mm of Hg <sup>-1</sup>	
54.9	
28.5 20.2	
<pre>log(x1/mol(mol of Li<sup>+</sup>)<sup>-1</sup> mm Hg<sup>-1</sup>) = -9.067 + 2447.3/(T/K) (compiler)</pre>	
INFORMATION	
SOURCE AND PURITY OF MATERIALS:	
Not described. About 10 g of the salt was taken and vacuum dried. The temperature was raised slowly above the melting point and brought to the working temperature. Evacuation of the melt was continued for several hours to ensure complete drying. ESTIMATED ERROR: Nothing specified.	

					363
COMPONENTS:		ORIGINAL MEAS	UREMENTS:		
<pre>(1) Water; H<sub>2</sub>O; [7732-14 (2) Sodium hydroxide; Na [1310-73-2]</pre>	Hoyt, E. J. Chem. 461 - 46	B. Eng. Data, 4.	<u>1967</u> , <b>12</b> ,		
VARIABLES:	PREPARED BY:				
T/K = 630 - 688 P/kPa = 1.013' - 59.	N	. P. Bansal			
EXPERIMENTAL VALUES: Solubilities of wate	t), in molt	en NaOH mea	sured at th	ree	
different temperatures of Hg), in molten NaOH a	under various are given be:	s vapor pre low :	ssures of w	ater, p <sub>H2</sub> 0	(mm
367°C	390	0°C	4	15°C	
P <sub>H2</sub> /mm Hg C <sub>H2</sub> /wt%	p <sub>H20</sub> /mm Hg	C <sub>H20</sub> /wt%	p <sub>H2</sub> o/mm Hg	C <sub>H20</sub> /wt%	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	339 325 283 257 238 229 207 198 178 164 150 142 127 115 106 93.6 85.6 72.6	0.830 0.772 0.720 0.678 0.640 0.565 0.532 0.496 0.466 0.433 0.397 0.364 0.287 0.257 0.222 0.187	447 397 375 343 305 279 256 228 205 181 160 141 124 113 98.8 83.0 69.5 50.9	0.774 0.715 0.660 0.558 0.513 0.473 0.438 0.402 0.362 0.324 0.289 0.258 0.231 0.207 0.179 0.147 0.117 cont	d
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: A Gas saturation method for measurement of the s of water under various v ssures of water in the o For details of the appar the procedure used, see inal publication.	Was used solubility vapor pre- gas phase. ratus and the orig-	SOURCE AND P Sodium hyd grade hav: on a dry 1 Na <sub>2</sub> SO <sub>4</sub> , 0 used.	URITY OF MATE ing $\approx 2.4$ basis(Na <sub>2</sub> CO .3; and Na <sub>2</sub>	RIALS; 6%) of comme total impuri 3, 1.0; NaCl SiO <sub>3</sub> , 0.7%)	ercial ties L, 0.4 was
		ESTIMATED ER	ROR: sified.		_
		REFERENCES: 1. Al-Mus Maund, J. Cher	lih, E.; Ird J. K. n. Eng. Data	edale, P. J. <b>a</b> , <u>1983</u> , 28,	; 245.

COMPONENTS :			ORIGINAL MEASUREMENTS:						
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> </ul>			Hoyt, E. B. J. Chem. Eng. Data, <u>1967</u> , 12, 461 - 464.						
VADTARI FS •		PREPARED BY:							
T/K = 630 - 688			N. P. Bansal						
P/kPa = 1.013 - 59.595									
EXPERIMENTAL VALUES:									
con	td								
1	367	°C	39	0°C	415°C				
		0 /::+%	m /mm Ug	<u> </u>					
	2 <sup>2</sup> 2	2 2	2 2 2	2 2	2 2 2	2 2			
	21.3	0.087	59.7	0.187	39.5	0.089			
	11.5 7.6	0.045 0.031	44.6 31.1	0.149 0.114	28.6 13.7	0.063 0.033			
			24.0	0.083	8.3	0.016			
			10.6	0.037					
		<u></u>	AUXILIARY	INFORMATION					
METH	IOD/APPARATUS/PI	ROCEDURE:		SOURCE AND PURITY OF MATERIALS:					
METHOD/APPARATUS/PROCEDURE:									
				ESTIMATED ERROR:					

	365
Components:	ORIGINAL MEASUREMENTS:
<ol> <li>Water; H<sub>2</sub>O; [7732-18-5]</li> <li>Sodium hydroxide; NaOH; [1310-73-2]</li> </ol>	Rahmel, A.; Kruger, HJ. Z. Physik, Chem. <u>1967</u> , 55, 25 - 32.
VARIABLES: $T/K = 623 - 773$	PREPARED BY:
no information on pressure	
EXPERIMENTAL VALUES:	I
Temperature dependence of the H for the solubility of water in molt	enry's law constant k in mg·g <sup>-1</sup> ·Torr <sup>-1</sup> en NaOH is given as :
$\log k = -$	6.54 + <u>3210</u>
Where T is the temperature in kelvi The above results have also bee	n. n expressed[1] as :
log K = 4	.88 - <u>3210</u>
Where K is the Henry's law constant temperature in kelvin.	in $atm \cdot mol^{-1} \cdot kg$ , and T is the
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gravimetry. The amount of water dissolved in the melt was measured as a function of vapor pressure of water in the gas phase.	
	ESTIMATED ERROR:
	REFERENCES :
	<ol> <li>Al-Muslih, E.; Iredale, J.; Maund, J. K. J. Chem. Eng. Data <u>1983</u>, 28, 245.</li> </ol>
	}

366	
COMPONE	NTS:
(1)	Water; H <sub>2</sub> O; [7732-18-5]
(2)	Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]
(3)	Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]

ELES: T/K = 503 - 553P/kPa = 0.667 - 4.000 VARIABLES: PREPARED BY: melt comp./mol% LiNO3 = 25 - 75 N. P. Bansal

**ORIGINAL MEASUREMENTS:** 

Z. Naturforsch. 1967, 22A, 1748 - 51.

Bertozzi, G.

EXPERIMENTAL VALUES:

The solubility of water vapors in molten LiNO3 - NaNO3 mixtures of various compositions at different temperatures are:

	10 <sup>5</sup> x <sub>1</sub> /	mol fraction	torr <sup>-1</sup>
Melt Composition/ mol% LiNO3	230	265	280
25 50 75	_ 24.2 35.4	8.4 11.0 16.5	6.4 8.1 11.8

Smoothed Data:

The temperature dependence of  $x_1$  in molten LiNO<sub>3</sub> - NaNO<sub>3</sub> mixtures containing 50 and 75 mol% LiNO<sub>3</sub> are expressed, by the equations:

50	mol%	LiNO3:	log(x1/mol	frac.	torr <sup>-1</sup> )	=	-8.871	+	2645/(T/K)	(compiler)
75	mol%	LiNO3:	$log(x_1/mol$	frac.	torr <sup>-1</sup> )	=	-8.687	+	2636/(T/K)	(compiler)
The	e heat	c of sol	lution, ∆H,	in bot	th melts	is	s estima	ite	ed to be:	
				∆H/kJ	$mol^{-1} =$	-	50.5		(compiler)	

AUXILIARY INFORMATION

METHOD / APPARATUS / PROCEDURE :

Gravimetric method. A crucible containing 3 - 5 g of the salt mixture is placed on the balance and the system evacuated. The temperature of the salt is raised slowly beyond its melting point and set to the working temperature. The melt is kept under high vacuum for many hours. The vacuum is disconnected and water vapors are allowed to enter the system to a definite pressure. After equilibrium is attained, the salt is weighed again. The increase in weight directly gives the amount of water dissolved in the melt.

SOURCE AND PURITY OF MATERIALS:

Not described.

ESTIMATED ERROR:

Nothing specified.

**REFERENCES:** 

COMPONENTS:	EVALUATOR:
(1) Water; H <sub>2</sub> O; [7732-18-5]	N. P. Bansal National Aeronautics and Space
<pre>(2) Lithium nitrate; LiNO<sub>3</sub>;</pre>	Administration.
[7790-69-4]	Lewis Research Center
(3) Potassium nitrate; KNO <sub>3</sub> ,	Cleveland, Ohio, 44135, U.S.A.
[7757-79-1]	December, 1989.

CRITICAL EVALUATION:

Four investigations have been reported (1 - 4) for the solubility of water in molten LiNO<sub>3</sub> - KNO<sub>3</sub>. Aganesova et al. (4) have used polarography which is not a very reliable method for solubility determinations. Also, their values are not in line with the other studies (1 - 3) and are rejected.

Bertozzi (3) has carried out measurements in three melt compositions, containing 25, 50 and 75 mol%  $LiNO_3$ , using a gravimetric method. His results for equimolar melt composition are in excellent agreement with those reported by Tripp et al. (1,2) who employed an indirect technique of vapor pressure measurements.

The recommended numerical values for the equimolar melt composition, based on the data sets of refs. (1 - 3); are given in Table 1 and also shown in Fig. 1. Tentative values for solubilities in melts containing 25 and 75 mol% LiNO<sub>3</sub> are also presented in Fig. 1.

#### Table 1

Recommended Solubilities in Equimolar LiNO<sub>3</sub> - KNO<sub>3</sub> Melt as a Function of Temperature

T/K	$10^4 x_1$ /mol fraction torr <sup>-1</sup>	
380	45.0	
400	22.5	
420	12.0	
440	6.8	
460	4.0	
480	2.5	
500	1.6	
520	1.1	
540	0.74	

References:

- 1. Tripp, T. B. J. Chem. Thermodyn. <u>1975</u>, 7, 263.
- 2. Tripp, T. B. Braunstein, J. J. Phys. Chem. <u>1969</u>, 73, 1984.
- 3. Bertozzi, G. Z. Naturforsch. 1967, 22A, 1748.
- Aganesova, S. B. Ladani, P.; Yurkinskii, V. P.; Morachevskii, A. G. Zhur. Priklad. Khim. <u>1975</u>, 48, 1164.





	369
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</pre>	Tripp, T. B.; Braunstein, J. <b>J. Phys. Chem. <u>1969</u>, 73,</b> 1984 - 90.
<pre>(3) Potassium nitrate; KNO₃; ·[7757-79-1]</pre>	
VARIABLES: T/K = 392 - 423 melt comp./mol% LiNO <sub>3</sub> = 50.0 P/kPa: 101.325 (compiler)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of water in the mol%) have been reported in the temp of a linear graph. The values of $x_1$ derived from the the compiler are:	molten mixture $LiNO_3 - KNO_3$ (50 - 50 berature range 392 - 423 K in the form e graph at different temperatures by
T/K 104 x1/mc	$pl(mol of NO_3^-)^{-1} torr^{-1}$
392 403 413	29.6 20.5 15.1
423	10.9
std. dev The enthalpy of solution, AH, is AH/kJ mol <sup>-1</sup> =	y. = 0.5% (compiler) given as: 43.1 ± 0.84
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Vapor pressure measurements. The solubility data have been indirectly derived from vapor pressure measurements of the system LiNO <sub>3</sub> - KNO <sub>3</sub> - H <sub>2</sub> O using a differential transpiration method.	Not described.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Tripp, T. B. J. Chem. Thermodyn. <u>1975</u> , 7, 263 - 69.
VARIABLES: T/K = 383 - 423 melt comp./mol% LiNO <sub>3</sub> = 50.0 P/kPa: 101.325 (compiler)	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of water in at different temperatures are:	n molten LiNO <sub>3</sub> - KNO <sub>3</sub> (50 - 50 mol%) mixture
т/к	10 <sup>4</sup> $x_1$ /mol fraction torr <sup>-1</sup>
383.15 392.15 402.15 413.15 423.15	40.1 29.3 20.5 14.8 10.9
Smoothed Data: The temperature dependence of $log(x_1/mol \ fraction$ sto The enthalpy of solution, AI	of $K_{H}$ can be expressed by the relation: torr <sup>-1</sup> ) = -8.376 + 2291/(T/K) (compiler) d. dev. = 0.14% (compiler) H, is:
	$not - = - 43.9 \pm 0.4$
AUX	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Vapor pressure measurements. The solubilities of water have been indirectly derived from var pressure measurements of LiNO <sub>3</sub> KNO <sub>3</sub> - H <sub>2</sub> O system using a differential transpiration meth described elsewhere (1).	Lithium and potassium nitrates, Ave Mallinckrodt AR grade, were dried at 520 K.
	ESTIMATED ERROR: Nothing specified.
	REFERENCES: 1. Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u> , 73, 1984.

COMPONENTS .	TORIGINAL MEASU	DEMENTC .
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Tripp, T. E Molten Salt Eds.], The Electro <u>1976</u> , p. 56	S. S. [J. P. Pemsler, et al, ochem. Soc., Princeton, NJ 50 - 574.
VARIABLES: T/K = 402.1 Melt composition/mol Li <sup>+</sup> per mol NO <sub>3</sub> <sup>-</sup> = 0.4493 - 0.7000	PREPARED BY: N.	P. Bansal
Vapor pressures of LiNO <sub>3</sub> - KNO water concentrations and melt comp The water mole ratio, $R_{\rm H}$ (mol $H_2O/m$ mol $H_2O/mol NO_3^-$ and the salt mole varied from 0.4493 to 0.7000 mol L mbe received a processed	$_{3}$ - H <sub>2</sub> O melts ositions have nol NO <sub>3</sub> <sup>-</sup> ), was e fraction, R <sub>1</sub> i <sup>+</sup> /mol NO <sub>3</sub> <sup>-</sup> .	over a wide range of been measured at 129.51°C s varied from $\approx 0.2$ to 1.0 (mol Li <sup>+</sup> /mol NO <sub>3</sub> <sup>-</sup> ), was
Where P is the vapor pressure Values of the coefficients A and B in terms of $R_{L}$ are given below:	in torr, and for various m	A and B are constants. Welt compositions expressed
Where P is the vapor pressure Values of the coefficients A and B in terms of $R_{r}$ are given below: $R_{r}$ /mol Li <sup>+</sup> per mol NO <sub>3</sub> <sup>-</sup>	in torr, and for various m	A and B are constants. Melt compositions expresse B
P = A + B R Where P is the vapor pressure Values of the coefficients A and B in terms of R <sub>r</sub> are given below: $R_r/mol Li^+ \text{ per mol NO}_3^-$ $0.45$ $0.50$ $0.55$ $0.60$ $0.65$ $0.70$	A 2.68 -1.24 -4.94 -10.35 -11.96 -12.8	A and B are constants. Melt compositions expresse B 524.8 491.3 453.9 418.9 392.1 359.5

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A differential transpiration method, details of which have been described previously(1,2), was used for measurements of the vapor pressure of water.	LiNO <sub>3</sub> and KNO <sub>3</sub> both from Mallin- ckrodt (AR grade) were finely ground, dried for 24h. at 150°C and stored over anhydrous magnesium perchlorate.
	ESTIMATED ERROR:
	Not specified.
	REFERENCES:
	<ol> <li>Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u>, 73, <u>1984</u>.</li> <li>Tripp, T. B. J. Chem. Thermodynamics <u>1975</u>, 7, 263.</li> </ol>

372	
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Bertozzi, G. <b>Z. Naturforsch. <u>1967</u>, 22A,</b> 1748 - 51
VARIABLES: T/K = 503 - 538 P/kPa = 0.667 - 4.000 water vapor pressure/torr = 5 - 30	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES: The solubilities of water vapors different compositions at two diffe	in molten LiNO <sub>3</sub> - KNO <sub>3</sub> mixtures of rent temperatures are:
	$10^5 x_1/mol fraction torr^1$
melt composition/mol% LiNO3	230 265
25 50 75	9.9 5.4 16.2 8.2 27.8 13.7
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: Gravimetric method. A crucible containing 3 - 5 g of the salt mixture is placed on the balance and the system evacuated. The temperature of the salt is raised slowly beyond its melting point and set to the desired temperature. The melt is kept under high vacuum for many hours. The vacuum is disconnected and water vapors are allowed to enter the system to a definite pressure. After equilibrium is reached, the salt is weighed again. The increase in weight directly gives the amount of water dissolved in the melt.	SOURCE AND PURITY OF MATERIALS; Not described.
	ESTIMATED ERROR: Nothing specified.

REFERENCES:

	373	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	Aganesova, S. B.; Ladani, P.; Yurkinskii, V. P.; Morachevskii, A. G. <b>Zhur. Priklad. Khim. <u>1975</u>, 48,</b> 1164 - 65.	
VARIABLES:	PREPARED BY:	
T/K = 420 - 603 P/kPa = 2.026	N. P. Bansal	
EXPERIMENTAL VALUES: The solubility of water in the molten eutectic LiNO <sub>3</sub> - KNO <sub>3</sub> has been studied in the temperature range 420 - 603 K. Henry's law was obeyed only in the temperature interval 513 - 603 K and the results have been reported in the form of a plot. Values of solubility derived from the plot at some experimental temperatures, by the compiler, are:		
T/K 10 <sup>5</sup> x <sub>1</sub> /	mol fraction torr <sup>-1</sup>	
516 542 559 585 606	34.7 17.4 14.3 8.5 7.4	
Some results are also reported for the water concentration in the melt saturated with water in the temperature range 420 - 463 K. However, for these solubilities the water content in the vapor phase is not known, Smoothed Data: The temperature dependence of $x_1$ is expressed by the relation: $log(x_1/mol \ fraction \ torr^{-1}) = -8.052 + 2351/(T/K)$ (compiler) std. dev. = 4.6% (compiler) The enthalpy of solution, $\Delta H$ , in the temperature range 513 - 603 K is: $\Delta H/kJ \ mol^{-1} = -43.9$		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Voltammetric method. A known amount of the mixed salt was fused and dried by bubbling dry nitrogen through the melt for one hour. The melt was saturated with water by sparging it with nitrogen saturated with vapor (water vapor pressure = 15.20 torr). Then the voltammogram was recorded. The method of standard additions was employed for determining the amount of water present in the melt corresponding to the wave height recorded. The additive used was (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> .H <sub>2</sub> O.	Not described. ESTIMATED ERROR: Nothing specified.	
	REFERENCES:	

COMPONENTS:

# (1) Water; H<sub>2</sub>O; [7732-18-5]

- (2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]
- (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]

### EVALUATOR:

N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135, U.S.A. December, 1989.

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### CRITICAL EVALUATION:

Three studies (1 - 3) are available for the solubility of water in molten NaNO<sub>3</sub> - KNO<sub>3</sub>. Haug and Albright (3) used the melt composition containing 54.3 mol% NaNO<sub>3</sub>. The results of the other two investigations, which employed equimolar melts, are compared in Fig. 1. It may be noted that the results of White and Twardoch (2), obtained by using the cyclic voltammetric technique, are in reasonable agreement with those of Zambonin et al. (1) who employed the prospure measuring technique Zambonin et al. (1) who employed the pressure measuring technique.



374

(1) Water; H<sub>2</sub>O; [7732-18-5]

(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1] N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

CRITICAL EVALUATION:

COMPONENTS:

The recommended values, obtained from the two data sets (1,2), in the equimolar melt are given in Table 1:

EVALUATOR:

Table 1

Recommended Solubilities in the Equimolar NaNO<sub>3</sub> - KNO<sub>3</sub> Melt as a Function of Temperature

т/к	10 <sup>4</sup> C/mol kg <sup>-1</sup> torr <sup>-1</sup>
500	9.29
510	7.87
520	6.72
530	5.76
540	4.97
550	4.32
560	3.76
570	3.30
580	2.90
590	2.57
600	2.28

References:

- Zambonin, P.G.; Cardetta, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u>, 28, 237.
- 2. White, S. H.; Twardoch, U. M. Proc. Third Intl. Symp. Molten Salts (Mamantov, G.; Blander, M.; Smith, G. P., Eds.) <u>1981</u>, 284.
- Haug, H.; Albright, L. F. Ind. Engg. Chem. Proc. Des. Dev. <u>1965</u>, 4, 241.

COMPONENTS :	UKIGINAL MEASUREMENTS:	
<pre>(1) Water; H₂O; [7732-18-5] (2) Sodium nitrate; NaNO₃; [7631-99-4]</pre>	Zambonin, P. G.; Cardetta, V. L.; Signorile, G.	
<pre>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	<b>J. Electroanal. Chem.</b> <u>1970</u> , <b>28</b> , 237 - 43.	
VARIABLES: $\pi/\kappa = 500 - 567$	PREPARED BY:	
P/kPa = 1.320 - 2.740	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solvent employed was an equimolar molten mixture of sodium nitrate and potassium nitrate. The data for the solubility of water in the melt at various temperatures and water vapor temperatures are:		
T/K $P_{H_2O}/torr$ 10 <sup>3</sup> x <sub>1</sub> /mol	kg <sup>-1</sup> 10 <sup>4</sup> K <sub>P</sub> /mol kg <sup>-1</sup> torr <sup>-1</sup>	
500 9.90 9.40	9.50	
501 10.30 9.30	9.05	
503 10.50 9.25 506 10.95 9.15	8.80	
514 11.95 8.95	7.50	
527 13.95 8.50 537 15.75 8.10	6.10	
547 17.40 7.75	4.45	
556 18.80 7.45 563 20.05 7.20	3.95	
567 20.55 7.10	3.45	
	continued	
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Drogguro mooguring toghniguo	Not described	
The diagram and details of the	Not described.	
apparatus and procedure used for		
described in the original paper.		
Briefly, the melt was evacuated		
The vacuum was disconnected and		
water vapors at a known pressure		
stirred vigorously and the system		
allowed to attain equilibrium.	ESTIMATED ERROR:	
dissolved in the melt was calculated from the equilibrium pressure.	Nothing specified.	
	REFERENCES :	
1		

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	377
COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Sodium nitrate; NaNO<sub>3</sub>;</pre>	Zambonin, P. G.; Cardetta, V. L.; Signorile, G.
[7631-99-4] (3) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	J. Electroanal. Chem. <u>1970</u> , <b>28</b> , 237 - 43.
VARIABLES:	PREPARED BY:
T/K = 500 - 567 P/kPa = 1.320 - 2.740	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
The temperature dependence of th relation:	we constant $K_{\mathbf{F}}$ is given by the
log(K <sub>r</sub> /mol kg <sup>-1</sup> torr <sup>-</sup>	(1) = -6.716 + 1843/(T/K) (compiler)
std. dev. = 0.5% (compiler)	
The heat of solution, $^{A}$ H, and er	tropy of solution, AS, are:
∆H/kJ mc	bl⁻¹ = -35.1
∆S/J K <sup>-1</sup> m	$nol^{-1} = -37.2$ (at 523 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:
	1

	OPTCINAL MEACHDEMENTS .	
COMPONENTS :	ORIGINAL MEASUREMENIS:	
(1) Water; $H_2O$ ; [7732-18-5]	White, S. H.; Twardoch, U. M.	
[7631-99-4]	Proc. Third Intl. Symp. Molten Salts	
(3) Potassium nitrate; KNO3;	(Mamantov, G.; Blander, M.; Smith,	
[7757-79-1]	<b>G. P., Eds.</b> ) <u>1981</u> , 284 - 94.	
VARIABLES:	PREPARED BY:	
P/R = 1.072 = 4.242	N. P. Bansal	
r/red = 1.072 = 4.242		
EXPERIMENTAL VALUES:		
Solubilities of water in molten equimolar NaNO <sub>3</sub> - KNO <sub>3</sub> mixture were measured at different temperatures under various partial pressures of water. The values of the solubility constant, K, are:		
T/K P <sub>HO</sub> /torr	10° K/mol kg-1 torr-1	
522 20.04	A 6	
573 9.21	3.4	
573 19.35	3.1	
573 20.82	2.5	
598 8.04	1.1	
598 20.94	2.0	
623 20.94	1.4	
<pre>Smoothed Data: Temperature dependence of K is expressed by the relation:</pre>		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Cyclic voltammetry.	Sodium and potassium nitrates were either ultrapure or $P_2O_5$ dried ACS grade. These were further dried under vacuum at temperatures up to 200°C. To prepare the melt, the salt mixture was melted under pure oxygen, evacuated and filtered. Water added was in the form of LiNO <sub>3</sub> .3H <sub>2</sub> O or saturated argon gas at a known partial pressure.	
	ESTIMATED ERROR:	
	Nothing specified.	
-	REFERENCES :	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Water; H <sub>2</sub> O; [7732-18-5]	Haug, H.; Albright, L. F.	
(2) Sodium nitrate; $NaNO_3$ ; [7631-99-4]	Ind. Eng. Chem. Proc. Des. Dev	
(3) Potassium nitrate; KNO <sub>3</sub> ;	<u>1965,</u> <b>4</b> , 241 - 49.	
[7757-79-1]		
VARIABLES:	PREPARED BY:	
T/K = 473 - 623 water vapor press /torr = 80 - 750	N D Bangal	
	N. I. Dansar	
EXPERIMENTAL VALUES:		
Henry's law was obeyed upto a vap solubility of water vapor in molten Values of water solubility at differ	por pressure of 1 atm. for the NaNO <sub>3</sub> - KNO <sub>3</sub> (54.3 - 45.7 mol%). The temperatures are:	
10 <sup>2</sup> x <sub>1</sub> */ T/K mol fraction atm	10 <sup>5</sup> x'ı <sup>-</sup> / mol fraction torr <sup>-1</sup>	
473 11.60	15.3	
523 4.79	6.3	
623 2.43	3.2 1.9	
	·····	
* Values derived from the gray	oh by the compiler.	
Smoothed Data:		
relations:	and X'1 can be expressed by the	
log(x <sub>1</sub> /mol fraction atm <sup>-1</sup>	(-1) = -4.747 + 1798.5/(T/K) (compiler)	
$log(x'_1/mol\ fraction\ torm$	(-1) = -7.596 + 1783/(T/K) (compiler)	
std. dev. = 1.5% (compiler) The heat of solution, $\Delta H$ , is reported to be: $\Delta H/kJ \text{ mol}^{-1} = -34.94$		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Stripping method. The melt was saturated with pure steam at a particular pressure. The steam dissolved in the melt was stripped with a stream of nitrogen and absorbed in tubes containing concentrated H <sub>2</sub> SO <sub>4</sub>	Not described.	
	ESTIMATED EDDOD.	
	LUTINIED ERROR:	
	solubility: ± 2% (authors)	
	REFERENCES :	

<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4] (3) Calcium nitrate; Ca(NO<sub>3</sub>)<sub>2</sub>; [10124-37-5]</pre> Frame, J. P.; Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1961</u> , 57, 1075 - 77.	
[7631-99-4] (3) Calcium nitrate; Ca(NO <sub>3</sub> ) <sub>2</sub> ; [10124-37-5] VARIABLES: PREPARED BY:	
VARIABLES: PREPARED BY:	
P/kPa = 10.666 - 9.999 one temperature: T/K = 572 N. P. Bansal	
EXPERIMENTAL VALUES:	
The solubility of water in the molten mixture NaNO <sub>3</sub> - Ca(NO <sub>3</sub> ) <sub>2</sub> (95 4.02 mol%) under the water vapor pressure 16 - 21 mm Hg is given as:	.98 -
t/°C 10 <sup>4</sup> x <sub>1</sub> /mol fraction	
298.67 20.0 ± 2.0	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
NaNO <sub>3</sub> containing less than 0.0	003%
Cryoscopic method. Of cation and less than 0.001% of A modified version of the anion impurities was air dried at	
previously described (2) 240°C for several days and then }	- y
cryoscopic apparatus was used. thermal shock technique (1). The	
carrier gas for water vapors.	alts
Freezing point of the same melt were mixed in proper amounts and	
sample was determined, first with melted. The melt was dried either	: by
nitrogen containing known partial stream of dry N <sub>2</sub> through the melt	: for
pressures of water. Solubility of 24 hr.	
water in the melt was calculated ESTIMATED ERROR:	
depression. Nothing specified.	
REFERENCES :	
1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , 251A 156.	
2. Rhodes, E.: Ubbelohde, A. R. <b>Trans. Faraday Soc.</b> <u>1959</u> , <b>55</b> , 170	)5.

COMPONENTS: (1) Water; H=0; [7732-18-5] (2) Poteasium nitrate; KNO <sub>3</sub> ; [10022-31-8] VARIABLES: P/KPa = 2.133 - 2.800 melt comp./mol% Ba(NO <sub>3</sub> ) <sub>2</sub> = 0.94 & 4.17 EXPERIMENTAL VALUES: The solubilities of water in the molten mixtures KNO <sub>3</sub> - Ba(NO <sub>3</sub> ) <sub>2</sub> at two different compositions under the water vapor pressure of 16 - 21 mm Ho are given as: Melt composition/ mol% Ba(NO <sub>3</sub> ) <sub>2</sub> t/°C mol fraction 0.94 332.13 6.0 1 2.0 4.17 322.64 4.2 2 2.0 METROD/AFFARATUS/FROCEDURE: Cryoscopic method. A modified form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the sale was calculated from the freezing point depression. NETRODAFFARMING/FROCEDURE: Cryoscopic method. A modified form of the previously reported (2) cryoscopic at r dried as above. The two salts we the mixed in proper ratio and melted. The melt was dried ated from the freezing point depression. Nothing specified. NETRENCES: 1. Rhodes, E.; Ubbelohde, A. R. Frans. Faraday Soc. 1959, 55, 1705.		•••	
<pre>(1) Water, H_0; (7732-18-5] (2) Profile and the set of the se</pre>	COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(3) having highly be and here and</pre>	<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.	
VARIABLES:       PREPARED BY:         melt comp./mol% Ba(NO_)_z = 0.94 & 4.17       N. P. Bansal         EXPERIMENTAL VALUES:       N. P. Bansal         The solubilities of water in the molten mixtures KNO Ba(NO_)_z at two different compositions under the water vapor pressure of 16 - 21 mm Hg are given as:       10 <sup>4</sup> x <sub>z</sub> /         Melt composition/ mol% Ba(NO_)_z       t/°C       mol fraction         0.94       332.13       6.0 ± 2.0         4.17       321.64       4.2 ± 2.0         0.94       332.13       6.0 ± 2.0         4.17       321.64       4.2 ± 2.0         KNO_ containing less than 0.0003         Cryoscopic method.         A modified form of the previously reported (2) cryoscopic         atried as any be was employed as the carrier gas for twater vapors. Freesing point of the same mett sample was employed as the carrier gas for the same mett sample was for the same mett solubility of water start of the sale abook. The two salts were mixed in proper ratio and method the meth freezing point depression.         REFERENCES:       I. Rhodes, E., Ubbelohde, A. R. Proc. Royal Soc. 1959, 251A, 156.         2. Rhodes, E., Ubbelohde, A. R. Trans. Faraday Soc. 1959, 55, 1705.       105.	<pre>(3) Barium nitrate; Ba(NO<sub>3</sub>)<sub>2</sub>; [10022-31-8]</pre>	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.	
MILLIARY INFORMATION         EXTENDA/APPARATUS/FROCEDURE:         Melt compositions         Melt compositions under the water vapor pressure of 16 - 21 mm He are given as:         Melt composition/ molb Ba(NO_s)_s         Melt composition/ molb Ba(NO_s)_s         Melt composition/ molb Ba(NO_s)_s         Melt composition/ molb Ba(NO_s)_s         10° x_/ molb Ba(NO_s)_s         V*°C         Melt composition/ molb Ba(NO_s)_s         10° x_2/ molb matchild form of the previously reported (2) cryoscopic methed. The melt was chelled the previously reported (2) cryoscopic methed. The melt was chelled with pure nitrogen, and then with nitrogen containing Rnown partial presersures of water. Solubility of water in the melt wa	VARTABLES :	PREPARED BY:	
EXPERIMENTAL VALUES: The solubilities of water in the molten mixtures KNO <sub>3</sub> - Ba(NO <sub>3</sub> ) <sub>2</sub> at two different compositions under the water vapor pressure of 16 - 21 mm Hy are given as: Melt composition/ 10 <sup>4</sup> X <sub>3</sub> / mol% Ba(NO <sub>3</sub> ) <sub>2</sub> t/°C mol fraction 0.94 332.13 6.0 ± 2.0 4.17 321.64 4.2 ± 2.0 METHOD/AFPARATUS/PROCEDURE: Cryoscopic method. A modified form of the previously reported (2) cryoscopic apparatus was used. Mitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression. Setting for the freezing point depression. METHOD/AFPARATUS/FILL (Setting Pressing a slow containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression. Setting for the freezing point depression. Setting for 24 br STIMATED ERROR: Nothing specified. Setting for the from the freezing point depression. Setting for the from the freezing point depression. Setting for the from the freezing point depression. Setting for the from the from the freezing point depression. Setting for the from	P/kPa = 2.133 - 2.800 melt comp./mol <sup>§</sup> Ba(NO <sub>3</sub> ) <sub>2</sub> = 0.94 & 4.17	N. P. Bansal	
The solubilities of water in the molten mixtures KNO <sub>3</sub> - Ba(NO <sub>3</sub> ) <sub>2</sub> at two different compositions under the water vapor pressure of 16 - 21 mm He are given as:         Melt composition/ mol% Ba(NO <sub>3</sub> ) <sub>2</sub> Melt composition/ determined, first with pure hitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression.         Nothing specified.         REFERENCES: 1. Rhodes, E., Ubbelohde, A. R. Trans. Faraday Soc. 1959, 251A, 156.	EXPERIMENTAL VALUES:		
Melt composition/ mol% Ba(NO <sub>3</sub> )2       10 <sup>4</sup> x <sub>1</sub> / mol fraction         0.94       332.13       6.0 : 2.0         4.17       321.64       4.2 : 2.0         4.17       321.64       4.2 : 2.0         METHOD/APPARATUS/PROCEDURE:       SOURCE AND PURITY OF MATERIALS: KNO <sub>2</sub> containing less than 0.0003 of cation and less than 0.0003 of cation period the period the thermal shock techn	The solubilities of water in the molten mixtures $KNO_3 - Ba(NO_3)_2$ at two different compositions under the water vapor pressure of 16 - 21 mm Ho are given as:		
0.94       332.13       6.0 ± 2.0         4.17       321.64       4.2 ± 2.0         AUXILIARY INFORMATION         METHOD/APPARATUS/PROCEDURE:         Cryoscopic method.         A modified form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen ontaining known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression.       SOURCE AND PURITY OF MATERIALS: KNO3 containing less than 0.0003 of cation and less than 0.001% of all dried as above. The two salts were mixed in proper ratio and melted. The melt was dried either by evacuation or by passing a slow stream of dry N, through the melt for 24 hr.         ESTIMATED ERROR:       ESTIMATED ERROR:         REFERENCES:       1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. 1959, 251A, 156.         2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. 1959, 55, 1705.	Melt composition/ mol% Ba(NO <sub>3</sub> ) <sub>2</sub>	10 <sup>4</sup> x <sub>1</sub> / t/°C mol fraction	
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: Cryoscopic method, A modified'form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression. Kefferences: 1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , 251A, 156. 2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.	0.94 4.17	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
AUXILIARY INFORMATIONMETHOD/APPARATUS/PROCEDURE:SOURCE AND PURITY OF MATERIALS: KNO3 containing less than 0.0003* of cation and less than 0.001% of anion impurities was air dried at 240°C for several days and then by the thermal shock technique (1). Ba(NO3)2 (Analytical Reagent) was air dried as above. The two salts were mixed in proper ratio and melted. The melt was dried either by evacuation or by passing a slow stream of dry N2 through the melt for 24 hr.REFERENCES: 1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. 1959, 251A, 156. 2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. 1959, 55, 1705.			
<pre>METHOD/APPARATUS/PROCEDURE: Cryoscopic method. A modified form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression.</pre> Source AND PURITY OF MATERIALS: KNO <sub>3</sub> containing less than 0.001% of anion impurities was air dried at 240°C for several days and then by by the thermal shock technique (1). Ba(NO <sub>3</sub> ) <sub>2</sub> (Analytical Reagent) was air dried as above. The two salts were mixed in proper ratio and melted. The melt was dried either by evacuation or by passing a slow stream of dry N <sub>2</sub> through the melt for 24 hr. ESTIMATED ERROR:	AUXILIARY	INFORMATION	
Cryoscopic method. A modified form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in the melt was calculated from the freezing point depression. Nothing specified. REFERENCES: 1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , 251A, 156. 2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
the melt was calculated from the freezing point depression.	Cryoscopic method. A modified form of the previously reported (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of water in	KNO <sub>3</sub> containing less than 0.0003% of cation and less than 0.001% of anion impurities was air dried at 240°C for several days and then by the thermal shock technique (1). Ba(NO <sub>3</sub> ) <sub>2</sub> (Analytical Reagent) was air dried as above. The two salts were mixed in proper ratio and melted. The melt was dried either by evacuation or by passing a slow stream of dry N <sub>2</sub> through the melt for 24 hr.	
REFERENCES: 1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , 251A, 156. 2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.	the melt was calculated from the freezing point depression.	ESTIMATED ERROR: Nothing specified.	
<ol> <li>Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u>, 251A, 156.</li> <li>Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u>, 55, 1705.</li> </ol>		REFERENCES :	
2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.		1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , <b>251A</b> , 156.	
		2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Cesium nitrate; CsNO<sub>3</sub>; [7789-18-6]</pre>	Frame,J. P.; Rhodes, E.; Ubbelohde, A. R.
<pre>(3) Barium nitrate; Ba(NO<sub>3</sub>)<sub>2</sub>; [10022-31-8]</pre>	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARTARLES .	PDEDADED BY.
P/kPa = 2.133 - 2.800 one temperature: T/K = 664	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water in the mo - 4.33 mol%) under the water vapor p	olten mixture $CsNO_3 - Ba(NO_3)_2$ (95.67 pressure of 16 - 21 mm Hg is given as:
t/°C 104	x <sub>1</sub> /mol fraction
391.00	6.3 ± 2.0
AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Cryoscopic method. A modified form of the previously described (2) cryoscopic apparatus was used. Nitrogen was employed as the carrier gas for water vapors. Freezing point of the same melt sample was determined, first with pure nitrogen, and then with nitrogen containing known partial pressures of water. Solubility of	$CsNO_3$ having less than 0.1% of all impurities was dried for several days in air at 240°C and then by the thermal shock technique. Ba(NO_3) <sub>2</sub> (Analytical Reagent) was air dried as above. The two salts were mixed in proper amounts and melted. The melt was dried either by evacuation or by passing a slow stream of dry nitrogen through the melt for 24 hr.
from the freezing point lowering.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :
	1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. <u>1959</u> , 251A, 156.
	2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Trudelle, M. C.; Abraham, M.; Sangster, J.
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	Can. J. Chem. <u>1977</u> , 55, 1713 - 1719.
<pre>(3) Thallium nitrate; TlNO<sub>3</sub>; [10102-45-1]</pre>	
VARIABLES: $\pi/\kappa = 371.5$	PREPARED BY:
1/K - 5/1.5	N. P. Bansal
EXPERIMENTAL VALUES:	
Henry's law constant, K <sub>H</sub> was ca	alculated from the equation :

 $f = f_{\omega}^{\circ} r_{\omega}^{\alpha} x_{\omega} = K_{H} x_{\omega}$ 

Where f is the fugacity of vapor,  $f_{\omega}^{\circ}$  is the fugacity of pure water  $r_{\omega}^{\alpha}$  is the activity coefficient of water at infinite dilution in the melt, and  $x_{\omega}$  is the mole fraction of water in the melt solution.

The value of  $K_{H}$  for water in the AgNO<sub>3</sub> - TlNO<sub>3</sub> melt (mol H<sub>2</sub>O)<sup>-1</sup> with Ag/Tl mole ratio of 1.14 at 100°C was calculated to be 1.3 atm. mol melt.

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measur- ement. For a description of the apparatus and the procedure,	SOURCE AND PURITY OF MATERIALS: Not given.
see the original paper.	
	ESTIMATED ERROR: Not specified.
	REFERENCES :

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Water; H <sub>2</sub> O; [7732-18-5]	Hull, H. S.; Turnbull, A. G.	
(2) Potassium nitrate; KNO <sub>3</sub> ;	T Drug Chor 1070 74 1793 97	
(3) Sodium nitrite; NaNO <sub>2</sub> ;	<b>5.</b> Figs. ciem. $1970$ , 74, 1783 - 87.	
[7632-00-0]		
VARIABLES: $\pi/\kappa = 416 - 551.6$	PREPARED BY:	
P/kPa = 0.667 - 3.200	N. P. Bansal	
EXPERIMENTAL VALUES:		
water in molten KNO <sub>3</sub> - NaNO <sub>2</sub> (46 - 5 temperature are:	4 mol%) mixture as a function of	
t/°C 10 <sup>5</sup> x <sub>3</sub>	/mol fraction torr <sup>-1</sup>	
142.9	61.0	
149.8	52.4	
160.1	38.1 24.2	
201.0	16.7	
220.9	8.12	
260.1	5.92	
	4.02	
Smoothed Data: The temperature dependence of $x_1$ can be expressed by the relation: $log(x_1/mol \ fraction \ torr^{-1}) = -7.782 + 1897/(T/K)$ (compiler) std. dev. = 1.2% (compiler) The heat of solution, $\Delta H$ , and entropy of solution, $\Delta S$ , are: $\Delta H/kJ \ mol^{-1} = -36.3$ (compiler) $\Delta S/J \ K^{-1} \ mol^{-1} = -38.5$ (compiler) at 523K.		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Elution method. At a fixed temperature, a	Analar reagent grade KNO <sub>3</sub> and NaNO <sub>2</sub> , air dried at 150°C, were	
known amount of the melt was	used.	
a stream of nitrogen which was		
presaturated with water to a known pressure After saturation		
the melt was sparged with dry		
nitrogen to strip water from the		
nitrogen and water was passed		
through two drying tubes containing magnesium perchlorate	ESTIMATED ERROR:	
and the amount of water absorbed	Nothing specified.	
was determined by the increase in weight of the drying tubes.	}	
	REFERENCES:	

	385	
COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrite; KNO<sub>2</sub>; [7757-79-1]</li> </ul>	Tripp, T. B. J. Electrochem. Soc. <u>1987</u> , <u>134</u> , 848 - 855.	
VARIABLES:	PREPARED BY.	
T/K = 383.15 - 402.66	N. P. Bansal	
EXPERIMENTAL VALUES: Vapor pressures of the melt system $LiNO_3 - KNO_2 - H_2O$ were measured at three different temperatures for three melt compositions and expressed as $R_L$ (moles $Li^+$ per mole of salt) as a function of the water mole ratio.		
Values of the Henry's law cons are given below at various temperat	stant $k_{H}$ for the composition $R_{L} = 0.5$ tures	
T/K k <sub>H</sub> /kl	Pa·mol salt·(mol $H_2O$ ) <sup>-1</sup>	
383.15 391.91 402.66	36.18 47.98 70.65	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A differential transpiration method, details of which have been described earlier(1), was used for vapor pressure measurements.	Reagent grade Lithium nitrate was dried at 423K for several days. Reagent grade Potassium nitrite was dried at 363K, pulverized, and redried at 373K.	
	ESTIMATED ERROR:	
	Not specified.	
	REFERENCES:	
	<ol> <li>Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u>, 73, <u>1984</u>.</li> </ol>	

COMDONENTS .	INDICINAL MEASUDEMENTS.
COMPORENTS	UNIONAL MEASUREMIS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Lithium chloride, LiCl:	Burkhard, W. J.; Corbett, J. D.
[7447-41-8]	J. Amer. Chem. Soc. <u>1957</u> , 79,
(3) Potassium chioride; KCI; [7447-40-7]	6361 - 63.
VARIABLES:	PREPARED BY:
P/kPa = 0.400 - 3.466	N. P. Bansal
water vapor press./mm = 3 - 26	
EXPERIMENTAL VALUES: The solubility of water in molter compositions at two temperatures are	n LiCl - KCl mixtures of different e:
	10 <sup>s</sup> x <sub>1</sub> /mol(mol of LiCl) <sup>-1</sup> mm <sup>-1</sup>
Melt Composition/ mol% LiCl	390°C 480°C
50.0	30.0 14.0*
53.0	11.8
68.6	10.8
Henry's law was obeyed upto a wa and 18 mm at 480°C. Smoothed Data: The values of heats of solution	ter vapor pressure of 14 mm at 390°C , $\Delta H$ , are:
Melt Composition/mol% L	iCl $\Delta H/kJ mol^{-1}$
50.0 60.0	-33.47 -46.02
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method.	LiCl from Baker or Baker and
Water vapors at a known pressure were introduced into the	Adamson, and KC1 from Baker were used.
system above the melt. The fall	The LiCl - KCl mixed melts were prepared in the dry state by using a
to the solubility in the melt was	modification of the procedure
noted. The solubility was calculated from initial and final	described by Lattinen et al. (1), which involved alternate evacuation
equilibrium values of the pressure.	and flushing with HCl gas a number of times.
F	
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	<ol> <li>Laitinen, H. A.; Ferguson, W. S.; Osteryoung, R. A.</li> </ol>
	J. Electrochem. Soc. <u>1957</u> , 104, 516.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Haug, H.; Albright, L. F.
[2] Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Ind. Eng. Chem. Proc. Des. Dev.
(3) Potassium chloride; KCl; [7447-40-7]	<u>1965</u> , 4, 241 - 49.
VARIABLES:	PREPARED BY:
one temperature: T/K = 598 P/kPa: 101.325 (1 atm.)	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water vapor at presence of 6 mol% Cl <sup>-</sup> ions at a sin in the original paper, is:	1 atm. pressure in molten $KNO_3$ in the ngle temperature, read from the graph
	$10^{5} x_{1}/$ m <sup>-1</sup> mol fraction torr <sup>-1</sup>
598 1.8 <del>*</del>	2.36*
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method. The melt was saturated with pure steam at a particular pressure. Steam dissolved in the melt was stripped with a stream of nitrogen and absorbed in tubes containing concentrated H <sub>2</sub> SO <sub>4</sub> .	Not described.
	ESTIMATED ERROR:
	solubility: ± 2% (authors)
	REFERENCES:

COMPONENTS :			ORIGINAL MEASUREMENTS:
(1) Water (2) Sodiu [1310 (3) Potas	; $H_2O$ ; [7732-18 m hydroxide; Nac -73-2] sium hydroxide; -59-21	-5] DH; KOH;	Al-Muslih, E; Iredale, P. J; Maund, J. K J. Chem. Eng. Data <u>1983</u> , 28, 245-246
[1310	-20-21	-	
VARIABLES:		<u> </u>	PREPARED BY:
T P/kI	/K = 523 - 723 KOH/ mol% = 36.9 Pa: 101.325 (com	9 piler)	N. P. Bansal
EXPERIMENTAL	VALUES:		
Value consistin Henry's L	s of Henry's Law g of 63.1 mole% aw : P <sub>H2</sub>	w constant fo NaOH and 36. $_{\rm P}$ = k N <sub>H2</sub>	r the solubility of water in a melt 9 mol% KOH were determined from
Where $P_{H,O}$ is the partial pressure of $H_2O$ in nitrogen, $N_{H,O}$ is the amount of $^{2}H_2O$ dissolved in the melt (mol kg <sup>-1</sup> ), and k is <sup>2</sup> the Henry's Law constant (atm mol <sup>-1</sup> kg). The values of k at various temperatures are given below:			f $H_2O$ in nitrogen, $N_{H_O}$ is the mol kg <sup>-1</sup> ), and k is <sup>2</sup> the Henry's Law f k at various temperatures are given
	T/K	107 k/atm mo	l <sup>-1</sup> Kg Std. dev.
	523 573 623 673	0.0095 0.0290 0.1200 0.3500	0.001 0.002 0.030 0.090
	723	0.6600	0.200
Temperature dependence of k is given by the relation: $\ln k = 10.8 - \frac{8081}{T}$			
		AUXILIARY	INFORMATION
METHOD/APPA	RATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Water - KOH mel were dete atures us For a dia details o the origi	solubilities in t of eutectic co rmined at varior ing a gravimetr: gram of the appa f the procedure nal paper.	n the NaOH omposition us temper- ic method. aratus and used see	AnalaR-grade NaOH and KOH were used. Cylinder N <sub>2</sub> was passed through a column of NaOH pellets (to remove $CO_2$ ) followed by another column containing Union Carbide "Type 4A" molecular sieve and self-indicating silica gel to remove H <sub>2</sub> O.
			ESTIMATED ERROR:
			Std. dev. 0.001 - 0.20(authors).
			REFERENCES:

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	Frame, J. P.; Rhodes, E.; Ubbelohde, A. R.
<pre>(3) Potassium dichromate; K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>; [7778-50-9]</pre>	<b>Trans. Faraday Soc.</b> <u>1961</u> , <b>57</b> , 1075 - 77.
VARIABLES: DUP. 0 100	PREPARED BY:
P/KPA = 2.133 - 2.800 one temperature: T/K = 602	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of water in the mo 1.9 mol%) at water vapor pressure of	olten mixture $KNO_3 - K_2Cr_2O_7$ (98.1 - E 16 - 21 mm Hg is given to be:
t/°C 10'	* x <sub>1</sub> /mol fraction
329.05	6.0 ± 2.0
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cryoscopic method. A modified version of the Previously described (2)	$KNO_3$ containing less than 0.0003% of cation and less than 0.001% of anion impurities was air dried at 240°C for several days and then by
Cryoscopic apparatus was used.	the thermal shock technique (1).
Carrier gas for water vapors.	Analytical Reagent grade. The two
Freezing point of the same melt sample was determined. first with	salts were mixed in proper amounts and melted. The melt was dried either
pure nitrogen, and then with	by evacuation or by passing a slow
pressures of water. Solubility of	melt for 24 hr.
Water in the melt was calculated	ESTIMATED ERROR:
depression.	Nothing specified
	REFERENCES :
	1. Rhodes, E.; Ubbelohde, A. R. Proc. Royal Soc. 1959, 251A 156.
	2. Rhodes, E.; Ubbelohde, A. R. Trans. Faraday Soc. <u>1959</u> , 55, 1705.

COMPONENTS .	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Marassi, R.; Bartocci, V.;
(2) Sodium acetate; CH <sub>3</sub> COONa;	Pucciarelli, F. Cescon, P.
$\begin{bmatrix} 127-09-3 \end{bmatrix}$	J Fleatroanal Chem 1973 47
[127-08-2]	509 - 19.
WADTADT FC .	DEDADED DV.
T/K = 527 - 561	FREFARED DI:
melt comp./mol% CH <sub>3</sub> COONa = 46.3	N. P. Bansal
P/kPa = 0.267 - 2.000	
EXPERIMENTAL VALUES:	
For the solubility of water vapor acetate mixture (46.3 - 53.7 mol%), vapor pressures upto 20 torr in the values of solubility, C1, at differe	s in molten sodium acetate - potassium Henry's law was obeyed for water temperature range 527 - 561 K. The ent temperatures are:
T/K 10 <sup>3</sup> (	C1/mol kg <sup>-1</sup> torr <sup>-1</sup>
	1 12
531.2	1.04
537.8	0.94
545.9	0.81
554.5	0.69
560.9	0.63
Smoothed Data:	
The temperature dependence of C i	s given by the expression:
log(C <sub>1</sub> /mol kg <sup>-1</sup> torr <sup>-1</sup> )	= -7.148 + 2213.7/(T/K) (compiler)
The heat of solution, $\Delta H$ , and the	e entropy of solution, AS, are:
$AH/KJ MOI - = AS/J K^{-1} moi$	$-42.7 \pm 1.20$ $0^{-1} = -48.5$ (at 523 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Prossure measuring technique	Persont grade codium agentate and
The diagram of the apparatus.	potassium acetate from Carlo Erba
which is a slight modification of	(Milan) were used without further
the one described earlier (1), is	purification.
melt was evacuated for a long	N <sub>-</sub> atmosphere, dried with liquid air
time for degassing. The vacuum	and molecular sieves and freed from
was disconnected and water vapors	oxygen. N <sub>2</sub> was bubbled through the
introduced. The melt was stirred	for several hours. A clear water free
vigorously and the system allowed	melt was obtained
to come to equilibrium. The	ESTIMATED ERROR:
in the melt was calculated from	Nothing specified.
the equilibrium pressure.	Liebhang Speetreet.
]	REFERENCES:
	<ol> <li>Zambonin, P. G.; Cardetta, V. L.; Signorile, G.</li> </ol>
	<b>J. Electroanal. Chem.</b> <u>1970</u> , <b>28</b> , 237.

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>;</pre>	Duke, F. R.; Doan, Jr., A. S.
<pre>(3) Sodium nitrate; NaNO<sub>3</sub>;</pre>	Iowa State Coll. J. Sci. <u>1958</u> , 32,
<pre>[7631-99-4] (4) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	451 - 53.
VARIABLES: P/kPa = 7.999 (max)	PREPARED BY:
T/K = 418 - 513 melt comp./mol% LiNO <sub>3</sub> = 12.5 - 86.9	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities of water vapors mixtures of different compositions given as:	in molten LiNO3 - NaNO3 - KNO3 and at different temperatures are
Composition of LiNO <sub>3</sub> - NaNO <sub>3</sub> - KNO <sub>3</sub> Melt/mol%	10 <sup>6</sup> x <sub>1</sub> / t/°C mol(mol of Li <sup>+</sup> ) <sup>-1</sup> (mm Hg) <sup>-1</sup>
12.5 - 46.4 - 41.1	240 1.02
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	240 2.07 240 2.50
46.7 - 28.2 - 25.1	240 10.0
86.9 - 6.9 - 6.2	240 27.4
30.0 - 23.0 - 47.0	145 23.8 170 13.0
	175 8.8
	continued
AUXILIARY	INFORMATION
ME THOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Manometric method. Water vapors at the desired pressure were let into the apparatus above the melt. The fall in the pressure of water vapors, due to its solubility in the melt, was recorded as a function of time till equilibrium was reached. The amount of water dissolved in the melt was calculated from the initial and	Not described. About 10 g of the salt mixture was taken and vacuum dried. The temperature was slowly raised above the melting point and brought to the working temperature. Evacuation of the melt was continued for several hours to ensure complete drying.
tinal values of the pressure.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	Duke, F. R.; Doan, Jr., A. S.
(3) Sodium nitrate; NaNO <sub>3</sub> ;	Iowa State Coll. J. Sci. <u>1958</u> , 32,
<pre>(4) Potassium nitrate; KNO<sub>3</sub>;</pre>	451 - 53.
[7757-79-1]	
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
Temperature dependence of $x_1$ for LiNO <sub>3</sub> - NaNO <sub>3</sub> - KNO <sub>3</sub> (30 - 23 - 47 m relation:	the solubility of water in molten nol%) can be expressed by the
$\log(x_1/\text{mol}(\text{mol of }\text{Li}^+)^{-1}(\text{mm Hg})^{-1})$	<pre>c) = -11.592 + 2932/(T/K) (compiler)</pre>
std. dev	r. = 7.5% (compiler)
The enthalpy of solution, AH, of (30 - 23 - 47 mol%) is:	water in molten LiNO3 - NaNO3 - KNO3
∆H/kJ mol <sup>-1</sup> =	-54.39 ± 16.7
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES :
	1

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Tripp, T. B.
(2) Lithium nitrate; LiNO <sub>3</sub> ;	J. Electrochem. Soc. <u>1987</u> , <u>134</u> , 848 - 855
(3) Potassium nitrate; KNO <sub>3</sub> ;	640 - 0551
[7757-79-1]	
[7631-99-4]	
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 383.15 - 412.77	N. P. Bansal
EXPERIMENTAL VALUES:	
Vapor pressures of the melt syst 0.18 NaNO <sub>3</sub> - $H_2O$ were measured at for water mole ratio in the melt.	tem 0.41 LiNO <sub>3</sub> - 0.41 KNO <sub>3</sub> - bur temperatures as a function of the
Values of the Henry's law constant are given below :	
T/K k <sub>H</sub> /kI	$P_a$ ·mol salt·(mol $H_2O$ ) <sup>-1</sup>
	24.60
383.15 391.91	34.69 46.92
402.66	66.87
412.77	91.89
to be 43.1 kJ mol <sup>-1</sup> .	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A differential transpiration method, details, of which have been described earlier(1), was used for Vapor pressure measurements.	Reagent grade lithium nitrate was dried at 423K for several days. NaNO <sub>3</sub> and KNO <sub>3</sub> , both of reagent grades, were dried at 383K for at least 24h.
	ESTIMATED ERROR:
	Not specified.
	Not specified.
	Not specified. REFERENCES: 1. Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u> , 73, <u>1984</u> .
	Not specified. REFERENCES: 1. Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u> , 73, <u>1984</u> .





COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>; [7700-60-41]</pre>	Tripp, T. B. J. Electrochem. Soc. <u>1987</u> , <b>134</b> , 248 - 255
<pre>(3) Potassium nitrate; KNO<sub>3</sub>;</pre>	646 - 655.
<pre>[7757-79-1] (4) Calcium nitrate; Ca(NO<sub>3</sub>)<sub>2</sub>; [10124-37-5]</pre>	
MADTADIEC.	
P/kPa: 101.325 (compiler)	FREFARED DI:
T/K = 402.66	N. P. Bansal
EXPERIMENTAL VALUES:	rate = 0.473  tino = 0.473  kmo =
$(NO_3)_2 - H_2O$ as a function of presented in Fig.	of water mole ratio in the melt are
\$0[	
WATER VAPOR PRESSURE	
U U U U U U U U U U U U U U U U U U U	
30	
SUBRE C	/ 1
L L L L L L L L L L L L L L L L L L L	
	4
10 -	_
	0.8 0.8 10
WATER MOLE RATIO (r	nole H_O/sait)
FIG. Vapor pressures of the me	lt system 0.472LiNO3 - 0.472KNO3 -
$0.056Ca(NO_3)_2 - H_2O$ at 402.66K as a the melt.	function of water mole ratio in
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A differential transpiration	Reagent grade lithium nitrate
method, details of which have been described earlier(1), was used for	Was dried at 423K for several days.
vapor pressure measurements.	at 383K for at least 24h.
	Reagent grade calcium nitrate
	ator over magnesium perchlorate for
	several weeks.
	ESTIMATED ERROR:
	Not specified.
	DEPENDING
	KLFERENCES:
	1. Tripp. T. B.: Braunstein. J.
	J. Phys. Chem. 1969, 73, 1984.

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Water; $H_2O$ ; [7732-18-5]	Abraham, M. C.; Abraham, M.;	
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	Sangster, J. J. Chem Eng. Data 1980, 25, 331 -	
(3) Thallium nitrate; TlNO <sub>3</sub> ;	332.	
[10102-45-1] (4) Sodium nitrate; Na(NO <sub>2</sub> );		
[7631-99-4]		
VARIABLES:	PREPARED BY:	
T/K = 371.5	N. P. Bansal	
P/kPa: 101.325 (compiler)		
EXPERIMENTAL VALUES:		
In the $AgNO_3 - TINO_3 - NaNO_3$ melts, the $Ag/TI$ mol ratio was fixed at 1.06. Various melt compositions were prepared by adding 0, 2.5, 5.0, 7.5 and 10.1 mol% of NaNO <sub>3</sub> to the melt.		
Henry's law constant, K <sub>H</sub> was cal	culated from the equation :	
f = f <sub>w</sub> ° r <sub>w</sub> °	$x_{\omega} = K_{H} x_{\omega}$	
Where f is the fugacity of var	oor. fº is the fugacity of pure water	
$r_{\omega}^{\alpha}$ is the activity coefficient of water at infinite dilution in the melt and $x_{\omega}$ is the mole fraction of water in the melt solution.		
Values of K <sub>H</sub> at 98.5 °C for va	rious melt compositions are given	
Melt comp*/mol % NaNO <sub>3</sub>	$K_{H}/atm.$ mol melt (mol $H_2O)^{-1}$	
	1 25	
2.5	1.18	
5	1.12	
10.1	1.02	
• • (		
* Ag/Tl mol ratio = 1.06		
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
A static method was used for	NaNO <sub>3</sub> (Anachemia Reagent) was	
vapor pressure measurements details of which have been described earli-	used without further treatment.	
er(1).	ation has been reported earlier(2).	
1		
ł		
	ESTIMATED ERROR:	
	Not specified.	
	REFERENCES :	
	1. Truddelle, M. C.; Abraham. M.	
	Sangster, J.	
	2. Abraham, M. C.; Abraham, M.;	
1	Sangster, J. J. Sol Chom. 1070 9 647	
1	1.501. citem. $19/9$ , 8, 64/.	

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Components :	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Abraham, M. C.; Abraham, M.;
(2) Silver nitrate; AgNO <sub>3</sub> ;	Sangster, J.
[7761-88-8]	<b>Can. J. Chem.</b> <u>1978</u> , <b>56</b> , 635 - 637.
(3) Thallium nitrate; TINO <sub>3</sub> ;	
$\begin{bmatrix} 10102-43-1 \end{bmatrix}$	
[10325-94-7]	
VARIABLES:	PREPARED BY:
T/K = 371.5	N. P. Bansal
P/kPa: 101.325 (compiler)	
POPEDINENTAL VALUES.	l
APERIMENTAL VALUES.	
Henry's law constant, K <sub>H</sub> was ca.	iculated from the equation :
$f = f_{\omega}^{\circ} r_{\omega}^{\circ}$	$\mathbf{x}_{\omega} = \mathbf{K}_{\mathbf{H}} \mathbf{x}_{\omega}$
Where f is the fugacity of vap at temperature, $r_{\omega}^{\alpha}$ is the activity dilution in the melt, and $x_{\omega}$ is the solution	por, $f_w^\circ$ is the fugacity of pure water coefficient of water at infinite mole fraction of water in the melt
Values of $K_{H}$ at 98.5 °C for values of k at	arious melt compositions are given
	$R_{\rm H}/4$ cm. not mett (not $R_2$ 0)
0	1 25
5	0.770
7.5	0.662
10	0.514
12.5	0.442
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS.
A static technique was used for vapor pressure measurements details of which have been descri- bed earlier(1).	Cd(NO <sub>3</sub> ) <sub>2</sub> ·4H <sub>2</sub> O (Fisher, 99.9%) was used.
In the melt, Ag/T1 mole ratio was fixed at 1.06 and the mole fractions of Cd, Cd/(Ag+T1+Cd), of Cd in the melt were varied 0, 0.05, 0.075, 0.10, and 0.125 by adding	
caumium nitrate.	
	ESTIMATED ERROR:
	Not specified
	Not specified.
	REFERENCES :
	REFERENCES :
	REFERENCES: 1. Truddelle, M. C.; Abraham, M.
	REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J.
	REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J. Can. J. Chem. <u>1977</u> , 55, 1713.
	REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J. Can. J. Chem. <u>1977</u> , 55, 1713.

COMPONENTS: (1) Water, H.O. [7732-18-5]		
(1) Water, $H \cap [7732-18-51]$	ORIGINAL MEASUREMENTS:	
(1) Watter, 1120, [//52 10 5]	Abraham, M. C.; Abraham, M.;	
<pre>(2) Silver nitrate; AgNO<sub>3</sub>;</pre>	Sangster, J.	
$\begin{bmatrix} 7761-88-8 \end{bmatrix}$	J. Sol Chem. $1979$ , 8, 647 - 654.	
[10102-45-1]		
(4) Cesium nitrate; CsNO <sub>3</sub> ;		
[7789-18-6]		
VADTADIEC.	PDEDADED BY.	
T/K = 371.5	N. P. Bansal	
$P/kP_{2}$ , 101 225 (compiler)		
P/KPa: 101.525 (Compiler)		
EXPERIMENTAL VALUES:		
Henry's law constant, $K_{H}$ was calculated from the equation :		
$f = f \circ r$	* v = K v	
	$\Lambda_{\omega} = \Lambda_{H} \Lambda_{\omega}$	
Where f is the fugacity of vapor, $f_{\omega}^{\circ}$ is the fugacity of pure wates $r_{\omega}^{\alpha}$ is the activity coefficient of water at infinite dilution in the melt, and $x_{\omega}$ is the mole fraction of water in the melt solution.		
Value of K. at 98.5 °C for va	rious melt compositions are given	
below:		
Melt comp*/mol % CsNO	K./atm. mol melt (mol $H_{-}O)^{-1}$	
0 2 45	1.25	
5	1.30	
7.5	1.33	
10	1.36	
•·····		
* $Ag/TI mol ratio = 1.06$	•	
AUXILIARY	INFORMATION	
AUXILIARY METHOD/APPARATUS/PROCEDURE:	INFORMATION SOURCE AND PURITY OF MATERIALS;	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO3 (99.99% Macco or 99.98%	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli-	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/T1 mole ratio	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories)	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TlNO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio Was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/T1 mole ratio Was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+T1+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio Was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered through sintered glass, and stored	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for Vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in Vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. T1NO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. EFFERENCES.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TlNO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. REFERENCES:	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. REFERENCES: 1. Truddelle, M. C., Abraham M	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS; AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/Tl mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+Tl+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J. Can. J. Chem. <u>1977</u> , 55, 1713.	
AUXILIARY METHOD/APPARATUS/PROCEDURE: A static technique was used for vapor pressure measurements details of which have been described earli- er(1). In the melt, Ag/T1 mole ratio was fixed at 1.06 and the mole fractions of Cs, Cs/(Ag+T1+Cs), in the melt were 0, 2.45, 5, 7.5, and 10. The salt mixture was prepared by weighing and dried at 200°C in vacuo. The melt was filtered through sintered glass, and stored in a closed vessel in an air oven at 120 °C.	INFORMATION SOURCE AND PURITY OF MATERIALS: AgNO <sub>3</sub> (99.99% Macco or 99.98% Engelhard was used without further treatment. TINO <sub>3</sub> (Alfa) was recrystallized from water and dried at 120°C. CSNO <sub>3</sub> (99.9% K&K Laboratories) was used as received. ESTIMATED ERROR: Not specified. REFERENCES: 1. Truddelle, M. C.; Abraham, M. Sangster, J. Can. J. Chem. <u>1977</u> , 55, 1713.	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</pre>	Tripp, T. B. Proc. Electrochem. Soc. <u>1984</u> , <b>84</b> , 403 - 410.	
<pre>(3) Potassium nitrite; KNO<sub>2</sub>;     [7758-09-0]</pre>		
<pre>(4) Sodium nitrite; NaNO<sub>2</sub>; [7632-00-0]</pre>		
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:	
T/K = 383.00 - 422.51	N. P. Bansal	
EXPERIMENTAL VALUES:		
The Henry's law constant, $k_{H}$ , was $k_{H} = p_{H_{2}O}/R_{H}$	calculated from :	
Where $p_{H_2O}$ is the vapor pressure(torr) of water in the gas phase, $R_{H}$		
is the water mole ratio in the melt. Values of $k_{\rm H}$ for the solubility of water in 0.52LiNO_3 - 0.17KNO_2 - 0.31NaNO_2 melt at various temperatures are given below :		
t/°C k <sub>H</sub> /torr(mol	of water) <sup>-1</sup> .mole of cation	
110.00	212.8	
118.76	292.5	
139.61	578.2	
149.51	761.3	
of water from the mert was calculated to be 10.4 kdaf/mor		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A differential transpiration method, the details of which have been described previously(1,2).	LiNO <sub>3</sub> (Alfa Products Co.) was dried for 24h. at 150°C. KNO <sub>2</sub> and NaNO <sub>2</sub> both from Alfa Products Co. were dried at 850°C for a minimum of 48h.	
	ESTIMATED EDDOD.	
	Uncertainty in $p_{H_2O} = \pm 1$ torr.	
	REFERENCES:	
	<ol> <li>Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u>, 73, <u>1984</u>.</li> <li>Tripp, T. B. in "Molten Salts", The Electrochem Soc., <u>1976</u>, p. 560.</li> </ol>	

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Tripp, T. B.
<pre>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</pre>	<b>J. Electrochem. Soc.</b> <u>1987</u> , <u>134</u> , 848 - 855.
(3) Potassium nitrite; KNO <sub>2</sub> ;	
[7758-09-0] (4) Sodium nitrite; NaNO <sub>2</sub> :	
[7632-00-0]	
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 383.15 - 422.66	N. P. Bansal
EXPERIMENTAL VALUES:	
Vapor pressures of the melt sy -H <sub>2</sub> O were measured at five tempera	ystem $0.52LiNO_3-0.31KNO_2-0.17NaNO_2$ atures as a function of water mole ratio.
Values of the Henry's law constant $k_{H}$ at various temperatures are given below :	
T/K k <sub>m</sub>	$/kP_a \cdot mol salt \cdot (mol H_2O)^{-1}$
383.15	28.06
391.91	38.56
402.66	54.00 76.45
422.66	100.60
AUXILIARY INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
A differential transpiration method, details of which have been described earlier(1), was used for vapor pressure measurements.	Reagent grade lithium nitrate was dried at 423K for several days. Reagent grade KNO <sub>2</sub> was dried overnight at 363K, pulverized, and and redried at 373K. NaNO <sub>2</sub> , reagent grade, was dried at 383K for at least 24h.
)	ESTIMATED ERROR:
	Not specified.
	REFERENCES :
	<ol> <li>Tripp, T. B.; Braunstein, J. J. Phys. Chem. <u>1969</u>, 73, <u>1984</u>.</li> </ol>

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	Haug, H.; Albright, L. F.
(3) Potassium nitrate; KNO <sub>3</sub> ;	Ind. Eng. Chem. Proc. Des. Dev.
(4) Potassium chloride; KCl; [7447-40-7]	<u>1965</u> , <b>4</b> , 241 - 49.
VARIABLES:	PREPARED BY:
T/K = 489 & 523 mol% Cl <sup>-</sup> in the melt = 2 - 5	N. P. Bansal
P/kPa: 101.325 (1 atm.)	
EXPERIMENTAL VALUES:	
The solubilities of water vapor a mixture NaNO <sub>3</sub> - KNO <sub>3</sub> (54.3 - 45.7 m of Cl <sup>-</sup> ions (2 - 5 mol%) have been p The values derived from the graph, b	at 1 atm. pressure in the molten ol%) containing various concentrations reported in a graphical form. by the compiler, are:
conc. of Cl <sup>-</sup> in T/K the melt/mol% fi	$10^{2} x_{1}/mol \qquad 10^{5} x_{1}/mol$ raction atm <sup>-1</sup> fraction torr <sup>-1</sup>
523 2.0 489 5.0	5.0 6.6 8.5 11.2
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Stripping method. The melt was saturated with steam at a particular pressure. The steam dissolved in the melt was stripped with a stream of nitrogen and absorbed in tubes containing concentrated $H_2SO_4$ .	Not described.
	ESTIMATED ERROR:
	solubility: ± 2% (authors)
	REFERENCES:

	405
COMPONENTS:	ORIGINAL MEASUREMENTS:
[11105-15-0]	Tripp, T. B.
[7790-69-4]	J. Chem. Thermodyn. <u>1975</u> , 7, 263 -
<pre>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	69.
VARIABLES:	PREPARED BY:
T/K = 383 - 422 P/kPa: 101.325 (compiler)	N. P. Bansal
EXPERIMENTAL VALUES:	l <sub>e</sub>
Henry's law was obeyed for the so $D_2O$ in molten LiNO <sub>3</sub> - KNO <sub>3</sub> (50 - 50 temperatures are:	olubility of D <sub>2</sub> O. The solubilities of mol%) mixture at different
T/K 10 <sup>4</sup> X <sub>1</sub> ,	/mol fraction torr <sup>-1</sup>
383.15	41.9
391.91 402.66	30.5
412.76	15.4
422.66	11.4 
std. dev The enthalpy of solution, AH, is: AH/kJ mol <sup>-1</sup>	<pre>v. = 0.2% (compiler) . = -44.4 ± 0.4</pre>
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Vapor pressure measurements. The solubilities of $D_2O$ have been indirectly derived from vapor pressure measurements of the LiNO <sub>3</sub> - KNO <sub>3</sub> - $D_2O$ system using a differential transpiration method described elsewhere (1).	Lithium and potassium nitrates, Mallinckrodt AR grade, were dried at 520 K. D <sub>2</sub> O (99.9 mol%) was provided by Oak Ridge National Lab.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Tripp, T. B.; Braunstein, J.
	J. Phys. Chem. 1969, 73. 1984.
	1

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Hydrogen sulfide; $H_2S$ ;	211.011 i C
(2) Lithium nitrate: LiNO.	Aliuili, S.
[7790-69-4]	J. Phys. Chem. 1969. 73, 1084 - 87.
(3) Potassium nitrate; KNO <sub>3</sub> ;	<u> </u>
[7757-79-1]	
WADTADT PC .	
VARIADLES:	PREPARED BI:
one temperature: $T/K = 433$	N. P. Bansal
EXPERIMENTAL VALUES.	
too small (<10 <sup>-7</sup> mol(mol of melt) <sup>-1</sup> experimental method employed.	torr <sup>-1</sup> ) to be measured with the
AUXILIARY	INFORMATION
METHOD /APPARATUS /PROCEDURE •	SOURCE AND DURITY OF MATERIALS.
	CONTRACT OF TATENTALS;
Manometric technique.	H <sub>2</sub> S (98%) from Rivoira was used without further purification. LiNO <sub>3</sub> (ERBA RP) was dehydrated at 70°C to avoid hydrolysis. KNO <sub>3</sub> (ERBA RP) was finely powdered and vacuum dried at 110°C for 24 hr.
1	ESTIMATED ERROR:
	Nothing specified
	worning sheetited.
	DEFEDENCIE
	REFERENCES:

COMPONENTS:	EVALUATOR:
<pre>(1) Ammonia; NH<sub>3</sub>; [7664-41-7] (2) Lithium nitrate; LiNO<sub>3</sub>;      [7790-69-4]</pre>	N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.

## CRITICAL EVALUATION:

Two independent studies (1,2) have been reported for the solubility of ammonia in molten lithium nitrate. Results from the two investigations, compared below in Fig. 1, are seen to be quite different. Tentative solubilities based on ref. (2) are given in Table 1. Further Studies are needed to evaluate this system.



## 406

COMPONENTS: (1) Ammonia; NH <sub>3</sub> ; [7664-41-7] (2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	EVALUATOR: N. P. Bansal National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio, 44135. U.S.A. December, 1989.
CRITICAL EVALUATION:	Nesser :

## Table 1

Tentative Solubilities as a Function of Temperature

т/к	10 <sup>6</sup> K <sub>H</sub> /mol cm <sup>-3</sup> torr <sup>-1</sup>	$10^{5} x_{1}/mol$ fraction torr <sup>-1</sup>
530	(3.6)	(13.8)
540	2.7	10.5
550	2.1	8.0
560	1.6	6.2
570	1.2	4.8
580	0.96	3.8
590	(0.76)	(3.0)

 $\mbox{Values in}$  ( ) outside temperature interval of experimental measurement; extrapolated by the evaluator.

References:

1. Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I 1973, 69, 2019.

2. Allulli, S. J. Phys. Chem. <u>1969</u>, 73, 1084.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Paniccia, F.; Zambonin, P. G.
(2) Lithium nitrate; LiNO₃; [7790-69-4]	J. Chem. Soc. Faraday Trans. I <u>1973</u> , 69, 2019 - 25.
VARIABLES:	PREPARED BY:
T/K = 523 & 623	N. P. Bansal
P/kPa = 10 - 40	
EXPERIMENTAL VALUES:	
Solubilities of ammonia were meas of various compositions. A linear re- logarithm of $x_1$ and the melt composi- in pure molten LiNO <sub>3</sub> at two temperat	sured in molten $LiNO_3 - KNO_3$ mixtures elationship was observed between the itions. The extrapolated values of $x_1$ cures are:
T/K 10 <sup>2</sup> x <sub>1</sub> /	mol fraction bar <sup>-1</sup>
523	6.6
623	1.2
Smoothed Data:	
AS°, are reported to be:	the standard entropy of solution,
∆H/kJ mo]	- <sup>-</sup> = -55.0
	101 - = -65.0 (at 623 K)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;
Extrapolated from the solubility data of ammonia in lithium nitrate - potassium nitrate mixtures. Gas solubilities in the mixed nitrates were measured by the manometric technique (1,2).	Anhydrous ammonia (Matheson) was used without further treatment. Reagent grade lithium nitrate (Carlo Erba, Milan) was used without further purification.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardetta, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Allulli, S.	
(2) Lithium nitrate; LiNO <sub>3</sub> ;	J. Phys. Chem. <u>1969</u> , 73, 1084 - 87.	
[7790-69-4]		
VARIABLES: $\pi/\kappa = 533 - 588$	PREPARED BY:	
P/kPa = 0.667 - 6.666	N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubility of ammonia in molt values of Henry's law constant, K <sub>H</sub>	en LiNO3 obeyed Henry's law. The at different temperatures are:	
t/°C 10 <sup>5</sup> X <sub>1</sub> /mol fraction	mm <sup>-1</sup> 10 <sup>6</sup> K <sub>H</sub> <sup>A</sup> /mol cm <sup>-3</sup> mm <sup>-1</sup>	
260 12.5	3.22	
283 7.05 303 4.1	1.80 1.04	
315 3.1	0.79	
• Values calculated by the compiler G. J., Molten Salts Handbook, Acad	using density data from: Janz, emic Press, New York, <u>1967</u> , 42.	
The temperature dependences of $K_{H}$ and $x_1$ are given by the expressions: $log(K_{H}/mol cm^{-3} mm^{-1}) = -12.08 + 3516/(T/K)$ (compiler) $log(x_1/mol fraction mm^{-1}) = -10.41 + 3472/(T/K)$ (compiler) std. dev. = 1.2% (compiler) The enthalpy of solution, $^{A}$ H, and entropy of solution, $^{A}$ S, are: $^{A}$ H/kJ mol <sup>-1</sup> = -69.04 $^{A}$ S/J K <sup>-1</sup> mol <sup>-1</sup> = -127.2 (at 543 K)		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric method.	Ammonia supplied by Matheson Co.	
The details of the procedure	purification. Its purity, checked by	
employed for solubility measurements have been given in	mass spectroscopy, was better than	
the original paper. In brief,	LiNO <sub>3</sub> (ERBA RP) was dehydrated	
ammonia was let into the system above the melt to the desired	at 70°C to avoid hydrolysis.	
pressure. The drop in gas pressure due to its solubility in the melt		
was recorded as a function of time		
pressure was attained. The	ESTIMATED ERROR:	
number of moles of the gas dissolved in the melt was	Nothing specified.	
calculated.		
	REFERENCES:	

COMPONENTE -	OPTCINAL WEASUPENER	
COMPONENTS:	ORIGINAL REASUREMENTS:	
(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Paniccia, F.; Zambonin, P. G.	
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631- 99-4]	J. Chem. Soc. Faraday Trans. I <u>1973</u> , 69, 2019 - 25.	
VARIABLES: T/K = 588 - 653 P/kPa = 10 - 40	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES:		
The solubilities of ammonia in molten sodium nitrate as a function of temperature are presented in graphical form in the original paper. The values of $x_1$ derived from this graph by the compiler are:		
T/K 10 <sup>4</sup> x	1/mol fraction bar <sup>-1</sup>	
588 591 612 624 637 653	14.1 13.4 11.6 10.9 9.5 8.5	
Smoothed Data: Temperature dependence of $x_1$ may be expressed by the equation: $log(x_1/mol \ fraction \ bar^{-1}) = -4.988 + 1254.3/(T/K)$ (compiler) std. dev. = 0.9% (compiler) The enthalpy of solution, $\wedge H$ , and the standard entropy of solution, $\wedge S^\circ$ , are: $\wedge H/kJ \ mol^{-1} = -23.0$ $\wedge S^\circ/J \ K^{-1} \ mol^{-1} = -34.0$ (at 623 K)		
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Manometric method. The experimental details have been described elsewhere (1,2). In brief, the apparatus was evacuated and then ammonia gas was introduced into the system at about one bar pressure. The initial gas pressure was immediately noted. The melt was vigorously stirred and the fall in gas pressure due to its solubility	Anhydrous ammonia (Matheson) was used without further treatment. Reagent grade sodium nitrate (Carlo Erba, Milan) was used as received.	
in the melt was continuously recorded till equilibrium was attained. The final gas pressure was noted and the Henry's law Constant was evaluated.	ESTIMATED ERROR: Nothing specified.	
	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardette, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.	

Γ	COMPONENTS :	ORIGINAL MEASUREMENTS :
ľ	CONFORMATO .	
	(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Paniccia, F.; Zambonin, P. G.
	(2) Potassium nitrate; KNO₃; [7757-79-1]	<b>J. Chem. Soc. Faraday Trans. I</b> <u>1973</u> , <b>69</b> , 2019 - 25.
ł	VARIABLES:	PREPARED BY:
	T/K = 619 - 680	
	P/kPa = 10 - 40	N. P. Bansal
┟	EXPERIMENTAL VALUES:	
	The solubilities of ammonia in mo of temperature are presented in grap publication. The values of $x_1$ derive are:	lten potassium nitrate as a function hical form in the original d from this graph by the compiler
	T/K 10 <sup>4</sup> X <sub>1</sub>	/mol fraction bar <sup>-1</sup>
	619	5.6
	640	5.2
	654 673	5.3 4.9
	Temperature dependence of x <sub>1</sub> coul log(x <sub>1</sub> /mol fraction bar <sup>-1</sup> std. dev The enthalpy of solution, <sup>Δ</sup> H, and <sup>Δ</sup> S°, are: <sup>Δ</sup> H/kJ mol ΔS°/J K <sup>-1</sup> m	<pre>d be given by the expression: ) = -4.117 + 542.9/(T/K) (compiler) . = 1.3% (compiler) the standard entropy of solution, -1 = -11.0 ol<sup>-1</sup> = -23.0 (at 623 K)</pre>
	AUXILIARY	INFORMATION
	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	Manometric method. The details of the experimental procedure are given elsewhere (1,2). In brief, the apparatus was evacuated and then ammonia gas was introduced into the system at about one bar pressure. The initial gas pressure was quickly noted. The melt was vigorously stirred and the fall in gas pressure due to its dissolution in	Anhydrous ammonia (Matheson) was used without further treatment. Reagent-grade potassium nitrate (Carlo Erba, Milan) was used without further purification.
	the melt was continuously	ESTIMATED ERROR:
	attained. The final gas pressure was noted and Henry's law constant was computed.	
	-	REFERENCES:
		1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardette, V. L.; Signorile, G. J. Electroanal. Chem.Chem. <u>1970</u> , 28, 237

<pre>(1) Ammonia; NH<sub>3</sub>; [7664-41-7] (2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1] VARIABLES: T/K = 475 - 560 P/kPa = 10 - 40 EXPERIMENTAL VALUES: The solubility of ammonia in the 33.33, 85-15 mol%) mixtures as a fun graphical form in the original paper graph by the compiler are:</pre>	Paniccia, F.; Zambonin, P. G. J. Chem. Soc. Faraday Trans. I <u>1973</u> , 69, 2019 - 25. PREPARED BY:
VARIABLES: T/K = 475 - 560 P/kPa = 10 - 40 EXPERIMENTAL VALUES: The solubility of ammonia in the 33.33, 85-15 mol%) mixtures as a fun graphical form in the original paper graph by the compiler are:	PREPARED BY:
T/K = 475 - 560 P/kPa = 10 - 40 EXPERIMENTAL VALUES: The solubility of ammonia in the 33.33, 85-15 mol%) mixtures as a fun graphical form in the original paper graph by the compiler are:	
EXPERIMENTAL VALUES: The solubility of ammonia in the 33.33, 85-15 mol%) mixtures as a fun graphical form in the original paper graph by the compiler are:	N. P. Bansal
The solubility of ammonia in the 33.33, 85-15 mol%) mixtures as a fun graphical form in the original paper graph by the compiler are:	
	molten LiNO <sub>3</sub> - KNO <sub>3</sub> (50 - 50, 66.67 - ction of temperature are presented in . The values of $x_1$ derived from this
Melt Composition/ T/ mol% LiNO3	K 10 <sup>3</sup> x <sub>1</sub> / mol fraction bar <sup>-1</sup>
50.0 47 48 52 52 53 53	5       18.7         8       15.5         2       9.2         7       8.5         0       8.2         9       7.2
66.67 49 49 51 51 52	5 26.0 6 27.9 5 18.9 7 18.9 9 15.5 ± 0.6
85.0 52 53 54 54 55 55 55 56	2 30.8 4 23.9 3 21.1 7 19.6 ± 0.7 4 17.1 8 16.1 continued 0 15.4
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric method. The experimental procedure has been described in detail elsewhere (1,2). Briefly, the apparatus was evacuated and then ammonia gas was introduced into the system at about one bar pressure. The initial gas pressure was quickly noted. The melt was vigorously stirred and the fall in gas pressure due to its	Anhydrous ammonia (Matheson) was used without further treatment. Reagent-grade lithium and potassium nitrates (Carlo Erba, Milan) were used as received. The melt container was made of Teflon.
solubility in the melt was Continuously recorded until equilibrium was reached. The final gas pressure was noted and the Henry's law constant was	ESTIMATED ERROR: Nothing specified.
evaluated.	REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardette, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Ammonia: $NH_2$ : [7664-41-7]	Paniccia, F.: Zambonin, P. G.
<pre>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4] (3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</pre>	J. Chem. Soc. Faraday Trans. I <u>1973</u> , <b>69</b> , 2019 - 25.
VARIABLES:	PREPARED BY:
	N. P. Bansal
EXPERIMENTAL VALUES:	
continued	
Smoothed Data:	
The temperature dependence of the form:	of $x_1$ could be expressed by equations of tion bar <sup>-1</sup> ) = a + b/(T/K)
and the standard entropy of solu	a and b of the above equation for along with the enthalpy of solution, AH, ution, AS°, are:
Melt Composition/ a 1 mol% LiNO <sub>3</sub>	b std. <sup>Δ</sup> H/ <sup>Δ</sup> S°/J K <sup>-1</sup> mol <sup>-1</sup> dev. kJ mol <sup>-1</sup> (at 623 K)
50.0 -5.232 166 66.67 -5.354 187 85.0 -5.869 227	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
IXUA	ILIARY INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS -	OPTCINAL MEASUPEMENTS.	
(1) Amonia: $[7664, 41, 7]$	Allulli C	
(1) Annonia; $NH_3$ ; $[7664-41-7]$ (2) Lithium nitrate; LiNO <sub>3</sub> ;	Allulli, S.	
[7790-69-4]	J. Phys. Chem <u>1969</u> , <b>73</b> , 1084 - 87.	
(3) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]		
VARIABLES:	PREPARED BY:	
melt comp./mol% LiNO <sub>3</sub> := 43 and 75 P/kPa = 0.667 - 6.666	N. P. Bansal	
T/K = 433 - 598	n. r. banbar	
EXPERIMENTAL VALUES:		
The solubility of ammonia in the molten mixtures $LiNO_3 - KNO_3$ (43 - 57, 75 - 25 mol%) obeyed Henry's law. The solubility values at various temperatures are:		
Melt Composition/ t	$/^{\circ}C$ 10 <sup>5</sup> x <sub>1</sub> /	
MOT% TINO <sup>3</sup>	mol fraction mm <sup>-1</sup>	
4.3 l 1	ou 4.1 90 2.45	
2	10 1.7	
2	50 1.05	
75 2	42 4.2	
2		
3	25 0.85	
	continued	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometria method	Ammonia supplied by Matheron Co	
The details of the procedure	was used without further	
employed for solubility	purification. Its purity, checked by	
original paper. Briefly, ammonia	99.5%	
was let into the system above the	KNO <sub>3</sub> (ERBA RP) was finely	
The fall in gas pressure due to	for 24 hr. LiNO, was dehydrated at	
its solubility in the melt was	70°C to avoid hydrolysis.	
a stable equilibrium pressure		
was attained. The number of moles	ECTIVATED EDDOD.	
or the gas dissolved in the melt was calculated.	Nothing specified.	
	REFERENCES :	
	1	

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Allulli, S.			
<pre>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</pre>	J. Phys. Chem. 1969. 73, 1084 - 87.			
(3) Potassium nitrate; KNO <sub>3</sub> ;	<u> </u>			
[//5/-/9-1]				
VARIABLES:	PREPARED BY:			
	N. P. Bansal			
EXPERIMENTAL VALUES:				
continued				
Smoothed Data:				
The temperature dependence of $x_1$ is given by the relations:				
$LiNO - KNO (43 - 57 mol^2)$				
$log(x_1/mol \ fraction \ mm^{-1}) = -7.86 + 1501.6/(T/K)  (compiler)$				
std. dev. = $1.6\%$ (compiler)				
$f_{1} = r_{1} = (75 - 25 - 25 - 26)$				
$linO_3 = KNO_3 (75 = 25 \text{ mors})$ log(x <sub>1</sub> /mol fraction mm <sup>-1</sup> ) = -9.37 + 2571.7/(T/K) (compiler)				
std dev = 0.63% (compiler)				
The enthalpies of solution, $\Delta H$ , and entropies of solution, $\Delta S$ , are:				
······				
Melt Composition/ AH	/kJ mol <sup>-1</sup> $\Delta S/J K^{-1} mol^{-1}$			
$mol\$ LiNO <sub>3</sub> (at 523 K)				
43 75	-49.37 -95.40			
METUON ADDADATIIS / DDOCENIDE +	SOURCE AND PUBLICY OF MATERIALS.			
TETRODYR PRRTUDY PROCEDURE.	SOURCE AND FORTH OF PATERIALS,			
	ESTIMATED ERROR:			
	REFERENCES :			
ICUMPONENTS •				
--	---	--	--	--
	ORIGINAL MEASUREMENTS:			
(1) Ammonia; $NH_3$ ; [7664-41-7] (2) Sodium nitrate: NaNO :	Paniccia, F.; Zambonin, P. G.			
[7631-99-4]	J. Chem. Soc. Faraday Trans. I			
(3) Potassium nitrate; KNO <sub>3</sub> ;	<u>1973</u> , <b>69</b> , 2019 - 25.			
[//5/-/9-1]				
<b>VARIABLES:</b> $T/K = 538 - 585$	PREPARED BY:			
P/kPa = 10 - 40	N. P. Bansal			
EXPERIMENTAL VALUES:				
The solubilities of ammonia in the molten equimolar NaNO <sub>2</sub> - KNO <sub>2</sub> mixtur				
are reported in graphical form in th	e original paper. The values of $x_1$ at			
different temperatures, derived from	this graph by the compiler, are:			
Melt Composition/ T/ mol% NaNO <sub>2</sub>	K $10^{-1} x_{1}$ mol fraction bar <sup>-1</sup>			
50.0 53	8 14.6			
56	5 11.5 ± 0.7			
58	5 $10.3 \pm 0.6$			
······································				
Smoothed Data:	vorassed by the relation.			
	xpressed by the relation:			
$\log(x_1/mol\ fraction\ bar^{-1}$	) = -4.744 + 1025.0/(T/K) (compiler)			
std. dev	. = 1.1% (compiler)			
The estheline of eslation All and				
AS°, are:	the standard entropy of solution,			
AH/kJ mol	-1 = -18.0			
∧S°/J K <sup>-1</sup> m	$ol^{-1} = -30.0$ (at 623 K)			
AUXILIARY	AUXILIARY INFORMATION			
METHOD / APPARATUS / PROCEDURE :				
Manamaturi a mathad	SOURCE AND PURITY OF MATERIALS:			
I Wanomerric mernod.	SOURCE AND PURITY OF MATERIALS:			
Details of the experimental	SOURCE AND PURITY OF MATERIALS: Anhydrous ammonia (Matheson) was used without further treatment.			
Details of the experimental technique are given elsewhere	SOURCE AND PURITY OF MATERIALS; Anhydrous ammonia (Matheson) was used without further treatment. Reagent-grade sodium and petagenum pitrates (Carlo Erba			
Manometric method. Details of the experimental technique are given elsewhere (1,2). In brief, the apparatus was evacuated and then ammonia gas was	SOURCE AND PURITY OF MATERIALS: Anhydrous ammonia (Matheson) was used without further treatment. Reagent-grade sodium and potassium nitrates (Carlo Erba, Milan) were used as received.			
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Manometric method. Details of the experimental technique are given elsewhere (1,2). In brief, the apparatus was evacuated and then ammonia gas was introduced into the system at about one bar pressure. The initial gas pressure was quickly noted. The melt was vigorously stirred and the fall in gas pressure due to its solubility in the melt was continuously recorded until equilibrium was attained. The final gas pressure was noted and Henry's constant was calculated.	SOURCE AND PURITY OF MATERIALS: Anhydrous ammonia (Matheson) was used without further treatment. Reagent-grade sodium and potassium nitrates (Carlo Erba, Milan) were used as received. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u> , 38, 373. 2. Zambonin, P. G.; Cardette, V. L.; Signorile, G. J. Electroanal. Chem. <u>1970</u> , 28, 237.			

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Ammonia; NH <sub>3</sub> ; [7664-41-7]	Allulli, S.	
(2) Lithium perchlorate; LiClO <sub>4</sub> ;	<b>T Phus Chem 1969 73 1094 - 97</b>	
(3) Potassium perchlorate; KClO <sub>4</sub> ;	<b>5.</b> Figs. citch. $(1505)$ , 75, 1084 - 87.	
[7778-74-7]		
VARIABLES: THE COLOR	PREPARED BY:	
P/kPa = 0.667 - 6.666	N. P. Bansal	
	1	
The solubility of ammonia in the	molten mixture LiClo - KClo (76 -	
24 mol%) obeyed Henry's law. The val	lues of solubility and Henry's law	
constant at different temperatures a	are:	
t/°C $10^5 x_1$ /mol fraction r	$m^{-1}$ 10 <sup>6</sup> K <sub>H</sub> /mol cm <sup>-3</sup> mm <sup>-1</sup>	
234 128	23.56	
266 61.5	11.32	
	6.81	
	7.25	
• Values calculated by the compiler	using appropriate value of density as	
2.1 g ml <sup>-1</sup> at 523 K from Allulli,	S.; J. Phys. Chem. <u>1969</u> , 73, 1084.	
Smoothed Data:		
The temperature dependences of K,	$_{\rm H}$ and x <sub>1</sub> are expressed by the	
relations:	$= -10.27 + 2862.6/(\pi/k)$ (compiler)	
$\log(x_{H}/\text{mol fraction mm}^{-1})$	= -8.53 + 2862.6/(T/K) (compiler)	
std. dev	v. = 1.1% (compiler)	
AH/kJ mol	$^{-1} = -57.74$	
AS/J K <sup>-1</sup> mol	$1^{-1} = -110.46$ (at 523 K)	
	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Manometric technique.	Ammonia supplied by Matheson Co.	
The details of the procedure used for solubility measurements	was used without further	
have been described in the	mass spectrometry, was better than	
original publication. In brief,	99.5%. KClO (FRBA PR) was dried under	
above the melt to the desired	vacuum at 110°C for 24 hr. LiClo <sub>4</sub>	
pressure. The fall in gas pressure	(RUDI PONT) was dehydrated at 70°C to	
was noted with time until a stable	avoid hydrofysis.	
equilibrium value was reached.		
dissolved in the melt was	ESTIMATED ERROR:	
calculated.	Nothing specified.	
	REFERENCES:	

ORIGINAL MEASUREMENTS:
Allulli, s.
J. Phys. Chem. 1969. 73, 1084 - 87.
PREPARED BY:
N. P. Bansal
L
ten LiNO <sub>3</sub> - NaNO <sub>3</sub> - KNO <sub>3</sub> (27 - 18 - lubilities at different temperatures
$_{\rm L}$ /mol fraction mm <sup>-1</sup>
2.1
1.5 1.15
0.7
ubility , $x_1$ , is given by the relation:
(-1) = -7.47 + 1208.4/(T/K) (compiler)
v. = 1.2% (compiler)
entropy of solution. AS. are:
$-1 = -24 \ 27$
$x^{1-1} = -46.44$ (at 522 K)
INFORMATION
SOURCE AND PURITY OF MATERIALS:
Ammonia supplied by Matheson Co.
Ammonia supplied by Matheson Co. was used without further
Ammonia supplied by Matheson Co. was used without further purification. Its purity, checked by mass spectrometry, was better than
Ammonia supplied by Matheson Co. was used without further purification. Its purity, checked by mass spectrometry, was better than 99.5%. NaNO <sub>3</sub> and KNO <sub>3</sub> both from ERBA RP
Ammonia supplied by Matheson Co. was used without further purification. Its purity, checked by mass spectrometry, was better than 99.5%. NaNO <sub>3</sub> and KNO <sub>3</sub> both from ERBA RP were vacuum dried at 110°C for 24 hr. LiNO <sub>3</sub> (ERBA RP) was dehydrated at
Ammonia supplied by Matheson Co. was used without further purification. Its purity, checked by mass spectrometry, was better than 99.5%. NaNO <sub>3</sub> and KNO <sub>3</sub> both from ERBA RP were vacuum dried at 110°C for 24 hr. LiNO <sub>3</sub> (ERBA RP) was dehydrated at 70°C to avoid hydrolysis.
Ammonia supplied by Matheson Co. was used without further purification. Its purity, checked by mass spectrometry, was better than 99.5%. NaNO <sub>3</sub> and KNO <sub>3</sub> both from ERBA RP were vacuum dried at 110°C for 24 hr. LiNO <sub>3</sub> (ERBA RP) was dehydrated at 70°C to avoid hydrolysis.
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COMPONENTS :	ORIGINAL MEASUREMENTS :		
<pre>(1) Silicon tetrachloride; SiCl<sub>4</sub>; [10026-04-7]</pre>	Kurmaev, R. Kh.; Amirova, S. A. <b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 2258 - 62;		
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Russ. J. Inorg. Chem. (Eng. Transl.) <u>1968</u> , 13, 1166 - 68. (*).		
VARIABLES:	PREPARED BY:		
T/K = 1093 - 1173	N. P. Bansal		
EXPERIMENTAL VALUES:			
Solubilities of SiCl <sub>4</sub> in molten NaCl at different temperatures are reported to be:			
t/°C C <sub>1</sub> /mass%	10 <sup>3</sup> x <sub>1</sub> <sup>-</sup> /mol fraction		
820 0.37	1.27		
850 0.31	1.07		
880 0.23	0.79		
Temperature dependence of C <sub>1</sub> is expressed by the relation: log(C <sub>1</sub> /mass%) = -5.583 + 5661.9/(T/K) (compiler) std. dev. = 4.8% (compiler)			
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Isothermal method. Vapors of silicon tetrachloride	Silicon tetrachloride was of 99%		
were passed through the molten	Sodium chloride was of		
NaCl, kept at a constant	"chemically pure" grade.		
min. The melt became saturated			
with the tetrachloride within			
2 - 3 min. The saturated melt was solidified and analyzed for			
silicon by the gravimetric			
sulfate method.	ESTIMATED EDDOD.		
	ESTIMATED ERROR:		
	Nothing specified		
	Nothing specified.		
	REFERENCES:		

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COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Silicon tetrachloride; SiCl₄; [10026-04-7]</pre>	Kurmaev, R. Kh.; Amirova, S. A. <b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 2258 -
<pre>(2) Potassium chloride; KCl; [7447-40-7]</pre>	62; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1968</u> , <b>13</b> , 1166 - 68. (*).
VARIABLES:	PREPARED BY:
T/K = 1123 - 1173	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of SiCl <sub>4</sub> in molten in reported to be:	KCl at different temperatures are
t/°C C <sub>1</sub> /mass%	$10^3 x_1^{\circ}$ /mol fraction
850 0.95	4.16
880 0.80 900 0.67	3.51 2.94
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method. Vapors of silicon tetrachloride were passed through the molten KCl, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and analyzed for silicon by the gravimetric sulfate method.	Silicon tetrachloride was of 99.99% purity. Potassium chloride was of "chemically pure" grade.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

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COMPONENTS :	ORIGINAL MEASUREMENTS:		
(1) Silicon tetrachloride: SiCl			
[10026-04-7]	Kurmaev, R. Kh.; Amirova, S. A.		
(2) Sodium chloride; NaCl;	Zh. Neorg. Khim. <u>1968</u> , <b>13</b> , 2258 -		
	62;		
(3) Potassium chioride; KCI;	Russ. J. Inorg. Chem. (Eng. Trans1.) $1069$ 12 $1166 - 69$ (*)		
	<u>1968</u> , 13, 1166 - 68. (^).		
	DEDADED BY.		
VARIADELS.	FREFARED DI:		
T/K = 973 - 1173	N. P. Bansal		
EXPERIMENTAL VALUES:			
Solubilities of SiCl <sub>4</sub> in molto different temperatures are report	en NaCl - KCl (50 - 50 mol%) mixture at ted to be:		
t/°C C <sub>1</sub> /mass%	$10^3 x_1^*$ /mol fraction		
700 0.56	2.19		
	2.11		
820 0.53	2.07		
850 0.52	2.03		
880 0.51	1.99		
900 0.51	1.99		
$log(C_1/mass\%) = -0.489 + 229.2/(T/K)  (compiler)$ std. dev. = 0.3% (compiler)			
AUXILI	ARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Isothermal method.	Silicon tetrachloride was of		
were passed through the molten	Sodium and potassium chlorides		
NaCl - KCl mixture, kept at a	were of "chemically pure" grade.		
constant temperature, for 10 - 19	5		
with the tetrachloride within 2.	_		
3 min. The saturated melt was	_		
solidified and analyzed for			
silicon by the gravimetric			
sulfate method.	ECTIVATED EDDOD.		
	ESTIMATED ERROR:		
	Nothing specified.		
1	REFERENCES:		
	1		
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COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</pre>	Kurmaev, R. Kh.; Amirova, S. A. <b>Zh. Neorg. Khim. <u>1968</u>, 13,</b> 2258 - 62;		
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Russ. J. Inorg. Chem. (Eng. Transl.) 1968, 13, 1166 - 68. (*).		
VARIABLES:	PREPARED BY:		
T/K = 1093 - 1173	N. P. Bansal		
EXPERIMENTAL VALUES:			
Solubilities of $TiCl_4$ in molten NaCl at different temperatures are reported to be:			
t/°C C <sub>1</sub> /mass%	$10^3 x_1^{-}$ /mol fraction		
820         1.20           850         0.89           880         0.52           900         0.38	3.70 2.74 1.60 1.17		
std. dev	7. = 3.8% (compiler)		
AUXILIARY	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:		
Isothermal method. Vapors of titanium tetrachloride were passed through the molten NaCl, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium chloride was of "chemically pure" grade.		
	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES :		

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COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</pre>	1. Maksimov, V. S.; Smirnov, M. V.	
<pre>(2) Sodium chloride; NaCl; [7647-14-5]</pre>	Electrochem. Molten Solid Electrolytes <u>1968</u> , 6, 30 - 36. continued	
VARIABLES: m/r = 1080 = 1224	PREPARED BY:	
P/kPa = 17.124 - 54.412	N. P. Bansal	
EXPERIMENTAL VALUES:		
Henry's law was obeyed upto $P_{ric}$ : (x <sub>1</sub> ) and the constant k (= x <sub>1</sub> /p) at	t = 0.54 atm. Values of solubility ⁴various temperatures are given as:	
T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol frac	tion 10 <sup>4</sup> k/mol fraction atm <sup>-1</sup>	
1089 0.296 22	74	
1089 0.537 30	56	
	65 64	
1097 0.470 32	68	
1099 0.456 25	55	
1099 0.456 30 1114 0.409 26	64	
1129 0.266 16	60	
	65	
1139 0.298 17	50	
1139 0.353 18	51	
	62 53	
1139 0.470 28	53 60	
1159 0.316 16	51	
1176 0.296 20	63 68	
1176 0.470 25	53 continued	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Equilibrium at fixed vapor	Not given	
pressure.		
measurements has been described		
earlier (1). A known amount of		
the meit, at a constant temperature, was kept in contact		
with the vapor phase consisting		
of a mixture of argon and		
8 hr. The partial pressure of		
titanium tetrachloride, at a	FSTIMATED EDDOD.	
fixed temperature, was calculated from an equation (2). The	Nothing specified	
saturated melt was solidified and	Nothing specified.	
analyzed for titanium using a		
carotimetric method.	REFERENCES:	
	1. Smirnov, M. V.; Maksimov, V. S.	
	Electrochem. Molten Solid	
	Electrolytes 1967, 5, 33.	
	continued	

COMPONENTS:ORIGINAL MEASUREMENTS: continue(1) Titanium tetrachloride; TiCl_; [7550-45-0]ORIGINAL MEASUREMENTS: continuecontinue(2) Sodium chloride; NaCl; [7647-14-5]Zh. Neorg. Khim. 1966, 11, 17 Russ. J. Inorg. Chem. (Eng. T 1966, 11, 945 - 48. (*).VARIABLES: T/K = 1089 - 1224 P/kPa = 17.124 - 54.412PREPARED EY:T/K P/Atm 10 <sup>4</sup> x_1/mol fraction 10 <sup>4</sup> k/mol fraction atm1176 0.470 1194 0.409 122 1209 0.266 1209 0.266 1209 0.266 1209 0.298 1757 54 1224 57 <th></th>	
(1) Titanium tetrachloride; TiCl <sub>3</sub> ; [7550-45-0] (2) Sodium chloride; NaCl; [7647-14-5] VARIABLES: T/K = 1089 - 1224 P/kPa = 17.124 - 54.412 T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol fraction 10 <sup>4</sup> k/mol fraction atm 1176 0.470 27 57 1194 0.409 22 54 1209 0.266 14 53 1209 0.266 16 60 1209 0.266 16 60 1209 0.266 17 57 1224 0.296 17 57 Smoothed Data: Temperature dependence of k is expressed by the relation: log(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) $\pm$ 0.04 The solubility of TiCl <sub>4</sub> as a function of temperature and the parti pressure of TiCl <sub>4</sub> in the gas phase is given by: log(x <sub>2</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) $\pm$ 0.04 The enthalpy of solution is: $\Delta H/kJ mol^{-1} = -11.3$	
VARIABLES:       T/K = 1089 - 1224       P/kPa = 17.124 - 54.412       PREPARED BY:         EXPERIMENTAL VALUES:       continued.         T/K       P/atm       10 <sup>4</sup> x <sub>1</sub> /mol fraction       10 <sup>4</sup> k/mol fraction atm         1176       0.470       27       57         1194       0.409       22       54         1209       0.266       14       53         1209       0.266       16       60         1209       0.266       16       60         1209       0.266       17       57         Smoothed Data:       Temperature dependence of k is expressed by the relation:       log(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) ± 0.04         The solubility of TiCl <sub>4</sub> as a function of temperature and the parti       pressure of TiCl <sub>4</sub> in the gas phase is given by:       log(x <sub>1</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) ± 0.04         AH/kJ mol <sup>-1</sup> = -11.3         AUXILIARY INFORMATION         METHOD/APPARATUS/PROCEDURE:	d V. S.; 65 - ransl.)
T/K = 1089 - 1224       N. P. Bansal         P/kPa = 17.124 - 54.412       N. P. Bansal         EXPERIMENTAL VALUES:       continued.         T/K       P/atm       10 <sup>4</sup> x <sub>1</sub> /mol fraction       10 <sup>4</sup> k/mol fraction atm         1176       0.470       27       57         1194       0.409       22       54         1209       0.266       14       53         1209       0.266       16       60         1209       0.298       17       57         1224       0.296       17       57         Smoothed Data:       Temperature dependence of k is expressed by the relation:       log(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) ± 0.04         The solubility of TiCl <sub>4</sub> as a function of temperature and the parti       pressure of TiCl <sub>4</sub> in the gas phase is given by:       log(x <sub>1</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) ± 0.04         The enthalpy of solution is:       AH/kJ mol <sup>-1</sup> = -11.3         AUXILIARY INFORMATION	
EXPERIMENTAL VALUES:       continued.         T/K       P/atm $10^4 x_1$ /mol fraction $10^4 k$ /mol fraction atm         1176       0.470       27       57         1194       0.409       22       54         1209       0.266       14       53         1209       0.266       16       60         1209       0.266       16       60         1209       0.266       17       57         Smoothed Data:       Temperature dependence of k is expressed by the relation:       log(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) ± 0.04         The solubility of TiCl <sub>4</sub> as a function of temperature and the parti       pressure of TiCl <sub>4</sub> in the gas phase is given by:       log(x <sub>1</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) ± 0.04         The enthalpy of solution is: $\Delta H/kJ mol^{-1} = -11.3$ AUXILIARY INFORMATION	
T/K         P/atm         10 <sup>4</sup> x <sub>1</sub> /mol fraction         10 <sup>4</sup> k/mol fraction atm           1176         0.470         27         57           1194         0.409         22         54           1209         0.266         14         53           1209         0.266         16         60           1209         0.298         17         57           1224         0.296         17         57           Smoothed Data:         Temperature dependence of k is expressed by the relation:         10g(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) ± 0.04           The solubility of TiCl <sub>4</sub> as a function of temperature and the partipressure of TiCl <sub>4</sub> in the gas phase is given by:         10g(x <sub>1</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) ± 0.04           The enthalpy of solution is:         ΔH/kJ mol <sup>-1</sup> = -11.3           AUXILIARY INFORMATION           METHOD/APPARATUS/PROCEDURE:	
1176       0.470       27       57         1194       0.409       22       54         1209       0.266       14       53         1209       0.266       16       60         1209       0.298       17       57         1224       0.296       17       57         Smoothed Data:         Temperature dependence of k is expressed by the relation:         log(k/mol fraction atm <sup>-1</sup> ) = -2.73 + 580/(T/K) ± 0.04         The solubility of TiCl <sub>4</sub> as a function of temperature and the partipressure of TiCl <sub>4</sub> in the gas phase is given by:         log(x <sub>1</sub> /mol fraction) = log(p/atm) - 2.73 + 580/(T/K) ± 0.04         The enthalpy of solution is:         AH/kJ mol <sup>-1</sup> = -11.3         MUXILIARY INFORMATION         METHOD/APPARATUS/PROCEDURE:	-1
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	 al
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:	
ESTIMATED ERROR: REFERENCES: continued 2. Pike, F. P.; Foster, C. T. J. Chem. Eng. Data <u>1959</u> , 4	, 305.

COMPONENTS :	ORIGINAL MEASUREMENTS:			
<ol> <li>Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</li> <li>Potassium chloride; KCl;</li> </ol>	1. Smirnov, M. V.; Maksimov, V. S. Elektrokhim. <u>1965</u> , 1, 727 - 30; Sov. Electrochem. (Eng. Transl.) <u>1965</u> , 1, 645 - 48. (*).			
[7447-40-7]	continued			
VARTABLES :	PREPARED RV.			
T/K = 1096 - 1213				
P/kPa = 34.248 - 65.456	N. P. Bansal			
EXPERIMENTAL VALUES:				
Henry's law was obeyed up to $P_{ricl} = 0.7$ atm. Values of solubility $(x_1)$ and the constant k ( = $x_1/P$ ) at <sup>4</sup> various temperatures are given as:				
T/K P/atm 10 <sup>3</sup> x <sub>1</sub> /mol frag	ction 10 <sup>3</sup> k/mol fraction atm <sup>-1</sup>			
1096 0.338 30	90			
1096 0.338 34	99			
1096 0.479 44 1096 0.479 44	92			
1096 0.479 46	96			
1096 0.479 47	98			
	93			
1114 0.338 29 1114 0.479 42	88			
1114 0.479 43	90			
	90			
1114 0.646 54 1135 0.338 26	84 77			
1135 0.338 27	79			
1135 0.338 28	84			
1135 0.479 36 1135 0.479 38	76			
1135 0.646 50	78			
1135 0.646 51	79 continued			
AUXILIARY INFORMATION				
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
Equilibrium at fixed vapor	Pure KCl, TiCl₄ and argon were			
A known amount of the melt was	used.			
kept in contact with argon				
containing vapors of titanium				
tetrachioride with a specific partial pressure. It was allowed				
to come to equilibrium for at				
least 10 hr. The saturated melt				
was solidified and analyzed for				
	ESTIMATED ERROR:			
	Nothing specified.			
	REFERENCES :			

				428	
OMPONEN	TS:			ORIGINAL MEASUREMENTS:	
<pre>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</pre>			hloride; -0]	continued 2. Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P.	
(2)	Potass [7447-	ium chlor 40-7]	ide; KCl;	zn. Neorg. Knim. <u>1966</u> , 11, 1765 - Russ. J. Inorg. Chem. (Eng. Transl.) <u>1966</u> , 11, 945 - 48. (*).	
ARIABLI	ES:			PREPARED BY:	
	T/ P/kPa	K = 1096 a = 34.248	- 1213 3 - 65.456	N. P. Bansal	
XPERIM	ENTAL VA	ALUES:	continued		
<u></u>	т/к	P/atm	10 <sup>3</sup> x <sub>1</sub> /mol fra	ction 10 <sup>3</sup> k/mol fraction atm <sup>-1</sup>	
	1174	0.338	23	69	
	1174	0.338	24	70	
	1174	0.338	26	77	
	1174	0.479	32	66	
	1174	0.646	45	70	
	1174	0.646	48	74	
	1213	0.338	22	64 70	
	1213	0.330	24	72 60	
	1213	0.479	29	60 61	
	1213	0.646	35	58	
	1213	0.646	39	60	
The	log( enthal	x <sub>1</sub> /mol fr	action) = $\log(P/a)$ ution is: $\Delta H/kJ$ mo	$l^{-1} = -38.1$	
*******			AUXILIARY	INFORMATION	
METHOD/	APPARAT	US/PROCEDUR	E:	SOURCE AND PURITY OF MATERIALS:	
		,			
				ESTIMATED ERROR:	
				REFERENCES:	

COMPONENTS .	ORTGINAL MEASUREMENTS .
CONFORMENTS:	ONTOTIGAL MEASUREMENTS:
<pre>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</pre>	Kurmaev, R. Kh.; Amirova, S. A. <b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 2258 - 62;
<pre>(2) Potassium chloride; KCl;     [7447-40-7]</pre>	Russ. J. Inorg. Chem. (Eng. Transl.) 1968, 13, 1166 - 68. (*).
VARIABLES:	PREPARED BY:
<b>Т/К = 1123 - 1173</b>	N. P. Bansal
EXPERIMENTAL VALUES:	
Solubilities of TiCl4 in molten K reported to be:	CC1 at different temperatures are
t/°C C <sub>1</sub> /mass%	$10^2 x_1^*$ /mol fraction
850 3.87	1.52
880 3.15 900 2.94	1.24 1.15
Temperature dependence of C <sub>1</sub> is e log(C <sub>1</sub> /mass%) = -2 std. dev.	expressed by the equation: 2.278 + 3214/(T/K) (compiler) . = 1.3% (compiler)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method. Vapors of titanium tetrachloride were passed through the molten KCl, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Potassium chloride was of "chemically pure" grade.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

			42	
COMPONENTS:			ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Titaniun tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</li> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> </ul>		hloride; -0] de; RbCl;	1. Maksimov, V. S.; Smirnov, M. V. Zh. Prikl. Khim. <u>1966</u> , <b>39</b> , 931 - 34; J. Appl. Chem. U.S.S.R.(Eng. Transl. <u>1966</u> , <b>39</b> , 872 - 75. (*). Continued	
VARIABLES:	ARIABLES: T/K = 1000 - 1170 P/kPa = 10.234 - 45.191			
T/ P/kPa			N. P. Bansal	
EXPERIMENTAL V	ALUES:		<u>l</u>	
Henry's (x <sub>1</sub> ) and	s law was the const	obeyed up to $P_{T1}$ ant k (= $x_1/P$ )	<sub>cı</sub> = 0.5 atm. Values of solubility at⁴various temperatures are given as:	
т/к	P/atm	10 <sup>3</sup> X <sub>1</sub> /mol fra	ction 10 <sup>2</sup> k/mol fraction atm <sup>-1</sup>	
1000 1008 1010 1015 1015 1043 1043 1043 1051 1051 1053 1060 1062 1063 1065 1070 1070 1072	0.226 0.226 0.423 0.101 0.173 0.226 0.240 0.423 0.423 0.446 0.446 0.173 0.263 0.242 0.251 0.313 0.260 0.260	81 86 127 30 54 51 61 70 92 98 118 120 43 63 53 68 61 69 55 60	35.8 38.1 30.0 29.7 31.2 29.5 27.0 29.2 21.7 23.2 26.4 26.9 24.9 24.0 21.9 27.1 19.5 22.0 21.2 23.1 continued	
	- <u></u> .	AUXILIARY	INFORMATION	
METHOD/APPARAT	TUS/PROCEDUR	E:	SOURCE AND PURITY OF MATERIALS:	
Equilib pressure. A known kept in co containing tetrachlor partial pr to reach e 8 hrs. The solidified titanium u	orium at f a amount o ntact with vapors o ide with essure. I quilibriu saturate i and anal sing a ca	ixed vapor f the melt was n argon f titanium a specific t was allowed n for at least d melt was yzed for lorimetric	Titanium tetrachloride and rubidium chloride were of "pure" grade.	
method.			ESTIMATED ERROR:	
			Nothing specified.	
			REFERENCES:	

COMPONENTS:			ORIGINAL MEASUREMENTS: continued
<ul> <li>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</li> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> </ul>		nloride; -0] de; RbCl;	<pre>2. Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P. Zh. Neorg. Khim. <u>1966</u>, 11, 1765 - 70; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1966</u>, 11, 945 - 48. (*).</pre>
VARIABLES:			PREPARED BY:
T/K = 1000 - 1170 P/kPa = 10.234 - 45.191		- 1170 4 - 45.191	N. P. Bansal
EXPERIMENTAL	VALUES:	continued	
т/к	P/atm	$10^3 x_1/mol frac$	tion $10^2$ k/mol fraction atm <sup>-1</sup>
1078	0.232	54	23.3
1089	0.220	43 52	21.7
1107	0.101	20	19.8
1107	0.242	42	17.4
1107	0.242	45	18.6
1107	0.232	46	19.8
1107	0.260	51	19.6
1107	0.263	51	19.4
1107	0.423	73	17.3
1107	0.446	88	19.7
11136	0.313 0.232	22	16.8
1136	0.232	42	18.1
1141	0.240	44	18.3
1156	0.263	42	16.0
1169	0.260	38	14.6
1170	0.446	60	13.5
Smoothed	Data:		· · · · · · · · · · · · · · · · · · ·
Temper	ature deper	ndence of k is ex	pressed by the relation:
	log(k/mol f	Fraction atm <sup>-1</sup> ) =	-2.92 + 2430/(T/K) ± 0.03 continued
		AUXILIARY	INFORMATION
METHOD/APPARA	TUS/PROCEDURE	:	SOURCE AND PURITY OF MATERIALS;
			ļ
			ESTIMATED ERROR:
1			
			REFERENCES:

<ul> <li>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</li> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> <li>VARIABLES:</li> <li>1. Maksimov, V. S.; Smirnov, M. V. J. Appl. Chem. U.S.S.R. <u>1966</u>, 39, 872 - 75.</li> <li>2. Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P. Russ. J. Inorg. Chem. <u>1966</u>, 11, 945 - 48.</li> </ul>
<ul> <li>(2) Rubidium chloride; RbCl; [7791-11-9]</li> <li>2. Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P. Russ. J. Inorg. Chem. <u>1966</u>, 11, 945 - 48.</li> <li>VARIABLES:</li> </ul>
VARIABLES: PREPARED BY:
T/K = 1000 - 1170
P/kPa = 10.234 - 45.191 N. P. Bansal
continued
The solubility of TiCl <sub>4</sub> as a function of temperature and the partial pressure of TiCl <sub>4</sub> in the gas phase is given by:
$log(x_1/mol fraction) = log(P/atm) - 2.92 + 2430/(T/K)$
The enthalpy of solution is:
$\Delta H/kT mol^{-1} = -46.4$
$a_{17} \times b_{10} \times c_{-40.4}$
AUXILIARY INFORMATION
METHOD / APPARATUS / PROCEDURE: SOURCE AND PURITY OF MATERIALS:
,
ESTIMATED ERROR:
REFERENCES

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</pre>	1. Smirnov, M. V.; Maksimov, V. S. Electrochem, Molten Solid
<pre>(2) Cesium chloride; CsCl; [7647-17-8]</pre>	Electrolytes 1967, 5, 33 - 39. continued
VARIABLES:	PREPARED BY:
T/K = 934 - 1163 P/kPa = 7.903 - 70.826	N. P. Bansal
EXPERIMENTAL VALUES:	
Henry's law was obeyed up to $P_{\tau_1}$ , $(x_1)$ and the constant k (= $x_1/P$ ) a	= 0.7 atm. Values of solubility at⁴various temperatures are given as:
T/K P/atm 10 <sup>2</sup> x <sub>1</sub> /mol frac	ction 10 <sup>2</sup> k/mol fraction atm <sup>-1</sup>
934 0.251 27.6	110.0
934 0.251 28.0	111.6
934 0.329 34.9	
934 0.359 33.5 943 0.585 33.8	
943 0.585 33.7	
948 0.303 26.9	88.8
965 0.236 17.1	72.5
971 0.383 30.4	79.4 82.8
981 0.257 16.5	64.2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	73.8
1005 0.084 5.4	64.3
$\begin{bmatrix} 1005 & 0.181 & 12.2 \\ 1005 & 0.181 & 12.4 \end{bmatrix}$	67.4 68.5
1005 0.208 12.6	60.6
1005 0.236 16.6	70.3 continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium at fixed vapor pressure. Details and diagram of the apparatus used for solubility measurements are given in the original paper. A known amount of	"Pure" titanium tetrachloride which was further purified by double distillation over copper shavings in a stream of pure argon was used. Cesium chloride was "chemically pure" grade.
the melt was kept in contact with argon containing vapors of titanium tetrachloride with a specific partial pressure. It was allowed to attain equilibrium	Argon was freed from oxygen and moisture by passing over anhydrous $P_2O_5$ , Cu shavings heated to 450° and titanium shavings heated to 850°C.
for about 8 hrs. The saturated melt was solidified and analyzed for titanium using a calorimetric method.	ESTIMATED ERROR: Nothing specified.
	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:	continued
<ul> <li>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</li> <li>(2) Cesium chloride; CsCl; [7647-17-8]</li> </ul>		2. Smirnov, M. V.; Ma Khaimenov, A. P. Zh. Neorg. Khim. <u>1966</u> Russ. J. Inorg. Chem. <u>1966</u> , 11, 945 - 48. (	aksimov, V. S.; 5, 11, 1765 - 70 (Eng. Transl.) (*).
VARIABLES:		PREPARED BY .	
T/K = 934 - 1163 P/kPa = 7.903 - 70.826		N. P. Bar	nsal
EXPERIMENTAL VALUES:	continued		
T/K P/atm	$10^2 x_1/mol frac$	ction 10 <sup>2</sup> k/mol frac	ction atm <sup>-1</sup>
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	17.8 $19.2$ $19.5$ $20.6$ $24.8$ $36.0$ $13.5$ $13.6$ $14.2$ $13.2$ $20.3$ $20.5$ $17.7$ $17.2$ $5.6$ $18.7$ $20.7$ $3.2$ $5.6$ $6.1$ $11.2$ $11.5$ $14.1$ $23.1$	66.7 58.4 59.3 62.6 66.1  54.2 61.3 55.3 53.0 51.4 51.9 49.3 45.9 45.9 45.9 45.9 45.9 45.9 45.9 34.4 35.3 35.7	
	AUXILIARY	INFORMATION	
TE IROD/APPARATUS/PROCEDURE		ESTIMATED ERROR:	11 ALS :
		KEFERENCES;	

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OMPONENTS :			CRIGINAL READERENIS.
<pre>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0] (2) Cesium chloride; CsCl; [7647-17-8] VARIABLES: T/K = 934 - 1163 P/kPa = 7.903 - 70.826</pre>		oride;	<ol> <li>Smirnov, M. V.; Maksimov, V. S. Electrochem. Molten Solid Electrolytes <u>1967</u>, 5, 33 - 39.</li> <li>Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P. Russ. J. Inorg. Chem. <u>1966</u>, 11, 945 - 48.</li> </ol>
		:sCl;	
			PREPARED BY:
		.63 10.826	N. P. Bansal
XPERIMENTAL VA	LUES: CC	ontinued	
т/к	P/atm 1	.0 <sup>2</sup> x <sub>1</sub> /mol fra	ction 10 <sup>2</sup> k/mol fraction atm <sup>-1</sup>
1101	0.648	23.5	36.3
1101	0.699	25.4	36.3
1139	0.318	10.0	30.0
1149	0.370	10.4	28.1
1163	0.294	7.9	26.9
1163 	0.294	8.2	27.9
Smoothed D	ata:		
pressure o log(	f TiCl₄ in t x₁/mol fract	the gas phase tion) = log(P/a	is given by: atm) - 2.95 + 2770/(T/K) ± 0.027
pressure o log( The enthal	f TiCl₄ in t x₁/mol fract py of soluti	the gas phase tion) = log(P/ .on is:	is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l <sup>-1</sup> = -53.1
pressure o log( The enthal	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of soluti	<pre>che gas phase cion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION</pre>
pressure o log( The enthal METHOD/APPARATI	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of soluti	che gas phase ion) = log(P/ on is: ΔH/kJ mo AUXILIARY	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS:</pre>
pressure o log( The enthal METHOD/APPARATI	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of solut:	<pre>che gas phase ion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS:</pre>
pressure o log( The enthal METHOD/APPARATU	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of solut:	<pre>che gas phase ion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS:</pre>
pressure o log( The enthal METHOD/APPARATI	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of solut: 	<pre>che gas phase ion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR:</pre>
pressure o log( The enthal METHOD/APPARATI	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of solut: 	<pre>che gas phase cion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR:</pre>
pressure o log( The enthal METHOD/APPARATO	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of solut: 	<pre>che gas phase cion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 INFORMATION SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:</pre>
pressure o log( The enthal	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of soluti	<pre>che gas phase cion) = log(P/A .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:</pre>
pressure o log( The enthal 4ETHOD/APPARATI	f TiCl <sub>4</sub> in t x <sub>1</sub> /mol fract py of soluti	<pre>che gas phase cion) = log(P/ .on is:</pre>	<pre>is given by: atm) - 2.95 + 2770/(T/K) ± 0.027 l<sup>-1</sup> = -53.1 SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Titanium tetrachloride; TiCl<sub>4</sub>: [7550-45-0]</pre>	Smirnov, M. V.; Maksimov, V. S.
<pre>(2) Magnesium chloride; MgCl<sub>2</sub>; [7786-30-3]</pre>	Electrochem. Molten Solid Electrolytes <u>1969</u> , 7, 37 - 41.
VARYANE DO	
T/K = 993 - 1204	PREPARED BY:
P/kPa = 15.807 - 95.448	N. P. Bansal
EXPERIMENTAL VALUES:	
Henry's law was obeyed up to $P_{T1}$ (x <sub>1</sub> ) and the constant k ( = x <sub>1</sub> /P) a	= 0.94 atm. Values of solubility at⁴various temperatures are given as:
T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol frac	tion 10 <sup>4</sup> k/mol fraction atm <sup>-1</sup>
993 0.249 10	40
1000 0.666 32	48
1020 0.568 28 1020 0.507 22	49 13
1034 0.759 32	43
1045 0.786 42	53
1052 0.452 22	49
	51
	55
1069 0.942 46	40
1078 0.666 40	60
1083 0.925 46	50
	61
1110 0.507 34 1110 0.507 38	67 75
1117 0.893 54	60
1123 0.156 8	51
1145 0.778 48 1155 0.759 64	62 84 continued
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Equilibrium at fixed vapor	Anhydrous MgCl <sub>2</sub> was obtained
pressure.	from Magnesium and very pure TiCl4
The method used for solubility	and triply distilled in vacuo.
described earlier (1). A known	
amount of the melt was kept in	
contact with argon containing	
vapors of titanium tetrachloride	
It was allowed to reach	
equilibrium for at least 8 hrs.	
The saturated melt was solidified	ESTIMATED ERROR:
and analyzed for titanium using a	
calorimetric method.	Nothing specified.
	REFERENCES:
	1. Smirnov, M. V.; Maksimov, V. S.
	Electrochem. Molten Solid
	Electrolytes <u>1967</u> , 5, 33.

COMPONENTS:		ORIGINAL MEASUREMENTS:
<pre>(1) Titanium tetrachlori TiCl<sub>4</sub>; [7550-45-0]</pre>	de;	Smirnov, M. V.; Maksimov, V. S.
(2) Magnesium chloride; 1 [7786-30-3]	MgCl <sub>2</sub> ;	Electrochem. Molten Solid Electrolytes <u>1969</u> , 7, 37 - 41.
VARIABLES:	······	PREPARED BY:
T/K = 993 - 1204 P/kPa = 15.807 - 99	5.448	N. P. Bansal
EXPERIMENTAL VALUES: Cont	inued	l
T/K P/atm 104	x <sub>1</sub> /mol fra	ction 10 <sup>4</sup> k/mol fraction atm <sup>-1</sup>
1175 0.942	90	96
	62 76	69 82
1191 0.925	82	89
1204 0.898	78	87
1204 0.898	82	91
Smoothed Data:		
Temperature dependenc	e of k is e	xpressed by the relation:
log(k/mol fract	ion atm <sup>-1</sup> )	$= -0.50 - 1890/(T/K) \pm 0.05$
The solubility of TiCl <sub>4</sub> pressure of TiCl <sub>4</sub> in the	as a functi gas phase	on of temperature and the partial is given by:
log(x,/mol frac	tion) = log	(P/atm) - 0.50 - 1890/(T/K)
The enthalpy of solution	is.	
ine enemapy of boracion	AH/k.T mo	$1^{-1} - 36^{-2}$
	AN/KU MC	- 50.2
······	AUXILIARY	INFORMATION
METHOD / APPARATUS / PROCEDURE :		SOURCE AND PURITY OF MATERIALS:
		ESTIMATED ERROR:
		REFERENCES:

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	435
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Titanium tetrachloride; TiCl<sub>4</sub>; [7550-45-0]</li> <li>(2) Lithium chloride; LiCl; [7447-41-8]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	1. Maksimov, V. S.; Smirnov, M. V. Zh. Prikl. Khim. <u>1966</u> , <b>39</b> , 931 - 34; J. Appl. Chem. U.S.S.R.(Eng. Transl.) <u>1966</u> , <b>39</b> , 872 - 75. (*). continued
VARIABLES: T/K = 823 - 1023 P/kPa = 20.265 - 88.355	PREPARED BY: N. P. Bansal
EXPERIMENTAL VALUES:	1
Henry's law was obeyed up to $P_{rid}$ 3 LiCl - 2 KCl. Values of solubility various temperatures are given as:	=1 = 0.9 atm. in the molten eutectic $ty^4(x_1)$ and the constant k (= $x_1/P$ ) at
T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol frac	ction 10 <sup>4</sup> k/mol fraction atm <sup>-1</sup>
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	26 30 27 36 23 30 25 33 37 22 25 22 27 22 27 22 27 22 27 22 27 22 27 22 27 22 27 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 33 37 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 27 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 25 22 26 37 22 25 26 37 22 25 22 25 26 37 22 25 26 37 22 25 26 37 22 26 37 22 25 26 37 22 26 37 22 26 37 22 26 37 22 26 37 22 26 37 22 37 24 30 36 Continued
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium at fixed vapor pressure. A known amount of the melt was kept in contact with argon containing vapors of titanium tetrachloride with a specific partial pressure. It was allowed to reach equilibrium for at least 8 hrs. The saturated melt was solidified and analyzed for titanium using a calorimetric	Titanium tetrachloride was of "pure" grade. LiCl and KCl were of c.p. grade.
method.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS.
(1) Titanium tetrachloride.	continued
Ticl <sub>4</sub> ; [7550-45-0]	2. Smirnov, M. V.; Maksimov, V. S.;
(2) Lithium chloride; LiCl;	Khaimenov, A. P.
[7447-41-8]	Zh. Neorg. Khim. <u>1966</u> , <b>11</b> , 1765 - 70;
(3) Potassium chioride; KCI; [7447-40-7]	Russ. J. Inorg. Chem. (Eng. Transl.) $1966. 11. 945 - 48. (*).$
	<u></u> , <b></b> , , , , , , , , , , , , , , , , , ,
VARIABLES:	PREPARED BY.
T/K = 823 - 1023	
P/kPa = 20.265 - 88.355	N. P. Bansal
EXPERIMENTAL VALUES: continued	
T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol frac	ction 10 <sup>4</sup> k/mol fraction atm <sup>-1</sup>
951 0.547 13	24
952 0.648 20	31
982 0.547 17	31
991 0.648 23	35
1023 0.872 28	32
Smoothed Data:	
Temperature dependence of k is e	pressed by the relation:
$\log(k/mo)$ fraction at	$n^{-1}$ = $-2.29 - 230/(\pi/K)$
	,
The solubility of $TiCl_4$ as a function pressure of $TiCl_4$ in the gas phase is	on of temperature and the partial is given by:
$log(x_1/mol \ fraction) = log(x_1/mol \ fr$	g(P/atm) - 2.29 - 230/(T/K)
The enthalpy of solution is:	
	1-1 - 4 2
	1 - 1.2
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

	437
COMPONENTS :	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</li> <li>(2) Lithium chloride; LiCl; [7447-41-8]</li> </ul>	Mui, J. H.; Flengas, S. N. Canad. J. Chem. <u>1962</u> , <b>40</b> , 997 -
<pre>(3) Potassium chloride; KCl; [7447-40-7]</pre>	1008.
VARIABLES: P/kPa: 101.325 (compiler)	PREPARED BY:
T/K = 693 - 773	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubilities (wt%) of titanin eutectic LiCl - KCl (59 - 41 mol%) a graphical form. The solubilities den are:	um tetrachloride in the molten at different temperatures are given in rived from the graph, by the compiler,
t/°C C₁ <sup>™</sup> /mass%	10 <sup>3</sup> x <sub>1</sub> <sup>b</sup> /mol fraction
420 1.5	4.39
443 1.8	5.27
478 2.9	8.49
490 3.95 500 5.0	11.57
Smoothed Data: Temperature dependence of C <sub>1</sub> is e log(C <sub>1</sub> /mass%) = 5. std. dev	expressed by the equation: 179 - 3508.6/(T/K) (compiler) 7. = 5.9% (compiler)
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium vapor pressure measurements. For diagram and details of the apparatus and procedure employed for solubility measurements refer to the original publication.	Commercially pure TiCl <sub>4</sub> was further purified by refluxing in the presence of Cu filings for about 2 hours and by fractional distillation in a dry atmosphere. Reagent grade LiCl and KCl were used for the preparation of the eutectic melt. The melt was purified by HCl treatment following the method of Boston and Smith (1).
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Boston, C. R.; Smith, G. P.
	J. Phys. Chem. <u>1958</u> , 62, 409.
L	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Titanium tetrachloride;	
$Ticl_4; [7550-45-0]$	1. Maksimov, V. S.; Smirnov, M. V.
(2) Sodium Chioride; NaCI; [7647-14-5]	Electrochem, Molten Solid
(3) Potassium chloride; KCl;	Electrolytes <u>1968</u> , 6, 30 - 36.
[7447-40-7]	continued
VARIABLES:	PREPARED BY:
T/K = 961 - 1214	N. D. Bongol
P/kPa = 25.939 - 70.826	N. P. Bansal
EXPERIMENTAL VALUES:	
For the solubility of TiCl4 in eq	uimolar NaCl - KCl melt, Henry's law
was obeyed up to $P_{TICI} = 0.7$ atm. V	values of solubility $(x_1)$ and the
constant K (= $x_1/P$ ) at various tempe	eratures are given as:
T/K P/atm 10 <sup>4</sup> x <sub>1</sub> /mol frac	tion 104 k/mol fraction atm <sup>-1</sup>
961 0.433 134	31
985 0.492 164	33
	27
1018 0.503 147	29
1036 0.433 108	25
1041 0.405 129	32
1041 $0.405$ $148$ $1055$ $0.276$ $84$	37
1070 0.492 129	26
1070 0.492 147	30
	24
1083 0.405 108	27
1085 0.401 125	31
1111 0.492 109	22
	23
1111 0.552 166	30 continued
······································	
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium at fived waper	Not given
pressure.	Not given.
Method employed for solubility	
measurements was the same as	
amount of the melt was kent in	
contact with the vapor phase	
consisting of argon and titanium	
tetrachloride for about 8 hrs.	
and analyzed for titanium using a	
calorimetric method.	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:
	1. Smirnov, M. V.; Maksimov, V. S.
	Fleatrochem Molton Solid
	Electrolytes <u>1967</u> , 5, 33.

COMPONENTS:	ORIGINAL MEASUREMENTS: continued
<ul> <li>(1) Titanium tetrachloride; TiCl₄; [7550-45-0]</li> <li>(2) Sodium chloride; NaCl; [7647-14-5]</li> <li>(3) Potassium chloride; KCl; [7447-40-7]</li> </ul>	2. Smirnov, M. V.; Maksimov, V. S.; Khaimenov, A. P. Zh. Neorg. Khim. <u>1966</u> , <b>11</b> , 1765 - 70 Russ. J. Inorg. Chem. (Eng. Transl.) <u>1966</u> , <b>11</b> , 945 - 48. (*).
VARIABLES:	PREPARED BY:
T/K = 961 - 1214	
P/kPa = 25.939 - 70.826	N. P. Bansal
	<u> </u>
1126  0.256  61	24
1126 0.405 83	20
1126 0.405 93	23
	21
1126 0.699 188	27
1131 0.401 95	24
1131 0.401 103	26
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	18
1194 0.552 97	18
1194 0.552 111	20
1196 0.699 131	19
	21
<pre>log(k/mol fraction atm<sup>-1</sup>) The dependence of solubility on tem TiCl<sub>4</sub> in the gas phase is given by:     log(x<sub>1</sub>/mol fraction) = log(P/ The enthalpy of dissolution is: ΔH/</pre>	$= -2.79 + 1300/(T/K) \pm 0.05$ operature and the partial pressure of fatm) - 2.79 + 1300/(T/K) ± 0.05 $fkJ mol^{-1} = -25.1$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
,	
l	ESTIMATED ERKOR:
	REFERENCES:

ICOMPONENTS !	ODTOTILIT MELOUDELEDING.
	ORIGINAL MEASUREMENTS:
(1) Titanium tetrachloride;	
TiCl <sub>4</sub> ; [7550-45-0]	Kurmaev, R. Kh.; Amirova, S. A.
(2) Sodium chloride; NaCl;	2n. Neorg. Knim. $1968$ , 13, 2258 - 62;
(3) Potassium chloride: KCl:	Russ. J. Inorg. Chem. (Eng. Transl.)
[7447-40-7]	1968, <b>13</b> , 1166 - 68. (*).
••••••	
VARIABLES:	PREPARED BY:
m/r = 072 = 1172	N. D. Bangal
1/K = 9/3 = 11/3	N. P. Ballsal
EXPERIMENTAL VALUES:	
Solubilities of TiCl <sub>4</sub> in molten	NaCl - KCl (50 - 50 mol%) mixture at
different temperatures are reported	to be:
	······································
+/°C C./mass%	$10^3 \text{ x}^{\text{a}}/\text{mol}$ fraction
·····	
700 2.84	9.95
750 2.68	9.39
800 2.39	8.37
	8.06
900 2.18	/.04
· · · · · · · · · · · · · · · · · · ·	
* Calculated by the compiler.	
Pressure of TiCl <sub>4</sub> was the vapo	or pressure of liquid TiCl <sub>4</sub> at 160°C.
Smoothed Data:	
Temperature dependence of $C_1$ is	expressed by the equation:
$log(C_{-}/mass^{*}) = -$	(0.243 + 678.8/(T/K)) (compiler)
109(01/11/2388) -	0.245 ( 0/0.0/(I/R) (Compiler)
std. de	ev. = 0.8% (compiler)
	· •
AUXILIAR	( INFORMATION
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS.
	booked has really of intenthes,
I Isothermal method.	
Voneur of titenium	Titanium tetrachloride was
Vapors of titanium tetrachloride were passed through	Titanium tetrachloride was of 99.99% purity.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified.
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:
Vapors of titanium tetrachloride were passed through the molten NaCl - KCl mixture, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the tetrachloride within 2 - 3 min. The saturated melt was solidified and titanium was determined volumetrically.	Titanium tetrachloride was of 99.99% purity. Sodium and potassium chlorides were of "chemically pure" grade. ESTIMATED ERROR: Nothing specified. REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Titanium tetrachloride;	Flengas S N	
(2) Sodium chloride; NaCl;	riengas, s. n.	
[7647-14-5] (3) Potassium chloride; KCl;	Ann. N. Y. Acad. Sci. <u>1960</u> , 79, 853 - 72.	
[7447-40-7]		
VARIABLES: T/K = 963 & 993	PREPARED BY:	
P/kPa = 87.993	N. P. Bansal	
EXPERIMENTAL VALUES:		
It has been reported that titanium tetrachloride vapors react with the fused NaCl - KCl (50 - 50 mol%) mixture. After an exposure of 30 hrs. to the vapors of titanium tetrachloride, the following concentrations are found in the melt solution:		
t/°C Solubility <sup>*</sup> /mass	to 10 <sup>2</sup> x <sub>1</sub> <sup>b</sup> /mol fraction	
690 14 720 5	4.91 1.75	
KCl present in the melt.		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Thermobalance technique. The diagrám and details of the	Commercially pure titanium tetrachloride was purified by	
apparatus and procedure employed for solubility measurements are described in the original paper. Briefly, the increase in weight of the melt in contact with vapors of titanium tetrachloride was directly observed with a quartz spring balance. Temperature of the melt was controlled within	distillation in the presence of copper shavings under a stream of argon. The first part of the distillate was rejected.	
within ± 0.5°C.	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES :	

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COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Vanadyl trichloride; VOCl<sub>3</sub>; [7727-18-6]</pre>	Kurmaev, R. Kh.; Amirova, S. A. Zh Neorg. Khim. <u>1968</u> , 13, 2258 -	
(2) Sodium chloride; NaCl; [7647-14-5]	62; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1969</u> , <b>13</b> , 1166 - 68. (*).	
VARIABLES:	PREPARED BY:	
T/K = 1093 - 1173	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of VOCl <sub>3</sub> in molten NaCl at different temperatures are reported to be:		
t/°C C <sub>1</sub> /mass%	$10^3 x_1^{*}$ /mol fraction	
820 1.9	6.41	
850 3.23	10.90	
860 3.44	11.61	
900 5.45	18.40	
<pre>Smoothed Data: Temperature dependence of C<sub>1</sub> is expressed by the relation: log(C<sub>1</sub>/mass%) = 6.879 - 7191/(T/K) (compiler) std. dev. = 2.4% (compiler)</pre>		
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Isothermal method. Vapors of vanadyl trichloride were passed through the molten NaCl, kept at a constant temperature, for about 10 - 15 min. The melt was saturated with the trichloride within 2 - 3 min. The saturated melt was solidified and analyzed for vanadium by the usual method of titration with aqueous acidified iron sulfate.	Vanadyl trichloride was obtained by repeated rectification of TiCl <sub>4</sub> - VOCl <sub>3</sub> mixture; the concentration of titanium tetrachloride in the vanadyl trichloride was less than 0.01%. Sodium chloride was "chemically pure" grade.	
	ESTIMATED ERROR:	
	Not specified.	
	REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<ul> <li>(1) Vanadyl trichloride; VOCl<sub>3</sub>; [7727-18-6]</li> <li>(2) Potassium chloride; KCl; [7447-40-7]</li> </ul>	Kurmaev, R. Kh.; Amirova, S. A. Zh. Neorg. Khim. <u>1968</u> , 13, 2258 - 62; Russ. J. Inorg. Chem. (Eng. Transl.) <u>1968,</u> 13, 1166 - 68. (*).	
WART ART RO		
VARIABLES:	PREPARED BY:	
T/K = 1073 - 1173	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of VOCl $_3$ in molten KCl at different temperatures are reported to be:		
t/°C C <sub>1</sub> /mass%	$10^3 x_1^{a}$ /mol fraction	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	19.36 40.87 49.05 58.08 67.12 83.90 108.85	
<pre>* Calculated by the compiler. Pressure of VOCl<sub>3</sub> was the vapor pressure of liquid VOCl<sub>3</sub> at 160°C. Smoothed Data: Temperature dependence of C<sub>1</sub> is given by the equation: log(C<sub>1</sub>/mass%) = 9.254 - 9162.9/(T/K) (compiler) std. dev. = 4.4% (compiler)</pre>		
AUXILIARY INFORMATION		
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
Isothermal method. Vapors of vanadyl trichloride were passed through the molten KCl, kept at a constant temperature, for about 10 - 15 min. The melt became saturated with the trichloride within 2 - 3 min. The saturated melt was solidified and analyzed for vanadium by the usual method of titration with acueous acidified	Vanadyl trichloride was obtained by repeated rectification of TiCl <sub>4</sub> - VOCl <sub>3</sub> mixture; the concentration of titanium tetrachloride in the vanadyl trichloride was less than 0.01% Potassium chloride was of "chemically pure" grade.	
iron sulfate.	ESTIMATED ERROR:	
	Nothing specified.	
	REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Vanadyl trichloride; VOCl <sub>3</sub> ;		
[7727-18-6]	Kurmaev, R. Kh.; Amirova, S. A.	
(2) Sodium chloride; NaCl; [7647-14-5]	<b>Zh. Neorg. Khim.</b> <u>1968</u> , <b>13</b> , 2258 - 62;	
(3) Potassium chloride; KCl;	Russ. J. Inorg. Chem. (Eng. Transl.);	
[7447-40-7]	1968, 13, 1166 - 68. (*).	
VARIABLES:	PREPARED BY:	
m/m = 0.70 + 11.70		
T/K = 9/3 - 11/3	N. P. Bansal	
EXPERIMENTAL VALUES:		
Solubilities of VOCl <sub>3</sub> in molten NaCl - KCl (50 - 50 mol%) mixture at different temperatures are reported to be:		
t/°C C <sub>1</sub> /mass%	10 <sup>3</sup> X <sub>1</sub> <sup>a</sup> /mol fraction	
700 5.23	20.07	
750 6.38	24.48	
	24.56	
900 10.80	41.44	
Calculated by the compiler.		
Pressure of VOCl <sub>3</sub> was the vapor	pressure of liquid VOCl <sub>3</sub> at 160 <sup>b</sup> C.	
Smoothed Data:		
Torresture dependence of Q is a	waves and has the wellsting.	
Temperature dependence of C <sub>1</sub> is e	expressed by the relation:	
$log(C_1/mass) = 2$	.483 - 1733/(T/K) (compiler)	
std deu $-4.1$ % (compiler)		
	(	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Tashbarmal mathed	Wanadal thicklands are alterined	
Vapors of vanadyl trichloride	by repeated rectification of	
were passed through the molten	TiCl <sub>4</sub> - VOCl <sub>3</sub> mixture; the concent	
NaCl - KCl mixture, kept at a	-ration of titanium tetrachloride in	
constant temperature, for about	vanadyl trichloride was less than	
saturated with the trichloride	Sodium chloride and potassium	
within 2 - 3 min. The saturated	chloride were of "chemically pure"	
melt was solidified and analyzed	grade.	
of titration with agueous		
acidified iron sulfate.	ESTIMATED ERROR:	
	Nothing specified.	
	nothing specified.	
	DEFEDENCIE	
	NULTERENCES;	
1	1	

	OPTCINAL WEACHDENENIES.
COMPONENTS .	ORIGINAL MEASUREMENTS:
(1) Methane; $CH_4$ ; [74-82-8] (2) Sodium nitrate: NaNO-:	Paniccia, F.; Zambonin, P. G.
[7631-99-4]	J. Chem. Soc. Faraday Trans. I 1972,
(3) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	68, 2083 - 89.
WARTARY RC .	
$\mathbf{W}_{\mathbf{X}} = \mathbf{F}_{\mathbf{X}} = \mathbf{F}_{\mathbf{X}}$	PREPARED BY:
T/K = 508 - 603 P/kPa = 102	N. P. Bansal
EXPERIMENTAL VALUES:	
The solvent was an equimolar mol nitrates. The solubilities of metha temperatures are:	ten mixture of sodium and potassium ne in the melt at different
т/к 10 <sup>в</sup>	K <sub>H</sub> /mol cm <sup>-3</sup> bar <sup>-1</sup>
	0.92
533	0.82
573	1.3
	1.5
Smoothed Data:	
The terrereture dependence of He	nula lou conchent V is siven bu
the relation:	$\frac{1}{100}$
log(K <sub>H</sub> /mol cm <sup>-3</sup> atm <sup>-</sup>	(1) = -6.38 - 865/(T/K) (compiler)
std. dev. = 0.8% (compiler)	
std. de	v. = 0.8% (compiler)
The enthalpy, AH, and the standa	v. = 0.8% (compiler)
std. de The enthalpy, AH, and the standa	v. = 0.8% (compiler) rd entropy, AS°, of solution are:
Std. de The enthalpy, $\wedge$ H, and the standa $\wedge$ H/kJ mol <sup>-1</sup> = 17 $\wedge$ S	w. = 0.8% (compiler) and entropy, $\Lambda S^\circ$ , of solution are: $M^{J} K^{-1} mol^{-1} = -33$ (at 533K)
std. de The enthalpy, $\wedge$ H, and the standa $\wedge$ H/kJ mol <sup>-1</sup> = 17 $\wedge$ S	v. = 0.8% (compiler) and entropy, AS°, of solution are: v/J K <sup>-1</sup> mol <sup>-1</sup> = -33 (at 533K)
std. de The enthalpy, $\Lambda$ H, and the standa $\Lambda$ H/kJ mol <sup>-1</sup> = 17 $\Lambda$ S	v. = 0.8% (compiler) rd entropy, AS°, of solution are: v/J K <sup>-1</sup> mol <sup>-1</sup> = -33 (at 533K)
std. de The enthalpy, ^H, and the stands ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY	v. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K <sup>-1</sup> mol <sup>-1</sup> = -33 (at 533K)
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE:	<pre>v. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) r INFORMATION Source AND PURITY OF MATERIALS;</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE:	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v°/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) r INFORMATION SOURCE AND PURITY OF MATERIALS: Nothern (Wich Purity South South)</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique.	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) v INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with </pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus	<pre>v. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K)  V INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Distributed by is for entropy in the second second</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v<sup>o</sup>/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) v INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARS METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly,	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) viscource AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular siever EVALUATE: Ascarite (A. M. Several hours to remove carbon dioxide and other acidic impurities and molecular siever acidic Astar Several hours to Several hours to Severa</pre>
std. de The enthalpy, ^H, and the stands ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) viscon in the second s</pre>
std. de The enthalpy, ^H, and the stands ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced et about one her	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) v INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieved 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to property the mole to be of the several of the property of the mole to be of the several were the mole to be of the several were the mole to be of the several acidic impurities and molecular sieved by the several to be of the several were the mole to be of the several were the mole to be of the several acidic to be a several to be the several acidic to be a several to be a several were the mole to be a several to be a several acidic to be a several to be a several to be a several acidic to be a several to be a several to be a several acidic to be a several to be a s</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARS METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) VINFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state.</pre>
std. de The enthalpy, ^H, and the stands ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were both d with a manemetor as a	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) v INFORMATION source AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR:</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) v INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified.</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) VINFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified.</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The welt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final pressure	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) in FORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified.</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final pressure variation after a suitable calibration.	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) VINFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified. REFERENCES:</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final pressure variation after a suitable calibration.	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) VINFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G.</pre>
std. de The enthalpy, ^H, and the stands ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARY METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final pressure variation after a suitable calibration.	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) in FORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. 1972, 38.</pre>
std. de The enthalpy, ^H, and the standa ^H/kJ mol <sup>-1</sup> = 17 ^S AUXILIARS METHOD/APPARATUS/PROCEDURE: Manometric technique. The details of the apparatus and procedure employed for solubility measurements are described elsewhere (1). Briefly, the melt was vacuum degassed for a few hours. The vacuum was disconnected and methane gas introduced at about one bar pressure. The melt was vigorously stirred and pressure changes were noted with a manometer as a function of time until the equilibrium was reached. The amount of gas dissolved was calculated from the final pressure variation after a suitable calibration.	<pre>vv. = 0.8% (compiler) ard entropy, AS°, of solution are: v/J K<sup>-1</sup> mol<sup>-1</sup> = -33 (at 533K) INFORMATION SOURCE AND PURITY OF MATERIALS: Methane (High Purity Grade) was purified by keeping in contact with Ascarite (A. H. Thomas Co., Philadelphia) for several hours to remove carbon dioxide and other acidic impurities and molecular sieve 5A (Carlo Erba, Milano) at -80°C to remove water. Reagent grade NaNO<sub>3</sub> and KNO<sub>3</sub> were used to prepare the melt which was filtered in the molten state. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Desimoni, E.; Paniccia, F.; Zambonin, P. G. J. Electroanal. Chem. <u>1972</u>, 38, 373.</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Chloroform; CHCl<sub>3</sub>; [67-66-3]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Allulli, S. J. Phys. Chem. <u>1969</u> , 73, 1084 - 87.
VARIABLES:	PREPARED BY:
one temperature: $T/K = 433$	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of chloroform in 160°C was found to be too small (<1) detected with the experimental method	the molten eutectic LiNO <sub>3</sub> - KNO <sub>3</sub> at 0 <sup>-7</sup> mol(mol of melt) <sup>-1</sup> mm <sup>-1</sup> ) to be od used.
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Manometric technique.	Chloroform (ERBA RP) was distilled under vacuum. LiNO <sub>3</sub> (ERBA RP) was dehydrated at 70°C to avoid hydrolysis. KNO <sub>3</sub> (ERBA RP) was finely powdered and dried under vacuum at 110°C for 24 hr.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ul> <li>(1) Acetone; (CH<sub>3</sub>)<sub>2</sub>CO; [67-64-1]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> </ul>	Allulli, S. J. Phys. Chem. <u>1969</u> , <b>73</b> , 1084 - 87.
VARIABLES:	PREPARED BY:
one temperature: T/K = 433	N. P. Bansal
EXPERIMENTAL VALUES:	
The solubility of acetone in the was found to be too small (<10 <sup>-7</sup> mo. with the experimental method employed	molten LiNO <sub>3</sub> - KNO <sub>3</sub> eutectic at 160°C l(mol of melt) <sup>-1</sup> mm <sup>-1</sup> ) to be measured ed.
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
Manometric, technique.	Acetone (ERBA RP ACS) was distilled under vacuum. LiNO <sub>3</sub> (ERBA RP) was dehydrated at 70°C to avoid hydrolysis. KNO <sub>3</sub> (ERBA RP) was finely powdered and vacuum dried at 110°C for 24 hr.
	ESTIMATED ERROR:
	Nothing specified.
	REFERENCES:

	ORIGINAL MEASUREMENTS:	
<pre>1 Boron trifluoride;BF<sub>3</sub>;[7637-07-2] 2 Lithium fluoride;LiF;[7789-24-4] 3 Beryllium fluoride;BeF<sub>2</sub>; [7789-49-7] 4 Zirconium fluoride;ZrF<sub>4</sub>;[7783-64-4] 5 Thorium fluoride;ThF<sub>4</sub>;[13709-59-6] 6 Uranium fluoride;UF<sub>4</sub>;[10049-14-6]</pre>	<ol> <li>Shaffer, J. H.; Grimes, W. R.; Watson, G. M.; Nuc. Sci. Eng. <u>1962</u>, 12, 337 - 340</li> <li>Shaffer, J. H. U. S. A. E. C. Rept. O. R. N. L -3127, <u>1960</u>, 12 - 13.</li> </ol>	
VARIABLES: T/K = 773 - 973 P/kPa = 121.59 - 192.52	PREPARED BY: N. P. Bansal	
EXPERIMENTAL VALUES: The values of Henry's law constant the melt LiF - BeF <sub>2</sub> - ZrF <sub>4</sub> - ThF <sub>4</sub> - temperatures are :	nt, $K_{H}$ , for the solubility of $BF_3$ in $UF_4$ (65-28-5-1-1 mol%) at different	
t/°C 10 <sup>2</sup> soly/mol liter <sup>-1</sup> at	$n^{-1}$ $10^{5}K_{H}^{A}/mol cm^{-3}atm^{-1}$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$26.7 \pm 0.5 \\ 13.2 \pm 0.1 \\ 8.26 \pm 0.25 \\ 3.46 \pm 0.17$	
- Calculated by the compiler.		
Smoothed data: Temperature dependence of $K_{H}$ can be expressed by the relation $\log(K_{H}/\text{mol cm}^{-3} \text{atm}^{-1}) = -7.857 + 3296.6/(T/K) \text{ (compiler)}$ Std. dev. = 2.5% (compiler) The enthalpy of the solution, $\Delta H$ , and the standard entropy of the solution, $\Delta S^{\circ}$ , are : $\Delta H/kJ \text{ mol}^{-1} = -63.18$ $\Delta S^{\circ}/J K^{-1} \text{ mol}^{-1} = -56.5$		
AUXILIARY		
	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	INFORMATION SOURCE AND PURITY OF MATERIALS:	
METHOD/APPARATUS/PROCEDURE: Stripping method. The solubility of BF <sub>3</sub> in the fluo- ride melt was determined by a met- hod similar to that described previously for determination of solubility of HF(1). At the exper- imental temperature, the melt was saturated by flushing with BF <sub>3</sub> . A known portion of the saturated melt was transferred to the stripping section of the apparatus. The BF <sub>3</sub> dissolved in the melt was recovered by sparging with helium. The str- ipped BF <sub>3</sub> was absorbed in an aque- ous saturated solution of NaCl. The amount of BF <sub>3</sub> was determined by Booth and Martin (2).	INFORMATION SOURCE AND PURITY OF MATERIALS: Not described. ESTIMATED ERROR: Not specified. REFERENCES:	

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Lithium oxide; Li<sub>2</sub>O; [12057-24-8] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Kurkjian, C. R.; Russell, L. E. J. Soc. Glass Tech. <u>1958</u> , 42, 130T - 144T.
VARIABLES: T/K: 1340 - 1740 H <sub>2</sub> O P/kPa = 101.3 (760 mmHg) mol% Li <sub>2</sub> O = 23.4 - 39	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubil in the temperature range 1340 - 174 temperature is shown in fig. 1 and	ity of H <sub>2</sub> O in various Li <sub>2</sub> O-SiO <sub>2</sub> melts 0 K. The solubility as a function of of Li <sub>2</sub> O content is shown in fig. 2. Temperature (°C) 1500 1400 1300 1200 1100
Fig. 1 Solubility of H <sub>2</sub> O in Li <sub>2</sub> O-SiO <sub>2</sub> melts as a function of temperature; mol% of Li <sub>2</sub> O: (1) 39, (2) 33, (3) 29, (4) 25, (5) 23.4	$\begin{array}{c} 0 \ 20 \\ \hline \\ 0 \ 10 \\ \hline \\ 0 \ 009 \\ \hline \\ 0 \ 008 \\ \hline \\ 0 \ 007 \\ \hline \\ 0 \ 006 \\ \hline \\ 0 \ 006 \\ \hline \\ 0 \ 006 \\ \hline \\ 0 \ 00060 \\ \hline \\ \hline \\ 0 \ 00000 \\ \hline \\$
AUXILIARY	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The stream of $H_2O$ at near one atm. was bubbled up through the melt in a Pt linered mullite tube. The determination of the solubility of $H_2O$ was made by the gas purging method with dried $O_2$ as described in ref. 1.	The samples were made by melting high purity sand and analytical reagent grade lithium carbonate.
	ESTIMATED ERROR:
	δ(ppm)/(ppm): within ± 0.10 (authors)
	REFERENCES :
	<pre>1. Russell, L. E. J. Soc. Glass Tech. <u>1957</u>, 41, 304T - 317T.</pre>

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water, H O. $[7722-19-5]$	Kunktion ( D. Dussell I I
(1) water; $H_2O$ ; [//32-18-5] (2) Lithium oxide; Li <sub>2</sub> O;	Kurkjian, C. R.; Russell, L. E.
[12057-24-8]	J. Soc. Glass Tech. <u>1958</u> , 42, 130T
(3) Silica; $SiO_2$ ; [7631-86-9]	- 144T.
<b>VARIABLES:</b> $T/K = 1473 - 1773$	PREPARED BY:
$H_2O P/kPa = 101.3$ (760 mmHg)	
mol% $Li_2O = 23.4 - 39$	M. Shinmei
EXPERIMENTAL VALUES:	
continued	
0-18-	P 1500°C -
010F	/ v/ 1400°C
014-	
Q 012-	/ / / <sup>3</sup> 1300°C
82	
<u> </u>	
	-
0.05	
0.04	-
	35 40
Mole per cent Li <sub>2</sub> O	
Fig. 2 Solubility of $H_2O$ in $Li_2O$ -SiO <sub>2</sub> melts as a function of mol% $Li_2O$	
AUXILIARY INFORMATION	
METUOD /APPARATUS /PROCEDURE .	COURCE AND DUDTTY OF MATERIALS.
TETHOD/R TRRATOS/TROCEDORE.	SOURCE AND FURIT OF PATERIALS;
	ESTIMATED ERROR:
	PEEEDENCES.
	INT LICIDES;


452 <sub>.</sub>

COMPONENTS :	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Lithium oxide: Li <sub>2</sub> O;	Uys, J. M.; King, T. B.
[12057-24-8] (3) Silica; SiO <sub>2</sub> ; [7631-86-9]	Trans. Met. Soc. AIME <u>1963</u> , 227, 492 - 500.
<b>VARIABLES:</b> $T/K = 1678 - 1925$	PREPARED BY:
$H_2O P/kPa = 19.5 (146 mmHg)$ mol% Li <sub>2</sub> O = 19 - 46	M. Shinmei
EXPERIMENTAL VALUES:	l
700	_
E con	
- 600 +-	
	0
5 500	•
	•
400	
0 19-21 Mol% Liz	o
● 44-46 Mol% Li₂	0
300	
5.2 5.4 5.6 5.	8 6.0 6.2 6.4
10°K/T	
Fig. 2 Solubility of U.O. in Ti.O. G	
Fig. 2 Solubility of $h_2$ in $h_2$ -S	102 merts as a runction of temperature.
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED EDDOD.
	STILLE EROR.
	REFERENCES :

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Water; $H_2O$ ; [7732-18-5] (2) Sodium oxide; $Na_2O$ ;	Kurkjian, C. R.; Russell, L. E.	
(3) Silica; $SiO_2$ ; [7631-86-9]	J. Soc. Glass Tech. <u>1958</u> , 42, 130T - 144T.	
$V_{A} P T_{A} P T_{F} S = \frac{\pi}{K} + \frac{1300}{1300} - \frac{1730}{1730}$	DECARED BY.	
$\begin{array}{c} \text{mol} \$ \ \text{Na}_2\text{O} = 16.6 - 50 \\ \text{H}_2\text{O} \ \text{P}/\text{kPa} = 7.3 \ (55 \ \text{mmHg}) - 101.3 \\ (760 \ \text{mmHg}) \end{array}$	M. Shinmei	
EXPERIMENTAL VALUES:		
The authors reported the solubility in the temperature range 1300 - 1730 graphical form: the solubility as a $Na_2O.2.4SiO_2$ at 1100°C is shown in f solubility with temperature and with 13-	ty of $H_2O$ in various $Na_2O-SiO_2$ melts K and at $P_{H_{2O}} = 7.3 - 101.3$ KPa in function of ${}^{2}H_2O$ partial pressure for ig. 1 and the variations of the $Na_2O$ content are shown in figs. 2, 3.	
mg H <sub>2</sub> O (per 15 gm glass)		
	25 30	
$(P_{H,0})^{i (mm^i)}$ Fig. 1 Solubility of H <sub>2</sub> O in Na <sub>2</sub> O.2.2SiO <sub>2</sub> as a function of P <sub>H O</sub> <sup>1/2</sup> at 1100°C: $\land$ - result by O <sub>2</sub> , $\lor$ - result by N <sub>2</sub> , solid <sup>2</sup> line - result in ref. 1		
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The stream of $O_2 + H_2O$ at nearly one atm. was bubbled up through the melt in a mullite tube. The determination of the solubility of $H_2O$ was carried out by the gas purging method with dried $O_2$ as described in ref. 1.	The samples were made by melting high purity sand and analytical reagent grade sodium carbonate.	
	ESTIMATED ERROR:	
	$\delta(ppm)/(ppm)$ : within ± 0.10 (authors)	
	REFERENCES:	
	1. Russell, L. E.	
	<b>J. Soc. Glass Tech.</b> <u>1957</u> , <b>41</b> , 304T - 317T.	

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COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Sodium oxide; Na<sub>2</sub>O;     [1313-59-3] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Kurkjian, C. R.; Russell, L. E. <b>J. Soc. Glass Tech.</b> <u>1958</u> , <b>42</b> , 130T - 144T.
VARIABLES: T/K = 1300 - 1730 H <sub>2</sub> O P/kPa = 7.3 - 101.3 mol% Na <sub>2</sub> O = 16.6 - 50	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	Temperature (°C)
continued	1500 1400 1300 1200 1100 1000
0.2	80
Fig. 2 Solubility of $H_2O$ in $Na_2O-SiO_2$ melts as a function of temperature; mol% $Na_2O$ : (1) 50, (2) 30, (2) 25 (4) 20 (5), (3) 25 (4) 20 (5), (4) 20 (5) (5), (4) 20 (5) (5), (5) (5) (5) (5) (5) (5) (5) (5) (5) (5)	(1) (1) (5) (4)
$ \begin{array}{c} (3) & 25, & (4) & 20, & (5) \\ 16.6 \\ \begin{array}{c} 0, & 0.10 \\ \hline & & 0.02 \\ \end{array} $	
0 00	
0 05	0 00060 0 00070 0 00080 K/T
AUXILIAR	Y INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:



COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Sodium oxide; Na<sub>2</sub>O;     [1313-59-3] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Tomlinson, J. W. J. Soc. Glass Tech. <u>1956</u> , 40, 25T - 31T.
VARIABLES: T/K = 1173, 1273, 1373 $H_2O P/kPa = 6.5 - 101.3$ mass ratio $m_2/m_3 = 31/69$	PREPARED BY: M. Shinmei

The author reported the solubility of  $H_2O$  in sodium silicate, approxima -tely  $Na_2O.2SiO_2$ , at 900, 1000 and 1100°C and at  $P_{H_2O} = 101.3$ , 24.1, 11.9 and 6.5 kPa in graphical form only. The  $H_2O$  solubility at 1100°C with various  $H_2O$  pressures is shown in fig. and the effect of temperature on the logarithm of the solubility of  $H_2O$ corrected at  $P_{H_2O} = 101.3$  KPa is in fig. 2



#### METHOD/APPARATUS/PROCEDURE:

One gram of sample rod in a Pt boat was equilibrated with the stream of  $N_2$  +  $H_2O$  at nearly one atm. and was quenched. Analysis of the melts for  $H_2O$  was carried out by reheating, trapping in a liquid air trap and determining the pressure change on freezing in solid  $CO_2$  and evaporating into a known volume.

#### \_\_\_\_\_

AUXILIARY INFORMATION

SOURCE AND PURITY OF MATERIALS:

Sodium silicate was prepared by fusing Analar sodium carbonate with silica obtained from selected pieces of mineral quartz. After sintering at 500°C to remove  $CO_2$ , the sample was fused in vacuum, and rods 0.5 mm diameter were drawn from the melt in air.

ESTIMATED ERROR:

 $\delta(ppm)/(ppm): < \pm 0.15$  (author)

**REFERENCES:** 

COMPONENTS: ORIGINAL MEASUREMENTS: Walsh, J. H.; Chipman, J.; King, T. B.; Grant, N. J. (1) Water; H<sub>2</sub>O; [7732-18-5] (2) Sodium oxide; Na<sub>2</sub>O; [1313 - 59 - 3]J. Metals 1956, 8, 1568 - 1576. (3) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: PREPARED BY: T/K = 1396 & 1640 mol ratio  $n_2/n_3 = 2.4$ M. Shinmei  $H_2O P/kPa = 25.3$  (190 mmHg) EXPERIMENTAL VALUES: The authors measured the solubility of  $H_2O$  in 30%  $Na_2O$  - 70%  $SiO_2$  (mass) glass melts with 190 mmHg of  $H_2O$  vapor pressure at 1123°C and 1367°C and reported the calculated solubility for 760 mmHg of  $H_2O$  by using the equation:  $C_{H_0} = k P_{H_0}^{1/2}$ where  $C_{H\ O}$  is the solubility of  $H_2O$  and k is constant for constant<sup>2</sup>temperature and for constant composition of the melt. ppm (mass/mass) of H<sub>2</sub>O Temperature at  $P_{H_{O}} = 25.33 \text{ kPa}^{+}$ °C at  $P_{H_{O}} = 101.3$  kPa 1123 443 885 1367 846 423 \* Actual experimental value (estimated by M. S.) AUXILIARY INFORMATION METHOD / APPARATUS / PROCEDURE : SOURCE AND PURITY OF MATERIALS: A slag in a Pt crucible was The slags were prepared by equilibrated with the stream mixing the chemically pure of nearly one atm., of  $N_2 + H_2O$ , and was quenched by lowering the Crucible into either Hg or  $H_2O$ components. The solubility of H<sub>2</sub>O was determined by applying the vacuum fusion technique to the sample wrapped with Al foil at about 1600°C. ESTIMATED ERROR: analysis of  $H_2O$ :  $\delta(ppm)/(ppm) > \pm 0.048$ (authors) **REFERENCES:** 

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Potassium oxide; K<sub>2</sub>O; [12136-45-7] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Kurkjian, C. R.; Russell, L. E. <b>J. Soc. Glass Tech.</b> <u>1958</u> , <b>42</b> , 130T - 144T.
VARIABLES: T/K: 1230 - 1820 H <sub>2</sub> O P/kPa = 101.3 (760 mmHg) mol% K <sub>2</sub> O = 17.5 - 45	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubil: in the temperature range about 1230 function of temperature is in fig. 3	ity of $H_2O$ in various $K_2O$ -SiO <sub>2</sub> melts - 1820 K. The solubility as a 1 and of $K_2O$ is in fig. 2.
	Temperature (°C) 1500 1400 1300 1200 1100
Fig. 1 Solubility of $H_2O$ in $K_2O-SiO_2$ melts as a function of 1/T; mol% $K_2O$ : (1) 45, (2) 40, (3) 33.3, (4) 31.6, (5) 20.3, (6) 17.5 Fig. 0.15 Fig. 0.15 Fig. 0.15 Fig. 0.15 Fig. 0.15 Fig. 0.10 Fig. 0.10	(1) - (1)
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The stream of $H_2O$ at near one atm. was bubbled up through the melt in a mullite tube. The determination of the solubility of $H_2O$ was made by the gas purging method with dried $O_2$ as described in ref. 1.	The samples were made by melting high purity sand and analytical reagent grade potassium carbonate.
	ESTIMATED ERROR:
	$\delta(ppm)/(ppm)$ : within t 0.10 (authors)
	REFERENCES:
	1. Russell, L. E.
	<b>J. Soc. Glass Tech.</b> <u>1957</u> , <b>41</b> , 304T - 317T.



COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Cesium oxide; Cs<sub>2</sub>O;     [20281-00-9] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Russell, L. E. <b>J. Soc. Glass Tech. <u>1957</u>, 41,</b> 304T - 317T.		
VARIABLES: T/K: $1150 - 1400$ H <sub>2</sub> O P/kPa = $101.3(760 \text{ mmHg})$ mol ratio n <sub>2</sub> /n <sub>3</sub> = $0.5$	PREPARED BY: M. Shinmei		
EXPERIMENTAL VALUES:			
The author reported the solubility of $H_2O$ in $Cs_2O.2SiO_2$ melts as a function of reciprocal temperature in the temperature range about 1150 - 1400 K, and in graphical form only.			
1100 1000	900 (°C)		
0.15-			
₩ 0.09 0.08			
± 0.07- ▽			
	▽ -		
0.05-	-		
	_		
3			
0.03-	-		
0.02.0 8	• • • • •		
10 <sup>4</sup> K	Т		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The stream of $O_2 + H_2O$ at near one atm. was bubbled up through the melt in a mullite tube. The determination of the solubility of $H_2O$ was made by the gas purging method with dried $O_2$ (Although no details about the partial pressure of $H_2O$ bubbled were given the solubility data shown are corresponding to that	The samples were made by melting high purity sand and analytical reagent grade cesium carbonate.		
$a = \frac{r_{HO}}{2} = 1 a = a = 1$	ESTIMATED ERROR:		
	$\delta(ppm)/(ppm)$ : it may be more than ± 0.10 because of high volatility of Cs <sub>2</sub> O. (authors)		
	REFERENCES:		

					4
OMPONENTS:		ORIGINAL MEAS	UREMENTS:		·
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>		Walsh, J. King, T. H	H.; Chipman B.; Grant, N	n, J.; N. J.	
[1305-78-8] (3) Silica; SiO <sub>2</sub> ; [7631-86	5-9]	J. Metals	<u>1956</u> , 8, 1	568 - 1576.	
ARIABLES: $T/K = 1823$ $H_2O P/kPa = 101.3$ (1 at Mol% CaO = 34.5 - 58.	:m.) 7	PREPARED BY:	M. Shinme		
XPERIMENTAL VALUES:		l			
The authors reported th 1500°C under steam atmosph	e solubil ere.	ity of H in	various Ca	O-SiO₂ melts	a 1
Mass %	Mo	1 %	ppm(mas	ss/mass)	
CaO SiO <sub>2</sub>	CaO	SiO₂	Н*	H <sub>2</sub> 0**	_
33 67 50 50 57 43	34.5 51.7 58.7	65.5 48.3 41.3	74.3 82.9 85.1	664 741 760	-
	AUXILIARY	INFORMATION			
METHOD/APPARATUS/PROCEDURE: A slag in a Pt crucible was equilibrated with a stream of nearly one atmosphere of $N_2 + H_2O$ or $H_2O$ , and was quenched by lowering the crucible into either Hg or $H_2O$ . The solubility of $H_2O$ was analyzed as a H content by the vacuum fusion technique for the sample wrapped with Al foil at		The sl mixing the constituer	lags were pi chemically its.	epared by pure	
sample wrapped with Al foi	as the r the l at				
sample wrapped with Al foi about 1600°C.	as the r the l at	ESTIMATED ER Analysis δ(ppm)/(p	ROR: of $H_2O$ : opm) = $\pm 0.0$	48 (autho	rs)

COMPONENTS :	ORIGINAL MEASUREMENTS:	
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1205-78-8]</pre>	Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
(3) Silica; SiO <sub>2</sub> ; [7631-86-9]	<b>Trans. Iron Steel Inst. Jpn.</b> <u>1966</u> , <b>6</b> , 225 - 232.	
VARIABLES: Molt CaO: $43 - 61$	PREPARED BY:	
T/K = 1773, 1823, 1873	M. Shinmei	
EXPERIMENTAL VALUES:		
The authors reported the solubility of $H_2O$ in various CaO-SiO <sub>2</sub> melts at 1500°C, 1550°C and 1600°C under the pressure of $H_2O$ at 289 mm Hg, an in graphical form only. The effect of temperature on the solubility is shown in fig. 1 and of composition of the melt at 1600°C is shown in fig. 2.		
Tempera 1600	ture (℃)	
······································	1900	
s/mat		
(mass	•	
, H		
) -4.30 0 1		
5.3 5.4	5.5 5.6 (×10-1)	
1/7	(*K)	
fig. 1, Effect of temperature on $37$ mass% CaO melts; $P_{H_{2O}}$	hydrogen content in 63 mass% SiO₂ - = 38.5 KPa.	
2	continued	
AUXILIARY	INFORMATION	
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
The completine Dt sweible	Coo. Mado by thermal deservation	
was equilibrated with the $H_2O$ +	of reagent grade carbonate	
was quenched. The $H_2O$ in the sample was reduced to $H$ by $\lambda$ at	(0VEL 57.56) SiO Ground quartz (over 99 99)	
1550 - 1600°C and was measured volumetrically by using a micro-	5102. Ground quartz (over 33.34)	
Orsat gas analyzer.		
	ESTIMATED ERROR:	
	analysis of $H_2O$ : $\delta(ppm)/(ppm) = \pm 0.08$ (authors)	
	REFERENCES :	



COMPONENTS:	ORIGINAL MEASUREMENTS:	
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide: CaO:</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
[1305-78-8]	Trans. Iron Steel Inst. Jpn. <u>1969</u> ,	
(3) SILICA; SIU <sub>2</sub> ; $[7631-86-9]$	<b>9</b> , 189 - 195.	
VARIABLES: $T/K = 1773 - 1873$	PREPARED BY:	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	M. Shinmei	
	L	
EXPERIMENTAL VALUES:		
The authors reported the solubil function of temperature, and in gray	ity of water in CaO-SiO2 melts as a phical form only.	
Iamaa	ratura 90	
2.68_1600	1550 1500	
2:00		
-255 20		
2,00 2.00		
£2.54		
100		
2,62	>°	
-1		
2,601	. 5.5 . 5.6	
10 <sup>4</sup> K/T		
fig.l, Solubility of water in Cao	-SiO <sub>2</sub> melts at P <sub>H2O</sub> = 38.5 KPa;	
molratio of CaO/SiO <sub>2</sub> are, -	<b>—●</b> — 0.63, <b>–</b> -01.26.	
AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The sample in a Pt crucible	CaO: made by thermal decomposition	
Ar stream at nearly one atm., and	carbonate	
was quenched in a water cooled Cu mold.	SiO <sub>2</sub> : high purity guartz (over 99.9%)	
$H_2O$ in a quenched sample was		
1600°C, which was measured		
volumetrically by using a micro- Orsat gas analyzer.		
	ESTIMATED EDDOD.	
	BUTHATED BRIOK.	
	analysis of Hydrogen: δ(ppm)/(ppm) = ± 0.06 (authors)	
	REFERENCES:	
	1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
	<b>Trans. Iron Steel Inst. Jpn.</b> <u>1966</u> , <b>6</b> , 225 - 232.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Chem. Met. of Iron and Steel Proc. of the Intl. Symp. on Met. Chem Appl on Ferrous Metallurgy held: Univ. of Sheffield, July 19 - 21, 1971, The Iron and Steel Inst. London, UK, <u>1973</u> , 28 - 30.
VARIABLES: $T/\kappa = 1873$ H <sub>2</sub> O P/kPa = 38.5 (289 mmHg) mol ratio n <sub>2</sub> /n <sub>3</sub> = 0.63 - 1.26	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES: The authors reported the solubi at 1600°C in graphical form. The a this file.	lity of H <sub>2</sub> O in various CaO-SiO <sub>2</sub> melts uthors provided the original data for



AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The sample in a Pt crucible was equilibrated with the stream of Ar + $H_2O$ of nearly one atm., and was quenched in a $H_2O$ cooled Cu mold. $H_2O$ in the sample was reduced to $H_2$ with Al at 1550 - 1600°C, and was measured volumetrically by using a micro-Orsat gas analyzer.	<pre>CaO: Made by thermal decomposition of reagent grade carbonate (over 99.5%) SiO<sub>2</sub>: Ground quartz (over 99.9%)</pre>
	ESTIMATED ERROR:
	Analysis of $H_2O$ : $\delta(ppm)/(ppm) = \pm 0.08$ (authors)
	REFERENCES:
	<ol> <li>Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T.</li> </ol>
	<b>Trans. Iron Steel Jpn.</b> <u>1966</u> , <b>6</b> , 225 - 232.

COMPONENTS :	ORIGINAL MEASUREMENTS:				
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>	Wahlster, M.; Reichel, H. H.				
[1305-78-8] (3) Silica; SiO <sub>2</sub> ; [7631-86-9]	Arch. Eisenhuttenwes. <u>1969</u> , <b>40</b> , 19 - 25.				
$m_{\mu} = 1072$					
$\begin{array}{rcl} & 17K - 1873 \\ H_2O \ P/kPa = 101.3 & (760 \ mmHg) \\ & mol \$ \ SiO_2 = 45 \ - \ 60 \end{array}$	M. Shinmei				
EXPERIMENTAL VALUES:					
The authors reported the solubilities and at $P_{H_{O}} = 101.3 \text{ kPa}$ in mass% of	ty of $H_2O$ in CaO-SiO <sub>2</sub> melts at 1873 K H (Actual measurements were carried				
out at $P_{H_2O} = 31.2 \text{ kPa}$ ).					
Composition of melt	Solubility of H <sub>2</sub> O				
CaO SiO <sub>2</sub>	H H <sub>2</sub> 0*				
40 60 45 55	58 518 51 456				
50 50 55 45	48 429 87 777				
AUXILIARY	INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
The samples in Pt crucibles were equilibrated with the stream of Ar + $H_2O$ at near one atm. and were quenched. The solubility of $H_2O$ was determined by the method described in ref. 1.	Not described.				
	ESTIMATED ERROR:				
	analysis of $H_2$ : $\delta(ppm)/(ppm) = \pm 0.05$ (authors)				
	REFERENCES:				
	1. Obst, KH.; Malissa, H.				
	<b>Arch. Eisenhuttenwes.</b> <u>1959</u> , <b>30</b> , 601 - 603.				



function of reciprocal temperature in the temperature range 1660 - 1870 K, and in graphical form only.



02. (Although no details on the partial pressure of H<sub>2</sub>O bubbled were given, the solubility data shown are coresponding to that at  $P_{H_0} = 1$  atm.)

The samples were made by melting high purity sand and analytical reagent grade strontium carbonate.

ESTIMATED ERROR:

 $\delta(ppm)/(ppm)$ : within  $\pm$  0.10 (author)

**REFERENCES:** 

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	Russell, L. E.
(2) Barium oxide; BaO;	T Sog Glass Moch 1057 41 304m
(3) Silica; $SiO_2$ ; [7631-86-9]	- 317T.
VARIABLES: $T/K$ : 1630 - 1780 H <sub>2</sub> O P/kP <sub>2</sub> = 101.3 (760 mmHg)	PREPARED BY:
Mol ratio $n_2/n_3 = 0.5$	M. Shinmei
EXPERIMENTAL VALUES:	
The author reported the solubility function of reciprocal temperature and in graphical form only.	cy of H <sub>2</sub> O in BaO.2SiO <sub>2</sub> melts as a in the temperature range 1360 - 1780 K,
1600 1400	1200 (°C)
0.06	-
V	
0.05	-
s	
E 0.04 - V	4
l lt	
l ute	
8 0.03	$\mathbf{N}$
ate	
3	
6.0	7.0 K/T
	~ -
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The stream of $O_2 + H_2O$ at a	The samples were made by melting
total pressure near 1 atm. was	high purity sand and analytical
mullite tube. The determination of	reagent grade barium carbonate.
the solubility was carried out by	
$O_2$ (Although no details about the	
partial pressure of $H_2O$ were given	
corresponding to that at	
$P_{H_2O} = 1 \text{ atm.})$	
	ESTIMATED ERROR:
	$\delta(ppm)/(ppm)$ : within ± 0.01 (author)
	REFERENCES :
1	

COMPONENTS :	ORIGINAL MEASUREMENTS:			
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Iron oxide; FeO; [1345-25-1] (3) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Uys, J. M.; King, T. B. Trans. Met. Soc. AIME <u>1963</u> , 227, 492 - 500.			
VARIABLES: $T/K = 1673$ H <sub>2</sub> O P/ kPa = 19.5 (146 mmHg) mol% FeO: 59 - 100	PREPARED BY: M. Shinmei			

The authors reported the solubility of  $H_2O$  in "FeO"-SiO<sub>2</sub> melts as a function of FeO concentration at 1400°C and at  $P_{H_2O} = 146$  mmHg in graphical form only.



COMPONENTS:		ORIGINAL MEASUREMENTS:				
<pre>(1) Water; 1 (2) Iron ox: (3) Silica;</pre>	H <sub>2</sub> O; [7732-18-5] ide; FeO; [1345-25- SiO <sub>2</sub> ; [7631-86-9]	·1]	Wahlster, M.; Reichel, HH. Arch. Eisenhuttenwes. <u>1969</u> , 40, 19 - 25.			
VARIABLES: $H_2O P/k$ mol <sup>9</sup>	T/K = 1873 Pa = 101.3 (760 mmH FeO = 55 - 100	ig)	PREPARED BY: M. Shinmei			
EXPERIMENTAL VALUES:						
The autho	ors reported the so	lubili	ity of H <sub>2</sub> O in various FeO-SiO <sub>2</sub> melts			
at 1873 K ar	nd at $P_{H_2^{\circ}} = 101.3$	kPa (a	actual measurements were carried out			
at $P_{H_2O} = 31$	2 kPa.).					
	Composition of Me	lt	Solubility of H <sub>2</sub> O			
	FeO SiO	2	ppm H H <sub>2</sub> O*			
	55         45           68         32           73         27           80         20           90         10           100         0		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			
* Calculated by the compiler.						
	AUX	ILIARY	INFORMATION			
METHOD/APPARATUS/	PROCEDURE :		SOURCE AND PURITY OF MATERIALS:			
The sampl were equilib of Ar + H₂O were quenche The solub determined b described in	es in Pt crucibles rated with the str at nearly one atm. d. ility of H <sub>2</sub> O was y the method ref. 1.	eam and	Not described.			
			ESTIMATED ERROR:			
			analysis of hydrogen $\delta(ppm)/(ppm) = \pm 0.05$ (authors)			
			REFERENCES:			
		ĺ	1. Obst, KH.; Malissa, H.			
			Arch. Eisenhuttenwes. <u>1959</u> , 30, 601 - 603.			



COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Cobalt oxide; CoO; [1307-96-6] (3) Silica: SiO-: [7631-86-9]	Uys, J. M.; King, T. B. Trans. Met. Soc. AIME <u>1963</u> , 227, 492 - 500.
(3) B1100, B102, [,001 00 0]	DEEDADED BY.
$H_2O P/kPa = 19.5 (146 mmHg)$ mol% CoO: 50 - 73	M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubil. function of mol% of CoO at 1500°C at only.	ity of $H_2O$ in CoO-SiO <sub>2</sub> melts as a nd $P_{H_2O} = 146$ mmHg in graphical form
200	$\mathbf{\hat{\mathbf{A}}}$
Content, PPA	
50 55 60 Mole Pe	- 65 70 75 rceni CaO
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The samples in Pt crucibles were equilibrated with the stream of $N_2$ + $H_2O$ at near one atm., and were quenched. The solubility of $H_2O$ was determined by the method of analysis described in ref. 1.	The silicates were prepared by mixing together the purest available constituents. SiO <sub>2</sub> : Brazilian rock quartz CoO: Thermal decomposition of carbonate.
	ESTIMATED ERROR: Although not described in the original paper, it
	is estimated to be similar to that in ref. 1 $\delta(ppm)/(ppm) = \pm 0.05$ (M.S.) REFERENCES:
	1. Walsh, J. H.; Chipman, J.; King, T. B.; Grant, N. J.
	Trans. Met. Soc. AIME <u>1956</u> , 206, 1568 - 1576.

COMPONENTS :	ORIGINAL MEASUREMENTS:			
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Silica; SiO<sub>2</sub>; [7631-86-9] (3) Zinc oxide; ZnO; [1314-13-2]</pre>	Uys, J. M.; King, T. B. <b>Trans. Met. Soc. AIME</b> <u>1963</u> , 227, 492 - 500.			
VARIABLES: mol% ZnO = 44 - 72.5 H <sub>2</sub> O P/kPa = 19.5 (146 mmHg) T/K = 1796, 1835, 1871, 1925	PREPARED BY: M. Shinmei			

**EXPERIMENTAL VALUES:** 

The authors reported the solubility of  $H_2O$  in various  $SiO_2$ -ZnO melts as a function of mol% of ZnO at  $P_{H_{O}}=146$  mmHg (fig. 1) and the temperature effect on the solubility (fig. 2),<sup>2</sup>in graphical form only.



Fig. 1 Solubility of  $\rm H_2O$  in SiO\_2 -ZnO melts as a function of mol% ZnO

METHOD/APPARATUS/PROCEDURE:



Fig. 2 Solubility of H<sub>2</sub>O in SiO<sub>2</sub>-ZnO melts as a function of reciprocal temperature

The silicates were prepared by

SOURCE AND PURITY OF MATERIALS:

#### AUXILIARY INFORMATION

The samples in Pt crucibles were equilibrated with the stream mixing together the purest available of  $N_2 + H_2O$  at nearly one atm., constituents. SiO<sub>2</sub>: Brazilian rock quartz ZnO: Reagent grade chemicals and were quenched. The solubility of  $H_2O$  was determined by the method of analysis described in ref.1.

ESTIMATED ERROR:

Not described in the paper, but is estimated to be similar to that in ref. 1;  $\delta(ppm)/(ppm) = \pm 0.05$ (M. S)

**REFERENCES:** 

1. Walsh, J. H.; Chipman, J.; King, T. B.; Grant, N. J.

> Trans. Met. Soc. AIME 1956, 206, 1568 - 1576.

COMPONENTS: **ORIGINAL MEASUREMENTS:** Uys, J. M.; King, T. B. (1) Water; H<sub>2</sub>O [7732-18-5] Silicate melt components: Trans. Met. Soc. AIME, <u>1963</u>, 227, (2) Calcium oxide; CaO [1305-78-8] (3) Lithium oxide; Li<sub>2</sub>O 492 - 500. [12057-24-8] (4) Silica; SiO<sub>2</sub> [7631-86-9] T/K : 1573, 1673 VARIABLES: PREPARED BY: H<sub>2</sub>O P/kPa : 2.1(16 mmHg) M. Shinmei - 19.5(146mm Hg) Mol % (Li<sub>2</sub>O + CaO) : 26 - 70 **EXPERIMENTAL VALUES:** The authors reported the solubility of  $H_2O$  in various CaO -  $Li_2O$  -  $SiO_2$  melts as the function of mol% (CaO +  $Li_2O$ ) at 1300°C and 1400°C (fig. 1, 2) and of square root of  $H_2O$  pressures at 1300°C (fig. 3), in graphical form only. o 1300° C • 1400°C 4000 300 17 India 200 5 Male Percent | Lig0+CaO3 Fig. 1 - Solubility of water in Li<sub>2</sub>O-CaO-SiO<sub>2</sub> melts as function of mole pct base. Pct Li<sub>2</sub>O approximately constant.  $p_{H_2O} = 146$  mm Hg. AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The samples in Pt crucibles The silicates were prepared by were equilibrated with the stream mixing together the purest available of  $N_2$  +  $H_2O$  at near one atm., and constituents. were quenched. The solubility of H<sub>2</sub>O was SiO<sub>2</sub>: Brazilian rock quartz determined by the method of analysis described in ref. 1. CaO, Li<sub>2</sub>O: Made by thermal decomposition of carbonates. ESTIMATED ERROR: Not described, but it is estimated to be similar to that in ref. 1.  $\delta(ppm)/(ppm) \pm 0.05$  (M. S.) REFERENCES: Walsh, J. H.; Chipman, J.; King, T. B.; Grant, N. J. Trans. Met. Soc. AIME 1966, 206, 1568 - 1576.





COMPONENTS:	ORIGINAL MEASUREMENTS:			
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Chem. Met. of Iron & Steel Proc. of the Int. Symp. on Met. Chem Appl.			
<pre>(3) Lithium oxide; Li<sub>2</sub>O; [12057-24-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	on Ferrous Met. Univ. Sheffield, 19 - 21 July 1971, The Iron & Steel Inst., London, UK, <u>1973</u> , pp. 28 - 30.			
$\pi/\kappa = 1000$				
VARIABLES: $T/R = 1823$ $H_2O P/kPa = 38.5 (289 mmHg)$ mol% Li <sub>2</sub> O = 17.2 - 42.5 mol ratio = $n_2/n_4 = 0.26 - 1.84$	M. Shinmei			

EXPERIMENTAL VALUES:

The authors reported the solubility of  $H_2O$  in various CaO -  $\text{Li}_2O$  -  $\text{SiO}_2$  melts at 1450°C in graphical form. The original data were provided by the authors.

	mol%		mole ratio	ppm(mass/ma	ss)
CaO	Li₂O	SiO <sub>2</sub>	CaO/SiO <sub>2</sub>	H <sub>2</sub> O	
27.0	17.2	55.8	0.49	402	
31.1	17.4	51.5	0.60	371	
33.3	22.3	44.5	0.75	443	
41.9	18.9	39.2	1.07	644	
11.7	27.2	61.1	0.63	516	
14.1	30.1	55.8	0.25	479	
22.3	27.4	50.2	0.45	461	
29.0	28.1	42.9	0.68	555	
37.3	27.2	35.5	1.05	1125	
10.4	35.8	53.9	0.80	528	
13.5	34.8	51.7	0.26	51.2	
20.3	36.7	43.0	1.26	558	•
24.7	35.4	40.0	1.43	705	
29.4	34.3	36.3	0.81	1125	
9.5	42.1	48.4	0.91	720	
12.0	42.5	45.5	1.03	618	
18.4	41.2	40.3	1.30	860	continued
<b></b>		AUXT	LIARY INFORMATION	1. 11	**

METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The sample in a Pt crucible CaO, LiO<sub>2</sub>: Reagent grade chemicals SiO<sub>2</sub>: Transparent high purity silica was equilibrated with the Ar +  $H_2O$  stream at nearly one atm., was washed and cleaned (over and was quenched. 99.9%)  $H_2O$  in a sample was measured as H<sub>2</sub> volumetrically by a micro-Orsat gas analyzer after reducing with Al at 1550 - 1600°C. ESTIMATED ERROR: analysis of H<sub>2</sub>:  $\delta(\text{ppm})/(\text{ppm}) = \pm 0.06$ (authors) **REFERENCES:** 1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. 1966, 6, 225 - 232. 2. Iguchi, Y.; Ban-ya, S.; Fuwa, T. Ibid. 1969, 9, 189 - 195.

COMPONENTS:				ORIGINAL MEAS	UREMENTS :		
(1) Water; H <sub>2</sub> O; [7732-18-5]			18-5]	Iguchi, Y.; Ban-ya, S.; Fuwa, T.			
(2) Calc	ium oxi	.de; Cao	;	Chem. Met.	of Iron & Steel Proc.	of	
[130	[1305-78-8]		the Int. S	Symp. on Met. Chem App	p1.		
	110m OX1	ae; 1120	J;	19 21 T	Met. Univ. Sherrieid,	<b>.</b> 1	
(4) Sili	.ca; SiC	) <sub>2</sub> ; [763]	1-86-9]	Inst., Lor	ndon, UK, 1973, pp. 28 -	30.	
	•		-			1	
VARIABLES:	T/	K = 1823	3	PREPARED BY:			
H <sub>2</sub> O	P/kPa =	38.5 (2	289 mmHg)				
mc	01% Li₂O	= 17.2	- 42.5		M. Shinmei		
mol r	atio n <sub>2</sub>	$/n_{4} = 0.$	.26 - 1.84				
EXPERIMENTAL	VALUES:	cont	inued				
		mol%	r	nole ratio	ppm(mass/mass)		
			<u> </u>				
	CaO	Li₂O	SiO2	CaO/SiO <sub>2</sub>	H <sub>2</sub> O		
1	9.1	39.6	41.3	1.25	911		
2	1.0	41.5	37.5	1.47	1033		
2	2.0	41.5	36.5	1.53	1260		
2	6.2	41.1	32.6	1.84	1999		
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METHOD/APPAR	ATUS /PRO	CEDURE:		SOURCE AND PL	URITY OF MATERIALS:		
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Calcium exide: Case	Iguchi, Y.; Ban-ya, S.; Fuwa, T.
(2) Calcium Oxide; CaO; [1305-78-8]	the Int. Symp. on Met. Chem - 3mp.
(3) Lithium oxide; Li <sub>2</sub> O;	on Ferrous Met. Univ. Sheffield.
[12057-24-8]	19 - 21 July 1971, The Iron & Steel
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]	Inst., London, UK, <u>1973</u> , pp. 28 - 30.
L	1
VARIABLES: $T/K = 1823$	PREPARED BY:
$H_2O P/kPa = 38.5$ (289 mmHg)	
mol% $\text{Li}_2 O = 17.2 - 42.5$	M. Shinmei
$mot \ latto \ n_2/n_4 = 0.20 - 1.84$	
EXPERIMENTAL VALUES: continued	
•	
Fig. 1 Solubility of water in Coo	- Li_O - Sio_ malte as a function of
CaO/SiO <sub>2</sub> .	
5000	· · · · · · · · · · · · · · · · · · ·
mass % mol%	/ /
L1 <sub>2</sub> 0 L1 <sub>2</sub> 0	/ /
0031	- / _
-0- 10 17.5	/ 7
15 27.5	/
	<b>▲</b> /
2.5 4±.5 g <sup>1</sup> 200	- 7,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
$P_{H_{O}} = 188 \text{ mmHg}$	
Temp. = 1450°C ð	¥//
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	, Q5 1,0
	Mol ratio of CaO/SiO,
	-
AUXILIARY	INFORMATION
METHOD /ADD AD ADVIS /DDG GDDVD-	CONTROL AND DURATING OF HUMBERS
*** INUD/APPAKATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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COMPONENTS:	MPONENTS:			ORIGINAL MEASUREMENTS:			
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Calcium oxide; CaO; [1305-78-8]</li> <li>(3) Sodium oxide; Na<sub>2</sub>O; [1313-59-3]</li> <li>(4) Silica; SiO<sub>2</sub>; [7631-86-9]</li> </ul>			Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u> , 6, 225 - 232.				
VARIABLES: $T/K = 1573$ H_O P/kPa=12.3-58.0	3 )(92.5-434	5 mmHa)	PREPARED I	BY:			
mass% $Na_2O =$	15.0	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		М.	Shinmei		
mass ratio CaO/SiC	$D_2 = 0.417$	7					
EXPERIMENTAL VALUES:							
The authors measured the solubility of H in 60% $SiO_2 - 25$ % CaO - 15% Na <sub>2</sub> O (mass) at 1300°C under water vapor pressure 92.5 mmHg - 435 mmHg and confirmed the linear relationship between the solubility and P <sub>H O</sub> <sup>1/2</sup> . The compiler converted the original solubility, expressed in ppm <sup>2</sup> of H, to of H <sub>2</sub> O.					CaO - 15% 435 mmHg and $P_{H} o^{1/2}$ . pm <sup>2</sup> of H, to		
Р <sub>н20</sub>	ppm(mass	s/mass)	PH	20	ppm(mas	s/mass)	
kPa mmHg	[H]	[H₂O]	kPa	mmHg	[H]	[H <sub>2</sub> O]	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	26 26 32 30.5 37.5 42 42 42 46.0	232 232 286 273 335 375 375 411	38.53 38.53 47.33 47.33 47.33 58.00 58.00 58.00 58.00	289 289 355 355 435 435 435 435 435	47.5 45.5 51 46.5 51 51 51 56 61 63.5	424 407 456 416 456 456 500 545 567	
(mass/mass)] = 66.9 and & is the standard	The compiler fitted the data for $[H_2O$ , ppm] by least squares to $[H_2O$ , ppm (mass/mass)] = 66.9 $P_{H_1O}^{1/2}$ , ( $\delta$ =26.5), where $P_{H_1O}$ is expressed in kPa and $\delta$ is the standard dev. <sup>2</sup> of the precision of the <sup>2</sup> least square fit.						
METHOD / APPARATUS / PROCEDUR	E:		SOURCE AND PURITY OF MATERIALS;				
The sample in a Pt crucible was equilibrated with the $H_2O$ + Ar stream of nearly one atm., and was quenched in a water cooled Cu mold. $H_2O$ in the sample was reduced to $H_2$ by Al at 1550 - 1600°C, and $H_2$ was measured volumetrically by using a micro-Orsat gas analyzer.			<pre>CaO: Made by thermal decomposition of reagent grade carbonate of over 99.5% at 900°C Na<sub>2</sub>O: Reagent grade chemical (over 99.5%) SiO<sub>2</sub>: Ground quartz (over 99.5%)</pre>				
	ESTIMATED ERROR:						
			Analysis of $H_2$ : $\delta(ppm)/(ppm) = \pm 0.10$ (authors)				
			REFERENCES:				
	<ol> <li>Fuwa, T.; Ban-ya, S.; Fukushima, T. Report of the 19th Committee of the Japan Society for Promotion of Science, No. 7834, <u>May 1965</u>.</li> </ol>						

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Water; H<sub>2</sub>O; [7732-18-5]</li> <li>Calcium oxide; CaO; [1305-78-8]</li> <li>Sodium oxide; Na<sub>2</sub>O; [1313-59-3]</li> <li>Silica; SiO<sub>2</sub>; [7631-86-9]</li> </ol>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Report of 19th Committee of the Japan Society for the Promotion of Science No. 9286, <u>May 1971</u> .
VARIABLES: $T/K = 1723$ $H_2O P/ kPa = 25.1$ (188 mmHg) mol% Na <sub>2</sub> O = 10.2 - 25.4 mol ratio $n_2/n_4 = 0.27 - 1.10$	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES: The authors reported the solubil - SiO <sub>2</sub> melts at 1450°C under the var	ity of H <sub>2</sub> O in various CaO - Na <sub>2</sub> O por pressure of H <sub>2</sub> O at 188 mmHg.
mol%	mole ratio ppm

	CaO	Na <sub>2</sub> O	SiO <sub>2</sub>	CaO/SiO <sub>2</sub>	H₂O	
-	21.7	11.2	67.1	0.32	251	
	28.3	10.4	61.8	0.46	247	
	31.4	13.3	55.9	0,56	267	
	33.7	10.7	55.6	0.61	257	
	37.4	11.3	51.3	0.73	302	
	39.8	10.7	49.5	0.80	328	
	46.8	10.2	43.0	1.09	603	
	22.7	16.2	61.1	0.37	339	
	26.9	16.4	56.7	0.76	296	
	35.8	14.3	49.9	0.72	323	
	44.2	15.6	40.2	1.10	731	
	16.8	21.6	61.6	0.27	487	
	17.4	19.4	63.3	0.28	389	
	21.8	19.1	59.1	0.37	404	
	26.1	20.4	53.5	0.49	401	
	30.3	20.3	49.3	0.62	466	
	32.0	18.3	49.7	0.64	687	continued

AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The sample in a Pt crucible	SOURCE AND PURITY OF MATERIALS: CaO: Thermal decomposition of
Was equilibrated with the H <sub>2</sub> O + Ar stream at nearly one atm., and was quenched in a water cooled Cu mold.	reagent grade carbonate (over 99.5%) at 900°C Na <sub>2</sub> O: Reagent grade chemical (over 99.5%)
$H_2O$ in a quenched sample was reduced to $H_2$ by Al at 1550 - 1600°C, which was measured Volumetrically by using a micro- Orsat gas analyzer.	SiO <sub>2</sub> : Ground quartz (99.9%)
	ESTIMATED ERROR:
	Analysis of H <sub>2</sub> O: δ(ppm)/(ppm) < ± 0.06 (authors)
	REFERENCES:
	<ol> <li>Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u>, 6, 225 - 232.</li> <li>Iguchi, Y.; Ban-ya, S.; Fuwa, T. Ibid. <u>1969</u>, 9, 189 - 195.</li> </ol>

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COMPONENTS:				ORIGINAL MEASUREMENTS:		
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;     [1305-78-8] (3) Sodium oxide; Na<sub>2</sub>O;</pre>			Iguchi, Y.; Ban Report of the 1	-ya, S.; F 9th Commit	uwa, T. tee of the	
<pre>(3) Bodium Oxide; Mago; [1313-59-3] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>				Japan Society fo Science No. 928	or the Pro 6, <u>May</u> 197	motion of 1.
VARIABLES: $T/K = 1723$ H <sub>2</sub> O P/kPa = 25.1 (188 mmHg) mol% Na <sub>2</sub> O = 10.2 - 25.4			PREPARED BY:	Shinmei		
mol rat	io $n_2/n_3 =$	0.27 - 1.	10			
EXPERIMENTAL	VALUES:	continued				-
		mol%		mole ratio	ppm	
	CaO	Na <sub>2</sub> 0	SiO₂	CaO/SiO₂	H₂O	_
	37.2 16.2	20.7 25.2	42.2 58.6	0.88 0.28	693 684	
	21.1	24.3	54.6	0.39	547 579	
	27.8	24.6	47.6	0.58	684	
	32.1	24.0	43.9	0.73	889	
		A	JXILIARY	INFORMATION		
METHOD/APPARA	TUS/PROCEDURI	E:		SOURCE AND PURITY O	F MATERIALS:	
				ESTIMATED ERROR:		
				REFERENCES :		
L				1		

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Water; $H_2$ (2) Calcium of [1305-78-1]	D; [7732-18-5] xide; CaO; B}	] Iguchi, Y.; Ban-ya, S.; Fuwa, T.
(3) Sodium ox [1313-59-1 (4) Silica; Si	ide; Na <sub>2</sub> O; 3] iO <sub>2</sub> ; [7631-86-	-9] Report of the 19th Committee of the Japan Society for the Promotion of Science No. 9286, <u>May 1971</u> .
VARIABLES: T/H H <sub>2</sub> O P/ kPa <sup>=</sup> mol% Na <sub>2</sub> C mol ratio n	x = 1723 = 25.1 (188 mm x = 10.2 - 25.2 $x_2/n_3 = 0.27 - 10.2$	PREPARED BY: nHg) .4 M. Shinmei 1.10
EXPERIMENTAL VALUES	continu	ued
Fig. 1, Solut mol ratio Cad	oility of wate D/SiO <sub>2</sub> at 1450	er in CaO - Na <sub>2</sub> O - SiO <sub>2</sub> melts as a function of $0^{\circ}$ C and $P_{H_{2}\circ} = 25.1 \text{ kPa}$ .
Na <sub>2</sub> O M	Masst Molt	F. = 188 mmHg
-0- 	10     11       15     16       20     21       25     25	E 1450°C
	25 25	
		0 0 0.5 Mol ratio CaO/SiO <sub>2</sub>
		AUXILIARY INFORMATION
METHOD/APPARATUS/PI	ROCEDURE :	SOURCE AND PURITY OF MATERIALS:
· · · · · · · · · · · · · · · · · · ·		
		ESTIMATED ERROR:
		REFERENCES :

				Chippe manage		
(1) Water: H.O. [7732- 18-5]			ORIGINAL MEA	ORIGINAL MEASUREMENTS:		
(1) water; $H_2O$ ; [7/32-18-5] (2) Calcium oxide; CaO; (1206-78 %)			Iguchi, Y	.; Ban-ya, S.; F	uwa, T.	
(3) Potassiu	um oxide; K;	₂0;	Report of	the 19th Commit	tee of the	
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]			Japan Soc. Science, 1	iety for Promoti No. 9286 <u>May</u> <u>197</u>	on of $1$ .	
WARTARI DC	1/v = 1700			······································		
$H_2O P/kH$	$P_a = 38.5$ (2)	289 mmHg)	PREPARED BY:			
mol%	$K_2 O = 6.1$	- 17.8	1	M. Shinmei		
	$n_2/n_4 = 0.$	.44 - 1.1				
EXPERIMENTAL VALU	JES:					
The autho melts at 145 data were pr	ors reported 0°C and at ovided by t	l the solubi 289 mmHg of the authors.	lity of H <sub>2</sub> O : H <sub>2</sub> O in graph	in various CaO - hical form. The	K₂O - SiO₂ original	
	mole %		mole ratio	ppm(mass/mass	)	
CaC	) K <sub>2</sub> O	SiOz	CaO/SiO <sub>2</sub>	H₂O	<b>-</b> ,	
	9 6 7	59 /	0.57	250		
34.	6 7.0	58.4	0.59	355		
37.	7 7.5	54.8	0.69	283		
41.	2 6.8	51.9	0.79	374		
49.	3 6.1	44.6	1.11	527		
27.	5 10.5	62.0	0.44	439		
32.	1 11.2	56.7	0.57	388		
34.	5 9.4	56.1	0.62	448		
35.	0 9.9	55.1	0.64	379		
36.	2 10.6	53.3	0.68	428		
38.	2 8.9	52.9	0.74	433		
40. 41.	5 10.0 4 9.7	49.5 48.9	0.82 0.85	402 455	continued	
		AUXILIAR	Y INFORMATION			
METHOD/APPARATUS	/PROCEDURE:		SOURCE AND P	PURITY OF MATERIALS:		
The sampl	e in a Pt c	rucible	CaO: Made	by thermal decor	nposition	
was equilibr	ated with t	he $H_2O +$	of re	agent grade carl	bonate	
was quenched	in a water	cooled	K-O: Reage	ent grade chemica	al (over	
Cu mold.			99.58	b)		
$H_2O$ in a quenched sample was reduced to $H_2$ by Al at 1500 - 1600°C, and was measured volumetrically by using a micro-		SiO <sub>2</sub> : Grou	ınd quartz (over	99.9%)		
Orsat gas an	alyzer.		1			
			ESTIMATED ED	PD0.		
4			LOTINIED EN			
			Analysis δ(ppm)/(	$ppm) = \pm 0.06$	(authors)	
			<b>REFERENCES</b> :			
l						
l			1			

CONTRACTOR		
COMPONENTS:	UKIGINAL MEASUREMENTS:	
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
<pre>[1305-78-8] (3) Potassium oxide; K<sub>2</sub>O;</pre>	Report of the 19th Committee of the	
[12136-45-7]	Japan Society for Promotion of	
(4) SIIICa; SIU <sub>2</sub> ; [/631-86-9]	Science, No. 9286, <u>May 1971</u> .	
VARIABLES: $T/K = 1723 (1450 °C)$	PREPARED BY:	
$H_2O P/KPa = 38.5 (289 mmHg) mol% K_2O = 6.1 - 17.8$	M. Shinmei	
mol ratio $n_2/n_4 = 0.44 - 1.11$		
EXPERIMENTAL VALUES:		
$CaO K_2O SiO_2$	CaO/SiO <sub>2</sub> $H_2O$	
41.8 8.9 49.3	0.85 487	
26.9 14.6 58.5	0.46 502	
27.1 13.7 59.2	0.46 475	
27.9 13.4 58.6	U.48 554 0.60 529	
32.6 13.9 53.6	0.61 517	
34.3 12.8 52.9	0.65 527	
35.1 13.7 50.8	0.82 633	
39.8 13.0 47.1	0.85 509	
41.2 12.4 46.4	0.89 770	
41.4 13.4 45.2 42.8 13.1 44.1	0.92 //5	
25.7 17.5 55.9	0.46 603	
	0.46 615	
31.6 15.7 53.3	0.59 655	
33.4 16.7 49.9	0.67 754	
33.5 17.8 48.7 34.0 16.1 49.9	0.69 773 - 0.68 730	
34.4 16.5 49.1	0.70 732	
37.8 17.2 45.0	0.84 978	
39.8 15.7 44.5	0.89 1156	
41.2 15.2 43.6	0.95 870	
AUXILIA	RY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS;	
1		
	ESTIMATED ERROR:	
	DEFEDENCIC .	
	REFERENCES:	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Water; (2) Calciun [1305-	$H_2O;$ [7732-18- m oxide; CaO; 78-8]	-5] Iguchi, Y. Ban-ya, S.; Fuwa, T.	
(3) Potass [121-3] (4) Silica	fum oxide; K <sub>2</sub> 0, 6-45-7] ; SiO <sub>2</sub> ; [7631-8	36-9] Report of the 19th Committee of the Japan Society for Promotion of Science, No. 9286, <u>May 1971</u> .	
VARIABLES:	T/K = 1723	PREPARED BY:	
H <sub>2</sub> O P/ mol <sup>9</sup> mol rat:	kPa = 38.5 (289 $K_2O = 6.1 - 1$ $io n_2/n_4 = 0.44$	9 mmHg) 17.8 M. Shinmei 4 - 1.11	
EXPERIMENTAL VA	LUES: conti	inued	
K₂O r	nass% mol%	1600	
-0	10 7	$\begin{array}{c} \Pi \\ \Omega \\ \Omega \\ \Omega \\ \Pi \\ \Pi \\ \Pi \\ \Pi \\ \Pi \\ \Pi \\$	
	15     10       20     13       25     16	Temp. 1450'C	
		0 0.5 1.0 Mol ratio CaO/SiO	
1 c	alubilian of .		
rig. 1, 2 n	nol ratio CaO/S	sio <sub>2</sub> at 1450°C and $P_{H_2O} = 38.5 \text{ kpa}$ .	
	<u>,</u>		
		AUXILIARY INFORMATION	
METHOD/APPARATU	IS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
		ESTIMATED ERROR:	
		REFERENCES:	
COMPONENTS:	ORIGINAL MEASUREMENTS:		
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(1) Water; $H_2O$ ; [7732-18-5] (2) Calcium oxide; CaO;	Iguchi, Y.; Fuwa, T.		
[1305-78-8] (3) Magnesium oxide: MgO:	Trans, Iron Steel Inst. Jpn 1970		
[1309-48-4]	10, 29 - 35.		
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]			
$H_2O P/kPa = 38.5$ (289 mmHg)	PREPARED BY:		
mol% MgO = $7.0 - 36$ mol ratio $n_2/n_2 = 0.16 - 1.2$	M. Shinmei		
EXPERIMENTAL VALUES:			
The authors reported the solubili melts at 1400, 1450, 1500, 1550 and $H_2O$ at 289 mmHg. The solubility data Figs. 1 - 2. The effect of temperatu to 1600°C is shown in Table 2 and Fi report were corrected by the compile	ty of $H_2O$ in various CaO - MgO - SiO <sub>2</sub> 1600°C under the vapor pressure of at 1550°C is shown in Table 1 and in the on the solubility of $H_2O$ from 1400 g. 3. Some misprints in the original		
report were corrected by the compile	i by correspondence with the authors.		
Tab Solubility of H <sub>2</sub> O at 38.5 P/KPa	ole 1 (289 mmHg) and at 1823 K (1550°C)		
mass % mol%	mole ratio ppm(mass/mass)		
	••••••••••••••••••••••••••••••••••••••		
CaO MgO SiO <sub>2</sub> CaO MgO SiO <sub>2</sub> C	$aO/SiO_2$ (CaO+MgO) $H_2O$		
	5102		
30.5 5.0 64.5 31.2 7.1 61.7	0.51 0.62 407		
37.8 5.0 57.2 38.5 7.1 54.4	0.71 0.84 369		
43.6 5.0 51.4 44.2 /.1 48./ 49.7 5.7 44.5 50.1 8.0 41.9	1.20 $1.39$ $492$		
24.9 9.6 65.5 25.1 13.4 61.5	0.41 0.63 409		
30.4 10.6 59.0 30.3 14.7 55.0	0.47 $0.73$ $3750.55$ $0.82$ $367$		
32.1 10.8 57.1 32.0 14.9 53.1	0.60 0.88 528		
35.1 10.8 54.1 34.9 14.9 50.2	0.70 0.99 402 cont <sup>*</sup> d		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The sample in a Pt crucible	CaO and MgO: Reagent grade chemicals		
was equilibrated with the $H_2O$ +	SiO <sub>2</sub> : Transparent high purity silica		
Was guenched in a water cooled	99.9%).		
Cu mold.			
$H_2O$ in the quenched sample was reduced to $H_2$ by Al at 1550 -			
1600°C, and $H_2$ was measured			
Orsat gas analyzer. (refs. 1, 2)			
	ESTIMATED ERROR.		
1			
	$\delta(ppm)/(ppm) = < \pm 0.06$ (authors)		
	REFERENCES:		
	1. Fukushima, T.; Iguchi, Y.; Ban-ya S.; Fuyus T		
	Trans. Iron Steel Inst. Jpn.		
	$\frac{1966}{2}$ , <b>6</b> , 225 - 232.		
	Ibid. <u>1969</u> , 9, 189 - 195.		

COMPONENTS:	OMPONENTS:				ORIGINAL MEASUREMENTS:		
(1) Water; $H_2$ (2) Calcium oz	<pre>(1) Water; H₂O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8]</pre>					т.	
(3) Magnesium [1309-48-4 (4) Silica; Si	gO; L-86-9	]	<b>Trans.</b> 10, 29	Iron Steel - 35.	Inst. Jpn. <u>1970</u> ,		
VARIABLES: T/K =	= 1673 - 1	.873		PREPARED	BY:		
H <sub>2</sub> O P/kPa = mol% Mg( mol ratio n <sub>2</sub>	$H_2O P/kPa = 38.5 (289 mmHg)mol% MgO = 7.0 - 36mol ratio n_2/n_4 = 0.16 - 1.2$					nmei	
EXPERIMENTAL VALUES	inued		•				
mass %		mol%		mole	ratio	ppm(mass/mass)	
CaO MgO S	SiO₂ CaO	MgO	SiO₂	CaO/SiO₂	<u>(CaO+MgO)</u> SiO <sub>2</sub>	H₂O	
42.9 10.0 4 38.7 11.5 4 39.4 12.2 4 19.3 15.0 6 23.2 14.7 6 23.3 15.0 6 25.8 15.3 5 29.9 15.4 5 34.2 15.1 5 41.1 15.8 4 10.1 21.3 6 16.0 20.0 6 22.8 20.0 5 29.7 21.3 4 38.8 20.1 4 15.7 27.7 5 METHOD/APPARATUS/PI	47.1 42.6 49.8 38.3 48.4 38.8 55.7 19.0 52.1 22.8 51.7 22.9 58.9 25.3 54.7 29.2 50.9 33.3 43.1 39.8 54.0 15.5 57.2 21.9 48.9 28.3 41.1 36.9 57.0 14.6	13.8 15.8 16.7 20.5 20.1 20.5 20.8 20.9 20.4 21.3 28.5 26.6 35.9	43.6 45.9 44.5 60.5 57.1 56.6 53.9 49.9 46.3 38.9 61.7 57.7 51.4 43.5 36.5 49.5	0.98 0.83 0.81 0.40 0.40 0.47 0.59 0.72 1.02 0.16 0.27 0.44 0.65 1.01 0.29 X INFORMATI	1.29 1.18 1.25 0.65 0.75 0.77 0.86 1.00 1.16 1.57 0.62 0.73 0.95 1.30 1.74 1.02 ON	465 440 390 426 403 420 390 461 616 522 468 451 474 641 469 continued	
				ESTIMATE	D ERROR: ES:		

COMPONENTS :						ORTGIN	AT. MEASUREMENTS	•	
(1) Wate	1) Water; $H_{2}O$ ; [7732-18-5]						ORIGINAL MEASUREMENTS:		
(2) Calc	2) Calcium oxide; CaO;					Igud	Iguchi, Y.; Fuwa, T.		
(3) Magn	s-/8- esium	oxide	; MgO	;		Tra	ns. Iron Stee	<b>l Inst. Jpn.</b> 1970,	
	9-48-	4]	7621	06-01		10,	29 - 35.	- <u>- ,</u> ,	
	ca; s.	102; [	1021-0	20-31		l			
VARIABLES:	<u>ד/א</u>	= 1673	- 18	73		PREPAI	RED BY.		
H <sub>2</sub> O P	/kPa	= 38.5	(289	mmHg	)	1.001.00			
mo mol ra	mol % MgO = 7.0 - 36 mol ratio $n_2/n_4 = 0.16 - 1.2$				M. S	hinmei			
EXPERIMENTAL.	FDIMENTAL VALUES: COntinued								
	Tak			ble 2					
Effect	of Tei	mperat	ure o	n the	Solub:	ility	of $H_2O$ at 38	.5 $P/kPa$ (289 mmHg)	
			٩.		ma14		molo motio		
Temp		mass	ð		MOIS		mole ratio	ppm(mass/mass)	
(°C)	CaO	MaO	SiO-	CaO	MaO	sio-	(CaO+MgO)	H_O	
,			2			2	SiOz		
1400	30.8	15.6	53.6	30.0	21.2	48.8	1.05	356	
1430	30.7	14.8	54.6	30.0	20.1	49.9	1.00	349	
1500	36.4	16.0	47.7	35.3	21.6	43.1	1.32	394	
1500	30.5	15.1	54.9	29.9	20.5	49.6	1.01	409	
1550	36.9	14.7	47.4	36.3	20.1	43.6	1.32	417	
1550	29.9	15.4	61.7	29.2	20.9	49.9	0.77	403	
1.000	39.4	12.2	47.8	39.0	16.8	44.2	1.26	390	
1600	15.9 30.1	34.0	50.1	14.5	43.0	42.5	1.35	521 471 ·	
	36.5	16.2	47.4	35.4	21.8	42.8	1.34	495	
			•						
								continued	
								Continued	
			• • • • • • • • •						
				AU	XILIARY	INFORM	ATION		
METHOD/APPAR	ATUS/PI	ROCEDUR	Е:			SOURC	E AND PURITY OF	MATERIALS:	
	,						-		
						ESTIM	ATED ERROR:		
						REFE	RENCES	<u></u>	
						1	uncio;		
						1			

4	9	0
4	9	0

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water: $H_0$ [7732-18-5]	
(2) Calcium oxide; CaO;	Iguchi, Y.; Fuwa, T.
[1305-78-8]	
(3) Magnesium oxide; MgO; [1309-48-4]	Trans. Iron Steel Inst. Jpn. <u>1970</u> ,
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]	10, 29 - 35.
· · · · · · · · ·	
VARIABLES: $T/K = 1823$	PREDADED RY.
$H_2O P/kPa = 38.5$ (289 mmHg)	
mol% MgO = 7.0 - 36	M. Shinmei
mol ratio $n_2/n_4 = 0.16 - 1.2$	
EXPERIMENTAL VALUES:	
continued	
continued	
Fig. 1 Solubility of water in CaO	- MgO - SiO, melts at 1550°C and
$P_{H_2O} = 38.5 \text{ kPa}$ as a function of m	ole ratio CaO/SiO <sub>2</sub> ;
20 mol% MgO	$\hat{i}$ /.
-2- 28 mol% MgO	
52 HOI & MgO 600	
E	
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j soo <del>  / / -</del>	
Solut	
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400	
0	0.5 1.0 1,5
	Male Iraction CaO/SiOz
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	]
	ESTIMATED ERROR:
	REFERENCES:
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COMPONENTS:	ORIGINAL MEASUREMENTS:					
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>	Iguchi, Y.; Fuwa, T.					
[ [1305-78-8] (3) Magnesium oxide: MgO:	Trans, Iron Steel Inst. Jpp. 1970					
[1309-48-4]	10, 29 - 35.					
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]						
VARIABLES: $T/K = 1823$	PREPARED BY:					
$H_2O P/kPa = 38.5$ (289 mmHg)						
mol% MgO = $7.0 - 36$ mol ratio $n_2/n_4 = 0.16 - 1.2$	M. Shinmei					
EXPERIMENTAL VALUES:						
continued	SiO <sub>2</sub>					
	, X,					
	× +6					
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	150 - 500 - 137 - 400					
19 8	· 100 · 100 · 100 · 100 · 100 · 100 · 100					
\$	13					
	de la					
$P_{\rm HO} = 289$	mmHg					
Temp. 155	0°C					
90 80 70 60 50 40 30 20 10 $-$ CaO mass %						
Fig. 2 Iso-solubility lines of wat	cer in CaO - MgO - SiO <sub>2</sub> melts at					
1550°C.						
AUXILIARY	INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
,						
{	ESTIMATED ERROR:					
	REFERENCES:					

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-9]</pre>	Iguchi, Y.; Fuwa, T.
<pre>[1305-48-8] (3) Magnesium oxide; MgO; [1309-48-4] (4) Silica: SiO. (7631-86-9)</pre>	Trans. Iron Steel Inst. Jpn. <u>1970</u> , 10, 29 - 35.
(4) SIIICa; SIO <sub>2</sub> ; [/031-00-9]	
VARIABLES: $T/K = 1673 - 1873$	PREPARED BY:
$H_2O P/KPa = 38.5 (289 mmHg)$ mol% MgO = 7.0 - 36 mol ratio $n_2/n_4 = 0.16 - 1.2$	M. Shinmei
EXPERIMENTAL VALUES:	
continued	
Fig.3 Effect of temperature on the s melts at $P_{H_{20}} = 38.5 \text{ kPa}$ ; mol ratio are: (1) 1.3 (2) 1.0 (3) 0.7 E 2.6 C 2.5 (3) 5.4 5.5 5.6 10	<pre>solubility of water in CaO - MgO - SiO<sub>2</sub> of: (CaO + MgO)/(SiO<sub>2</sub>) 300 1450 1400 (3) (3) (1) (2) 5.7 5.8 5.9 6.0 4x/T</pre>
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:					
	ORIGINAL MEASUREMENTS:				
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8]</pre>	Ban-ya, S.; Iguchi, Y.; Yamamoto, S.				
(3) Magnesium oxide; MgO;	Tetsu to Hagane <u>1986</u> , 72, 2210 -				
(4) Silica; $SiO_2$ ; [7631-86-9]	2217.				
VARIABLES: $\pi/\kappa = 1722$	PREPARED BY:				
$H_2O P/kPa = various$ $n_2/n_3/n_4 = various$	M. Shinmei				
EXPERIMENTAL VALUES:					
The authors reported the iso-wate	er vapor capacities defined by:				
log K' = log(mas	$ss % H_2 O/P^{1/2}_{H_2 O})$				
as shown in Fig. 1, where $P_{H_2}$ is explicitly as a shown in Fig. 1, where $P_{H_2}$ is explicitly as a shown in Fig. 1.	presed in mm Hg.				
20,					
	بى ب				
	0-1,08 105 60 9				
£ 1/	3				
0					
60/	= <u>1</u> 40°				
	À				
80/	<u>× × × × 2</u> 0				
0 20	40 60 80				
MgO mol */•					
Fig. 1 Iso-water vapor capacity line	es in CaO - MgO - SiO <sub>2</sub> melts at 1450°C				
AUXILIARY					
	INFORMATION				
METHOD / APPARATUS / PROCEDURE :	INFORMATION SOURCE AND PURITY OF MATERIALS:				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz ESTIMATED ERROR: No description in the paper but is estimated to be of the same order as in ref. 1.				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade CaCO <sub>3</sub> MgO: reagent grade powder SiO <sub>2</sub> : crushed quartz ESTIMATED ERROR: No description in the paper but is estimated to be of the same order as in ref. 1. REFERENCES:				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	<pre>INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade         CaCO<sub>3</sub> MgO: reagent grade powder SiO<sub>2</sub>: crushed quartz ESTIMATED ERROR: No description in the paper but is estimated to be of the same order as in ref. 1. REFERENCES: 1. Ban-ya, S.; Iguchi, Y.; Nagata, S.</pre>				
METHOD/APPARATUS/PROCEDURE: Synthesized slag was equilibrated with water vapor by blowing nearly one atm. Ar + H <sub>2</sub> O gas mixture over the melt. Water contents were determined by the method developed by the authors (1).	<pre>INFORMATION SOURCE AND PURITY OF MATERIALS: CaO: made by fining reagent grade         CaCO<sub>3</sub> MgO: reagent grade powder SiO<sub>2</sub>: crushed quartz ESTIMATED ERROR: No description in the paper but is estimated to be of the same order as in ref. 1. REFERENCES: 1. Ban-ya, S.; Iguchi, Y.; Nagata, S. Tetsu to Hagane 1985, 71, 55 - 62.</pre>				

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COMPONENT	rs :			ORIGINAL MEAS	UREMENTS :	
(1) W (2) F	Water; $H_2O$ ; [7732-18-5] Barium oxide; BaO;			Iguchi. T.	; Ban-va. S.:	Fuwa. T.
[	1304-28-5	]			, 200 30, 20,	2444, 20
(3) C	alcium ox 1305-78-8	ide; CaO;	;	Report of	the 19th Commi	ttee of the
(4) S	Silica; Si	.0 <sub>2</sub> ; [763]	L-86-9]	Science No	<b>9286</b> , <u>May</u> 19	71.
VARIABLE	S: T/	K = 1823		PREPARED BY:		
H	I <sub>2</sub> O P/kPa	= 38.5 (2	289 mmHg)			
ma	l ratio n	$n_{a} = 1.9$	35 - 1.10		M. Sninmei	
EVDEDIME	NTAL VALUES					
BAI BRIND		•				
Th	e authors	reported	the solubi	ility of $H_2O$ i	n various BaO	- CaO $-$ SiO <sub>2</sub>
data	were prov	ided by t	the authors.	, pressure at	. 209 mund. The	Original
-						
		mole %		mole ratio	ppm(mass/mas	s)
	BaO	CaO	SiO <sub>2</sub>	CaO/SiO <sub>2</sub>	H₂O	
-						
	2.0	34.7	63.3	0.55	324	
	2.0	40.4	57.7	0.70	337	
	1.9	46.5	51.6	0.90	335	
	2.0	51.4	46.6	1.10	354	
	4.1	29.7	66.2	0.45	326	
	4.1	34.1	61.9	0.55	316	
	4.1 4.1	37.9	56.5	0.65	318	
	3.8	42.8	53.4	0.80	315	
	4.0	42.8	53.2	0.80	309	
	4.1	45.4	50.5	0.90	294	
	4.0	47.9	48.0	1.00	364	
	6.3	31.4	62.3	0.50	314	
	6.3	37.0	56.7	0.65	292	continued
			AUXILIA	RY INFORMATION	· · · · · · · · · · · · · · · · · · ·	
METHOD/A	PPARATUS/PR	OCEDURE:		SOURCE AND PL	URITY OF MATERIALS	5:
	_	•				
The	e sample :	in a Pt c	rucible was	BaO: Reage	nt grade chemi	cal (over
at nea	arly one a	atm., and	Was	CaO: Decom	, position of rea	agent grade
quencl	hed in a y	water coo	led Cu	carbo	nate (over 99.	5%) at 900°C
mold.	H <sub>2</sub> O in th	ne quench	ed sample	SiO <sub>2</sub> : Grou	nd quartz (ove:	r 99.9%)
1600°	equced to C. and way	H <sub>2</sub> DY AL S measure	at 1550 - d			
volum	etrically	by using	a micro-			
Orsat	gas analy	yzer.				
				ESTIMATED ERI	ROR:	
				)	of Muduemen	
				δ(ppm)/(	$ppm) = \pm 0.04$	(authors)
				REFERENCES		
				1. Fukushin	ma. T.: Iguchi	. Y.;
				Ban-ya,	S.; Fuwa, T.	,,
				Trans.	Iron Steel Ins	t. Jpn.
				$2, \frac{1966}{1000}, 6$	7.225 - 232.	• Filwa T
				Ibid. 19	<u>969</u> , <b>9</b> , 189 - 3	195.

COMPONENTS :			ORIGINAL MEASURE	MENTS:
(1) Water; $H_2O$ ;	[7732-18	-5]	Tauahi V	
(2) Barium Oxide [1304-28-5]	e; BaU;		Igueni; Y.;	Ban-ya, S.; Fuwa, T.
(3) Calcium oxid	le; CaO;		Report of the	e 19th Committee of the
[1305-78-8]	[1305-78-8]			y for Promotion of
(4) Silica; SiO <sub>2</sub>	(4) Silica; SiO <sub>2</sub> ; [7631-86-9]			<b>9286,</b> <u>May</u> <u>1971</u> .
VARIABLES: T/K	= 1823		PREPARED BY:	
$H_2O P/kPa =$	38.5 (28	9 mmHg)		
mol% BaO	$= 1.9 - (n - 0)^{2}$	11.8	1	M. Shinmei
	·II₄ = 0.5	5 - 1.10		
EXPERIMENTAL VALUES:	conti	nued		
	mole %	m	ole ratio 🛛 🕯	pom(mass/mass)
BaO	CaO	SiO <sub>2</sub>	CaO/SiO2	H <sub>2</sub> O
6.2	38.2	55.6	0.70	319
6.3	44.4	49.3	0.90	305
6.3	46.8	46.9	1.00	322
8.9	22.8	68.3	0.35	343
8.5	20.6	64.9 60.7	0.42	335
8.7	36.1	55.2	0.65	292
8.6	38.1	53.3	0.72	345
8.7	40.7	50.6	0.80	294
8.6	43.5	47.9	0.91	314
8.6	46.8	44.6	1.05	332
11.8	24.8	63.4	0.40	317
	25.3	63.3	0.40	311
11.7	28.1	60.2	0.47	318
11.3	31.3	57.4	0.55	287
11.4	32.2	56.4	0.58	312
11.2	36.4	52.4	0.70	286
11.3	40.8	47.9	0.85	304
11.2	44.3	44.5	1.00	357
11.2	44.7	44.1	1.02	333
		AUXILIARY	INFORMATION	
METHOD/APPARATUS/PROCH	EDURE:		SOURCE AND PURIT	Y OF MATERIALS:
, ,				
			ESTIMATED ERROR:	
			REFERENCES:	
			Į	

4	9	6
		_

COMPONENTS:	ORIGINAL MEASUREMENTS:		
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Barium oxide; BaO; [1304-28-5]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T.		
<pre>(3) Calcium oxide; CaO; [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Report of the 19th Committee of the Japan Society for the Promotion of Science No. 9286, <u>May 1971</u> .		
VARIABLES: $T/K = 1823$ H <sub>2</sub> O P/kPa = 38.5 (289 mmHg) mol% BaO = 1.9- 11.8 mol ratio n <sub>3</sub> /n <sub>4</sub> = 0.35 - 1.10	PREPARED BY: M. Shinmei		
EXPERIMENTAL VALUES:			
continued	400		
BaO mass% mol% BaO mass% mol% 	Solubility of water, ppm 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 200		
Fig. 1 Solubility of water in Ba P <sub>H2</sub> 0 = 38.5 kPa.	250 0 $0.5$ 1.0 Mol ratio CaO/S10 <sub>2</sub> 10 - CaO - SiO <sub>2</sub> melts at 1550°C and		
AUXILIAR	INFORMATION		
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS.		
	ESTIMATED ERROR:		
	REFERENCES :		

<pre>COMPONENTS: (1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Silica; SiO<sub>2</sub>; [7631-86-9] (4) Strontium oxide; SrO; [1314-11-0]</pre>	ORIGINAL MEASUREMENTS: Iguchi, Y.; Ban-ya, S.; Fuwa, T. Chem. Met. of Iron and Steel Proc. of the Intl. Symp. on Met. Chem Appl. on Ferrous Met. held at Univ. Sheffield, 19 - 21 July 1971, The Iron and Steel Inst., London, UK, <u>1973</u> , 28 - 30.
VARIABLES: T/K = 1823 $H_2O P/kPa = 38.5$ (289 mmHg) mol% SrO = 2.8 - 15.8 mol ratio $n_2/n_3 = 0.34 - 1.1$	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in various CaO - SiO<sub>2</sub> - SrO melts at 1550°C and at 289 mmHg of  $H_2O$  partial pressure in graphical form. The original data were provided by the authors.

		mol%		mole ratio	ppm(mass/mass	)
	CaO	SiO₂	SrO	CaO/SiO <sub>2</sub>	H <sub>2</sub> O	
	34.3 39.8 47.3 50.9 29.6 31.6 34.4 37.2 42.0 43.1 47.0 28.2 28.6 33.5 37.2 43.1	62.8 57.3 49.9 46.2 64.5 59.6 59.6 59.9 52.1 51.0 47.1 62.7 62.3 57.4 53.7 47.9	2.9 2.8 2.9 5.9 5.9 5.9 5.9 5.9 5.9 9.1 9.1 9.2 9.0	0.55 0.70 0.95 1.10 0.46 0.50 0.58 0.65 0.80 0.85 1.00 0.45 0.46 0.59 0.69 0.90	379 334 305 311 367 350 364 338 311 325 327 332 340 310 305 329	continued
	<u> </u>		AUXILIA	ARY INFORMATION		
METHOD/A Th Was e H <sub>2</sub> O s and w H <sub>2</sub> as H <sub>2</sub> Orsat With	PPARATUS/PROCI e sample in quilibrated tream at ne as quenched O in a samp volumetric gas analyz Al at 1550	a Pt cru with the arly one le was me ally by a er after - 1600°C.	acible Ar + atm., easured a micro- reducing	SOURCE AND PU CaO, SrO: F SiO <sub>2</sub> : Trans Was V 99.99	RITY OF MATERIALS: Reagent grade ch sparent high pur vashed and clean	emicals ity SiO <sub>2</sub> ed (over
				ESTIMATED ERR Analysis &(ppm)/(p	OR: of $H_2$ : opm) = $\pm$ 0.06	(authors)
				REFERENCES: 1. Fukushim Ban-ya, Trans. I <u>1966</u> , 6, 2. Iguchi, Ibid. <u>19</u>	na, T.; Iguchi, S.; Fuwa, T. <b>Fron Steel Inst.</b> 225 - 232. Y.; Ban-ya, S.; 269, <b>9</b> , 189 - 19	Y.; <b>Jpn.</b> Fuwa, T. 5.

COMPONENTS: (1) Water; H <sub>2</sub> O; (2) Calcium ox: [1305-78-8; (3) Silica; Sic (4) Strontium ( [1314-11-0]	; [7732-18 ide; CaO; ] D <sub>2</sub> ; [7631- oxide; SrC ]	-5] -86-9] );	ORIGINAL MEASI Iguchi, Y. Chem. Met. of the Int Appl. on F Sheffield, Iron and St <u>1973</u> , 28 -	ORIGINAL MEASUREMENTS: Iguchi, Y.; Ban-ya, S.; Fuwa, T. Chem. Met. of Iron and Steel Proc. of the Intl. Symp. on Met. Chem Appl. on Ferrous Met. held at Univ. Sheffield, 19 - 21 July 1971, The Iron and Steel Inst., London, UK, <u>1973</u> , 28 - 30.			
VARIABLES: T/K H <sub>2</sub> O P/ kPa= mol% SrO mol ratio n <sub>2</sub>	$ = 1823  38.5 (289  = 2.8 - 1  _2/n_3 = 0.3 $	mmHg) 5.8 4 - 1.1	PREPARED BY:	M. Shinmei			
EXPERIMENTAL VALUES:	conti	nued					
	mol%		mole ratio	ppm(mass/mass)			
CaO	SiO <sub>2</sub>	SrO	CaO/SiO <sub>2</sub>	H₂O			
45.5 23.0 25.0 27.6 29.3 32.0 32.9 40.3 42.7 22.4 28.2 29.8 31.6 34.5 37.4 42.1	45.5 64.5 60.0 58.2 55.5 54.7 47.4 44.9 62.7 55.9 54.3 52.6 49.7 46.8 42.1	9.0 12.5 12.5 12.4 12.5 12.4 12.3 12.3 14.9 15.9 15.9 15.8 15.8 15.8 15.8 15.7	1.00 0.34 0.40 0.46 0.50 0.65 0.60 0.85 0.95 0.36 0.50 0.55 0.60 0.70 0.80 1.00	346 341 323 315 310 296 307 304 354 311 296 294 295 297 312 318 			
		AUXIL	IARY INFORMATION				
METHOD/APPARATUS/PR	OCEDURE :		SOURCE AND PU	RITY OF MATERIALS:			
			ESTIMATED ERR	OR:			
			REFERENCES :				

	499		
COMPONENTS :	ORIGINAL MEASUREMENTS:		
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;     [1305-78-8] (3) Silica; SiO<sub>2</sub>; [7631-86-9] (4) Strontium oxide; SrO;     [1314-11-0]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Chem. Met. of Iron and Steel Proc. of the Intl. Symp. on Met. Chem Appl. on Ferrous Met. held at Univ. Sheffield, 19 - 21 July 1971, The Iron and Steel Inst., London, UK, 1973, 28 - 30.		
VARIABLES: $T/K = 1823$ H <sub>2</sub> O P/kPa = 38.5 (289 mmHg) mol% SrO = 2.8 - 15.8 mol ratio n <sub>2</sub> /n <sub>3</sub> = 0.34 - 1.1	PREPARED BY: M. Shinmei		
EXPERIMENTAL VALUES:			
continued	450 PH20 # 289 mm Hg Jamparature 1550fC		
Sr0       mass%       mol%         →       10       5.9         →       15       9.1         →       20       12.4         →       25       15.8	$i = \frac{1}{3}$ $i = \frac{1}{3}$ i =		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR:		
	REFERENCES:		

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COMPONENTS :	ORIGINAL MEASUREMENTS:			
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Boron oxide; B<sub>2</sub>O<sub>3</sub>; [1303-86-2] (3) Calcium oxide; CaO; [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u> , 6, 225 - 232.			
VARIABLES: $T/K = 1823$ $H_2O P/kPa = 38.5 (289 mmHg)$ mol% $B_2O_3 = 2.5 - 11.2$ mol ratio $n_2/n_4 = 0.63$	PREPARED BY: M. Shinmei			
EXPERIMENTAL VALUES:				
The authors reported the solubili $B_2O_3$ - CaO - SiO <sub>2</sub> melts at 1500°C an form. The original data are shown in	ty of $H_2O$ in ppm of H in various d at $P_{H_1O}$ = 289 mmHg in graphical ref. 1 <sup>2</sup>			
Mass% Mol %	mol ratio ppm(mass/mass)			
B <sub>2</sub> O <sub>3</sub> CaO SiO <sub>2</sub> B <sub>2</sub> O <sub>3</sub> CaO	SiO <sub>2</sub> CaO/SiO <sub>2</sub> H H <sub>2</sub> O*			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	59.70.635145658.60.635044756.10.635549056.10.635347454.40.6358518			
AUXILIARY	INFORMATION			
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:			
The sample in a Pt crucible was equilibrated with the $H_2O$ + Ar stream of nearly one atm., and was quenched in a water cooled Cu mold. $H_2O$ in a quenched sample was reduced to $H_2$ by Al at 1500 - 1600°C, and was measured volumetrically by using a micro- Orsat gas analyzer.	B <sub>2</sub> O <sub>3</sub> : Reagent grade chemical (over 90%, impurity except for H <sub>2</sub> O was less than 0.1%) CaO: Made by thermal decomposition of reagent grade carbonate (over 99.5%) at 900°C SiO <sub>2</sub> : Ground quartz (over 99.9%)			
	ESTIMATED ERROR:			
	$\delta(ppm)/(ppm) = \pm 0.08$ (authors)			
	REFERENCES:			
	<ol> <li>Fuwa, T.; Ban-ya, S.; Fukushima, T. Report of the 19th Committee of the Japan Society for Promotion of Science, No. 7834, <u>May</u> 1965.</li> </ol>			

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Aluminum oxide; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] (3) Calcium oxide; CaO; [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. <b>Trans. Iron Steel Inst. Jpn. <u>1969</u>, 9, 189 - 195.</b>
VARIABLES: $T/K = 1823$ $H_2O P/kPa = 38.4$ (288 mmHg) $Al_2O_3/mass$ = 3.0 - 51.7 mass ratio $n_3/n_4 = 0.51 - 8.96$	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in various  $Al_2O_3$  - CaO - SiO<sub>2</sub> melts at 1550°C in graphical form. The original data were provided by the authors.

mass(%)		mole ratio	ppm(mass/mass	;)	
Al <sub>2</sub> O <sub>3</sub>	CaO	SiO2	CaO/SiO <sub>2</sub>	H₂O	_
 3.0	53.4	43.6	1.31	468	
4.6	35.6	59.4	0.64	318	
5.0	41.4	51.9	0.85	397	
5.0	52.2	42.8	1.30	485	
9.0	33.9	57.0	0.64	316	
9.0	45.3	45.3	1.07	419	
9.0	49.5	41.9	1.27	524	
9.1	39.7	49.5	0.86	371	
9.5	37.1	52.9	0.75	369	
10.0	49.5	40.5	1.31	533	
13.0	47.8	39.2	1.31	525	•
13.0	50.5	36.5	1.48	595	
14.4	37.6	47.1	0.86	366	
15.0	27.4	57.6	0.51	307	
15.0	46.7	38.3	1.31	523	
2010	,	20,0	*•31	222 222	ontinued

AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The samples in Pt crucibles Al<sub>2</sub>O<sub>3</sub>: reagent grade chemical (over were equilibrated with H2O + Ar 99.9%). stream at near one atm. and were CaO: made by thermal decomposition quenched. of reagent grade calcium The water in guenched samples carbonate was reduced to H<sub>2</sub>O by Al at 1450 - 1600°C and was determined SiO<sub>2</sub>: high purity quartz (over 99.9%) volumetrically as H<sub>2</sub>. (ref. 1) **ESTIMATED ERROR:** Analysis of  $H_2$ :  $\delta(ppm)/(ppm) = \pm 0.06$ (authors) **REFERENCES:** 1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966, 6, 225 - 232.</u>

502						
COMPONENTS :			ORIGINAL MEASU	JREMENTS :		
<pre>(1) Water; H<sub>2</sub>' (2) Aluminum [1344-28- (3) Calcium o: [1305-78- (4) Silica; S.</pre>	D; [7732-13 oxide; Al <sub>2</sub> ( 1] xide; CaO; 8] iO <sub>2</sub> ; [7631-	8-5] D <sub>3</sub> ; -86-9]	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1969</u> , <b>9</b> , 189 - 195.			
VARIABLES: H <sub>2</sub> O P/kPa Al <sub>2</sub> O <sub>3</sub> /ma mass ratio	F/K = 1823 = 38.4 (28 ss% = 3.0 $n_3/n_4 = 0.5$	38 mmHg) - 51.7 51 - 8.96	PREPARED BY:	M. Shinmei		
EXPERIMENTAL VALUES	cont	inued.				
Al <sub>2</sub> 0 <sub>3</sub>	mass(%) CaO	SiO <sub>2</sub>	mole ratio CaO/SiO <sub>2</sub>	ppm(mass/mass) H <sub>2</sub> O		
15.5 18.0 18.5 19.0 19.0	31.4 45.1 40.0 35.2 44.0	53.3 36.9 40.0 43.7 36.0	0.63 1.31 1.07 0.86 1.31	345 507 428 344 523		

 15.5	31.4	53.3	0.63	345
18.0	45.1	36.9	1.31	507
18.5	40.0	40.0	1.07	428
19.0	35.2	43.7	0.86	344
19.0	44.0	36.0	1.31	523
19.6	33.5	46.4	0.77	375
19.7	29.8	50.8	0.63	327
24.0	42.0	34.1	1 32	188
24.2	33 0	A1 A	0.85	350
25 6	27 7	46 4	0.63	376
22.0	20.2	40.4	0.04	304
20.9	29.2	40.0	0.77	394
29.0	35.0	35.0	1.07	428
29.0	38.5	31.8	1.30	501
29.6	30.9	38.2	0.87	390
29.6	26.2	42.8	1.30	485
31.8	57.4	10.3	5.97	1170
34.0	35.7	28.9	1.32	483
36.7	55.8	7.0	8.54	1520
39.0	32.5	25.5	1.37	501
39.2	26.3	33.2	0.85	399
42.5	50.8	6.1	8.96	1190
44.9	45.9	8.7	5.65	855
51.7	42.6	5.2	8.19	844

KUA	<b>ILIARY</b>	INFORMA	TION			
METHOD/APPARATUS/PROCEDURE:		SOURCE	AND	PURITY	OF	MATERIALS:
		ESTIMA	TED	ERROR:		
		REFERE	NCES	:		

<pre>(1) Water; H.G. [7732-18-5] (2) Aluminum exide; CaO; [1305-78-8]; (4) Silica; SiO_; [7631-86-9] VARIABLES: T/K = 1823 H.G.O P/KPA = 3.6 (288 mmHg) Al_Q_/mass% = 3.0 51.7 mass ratio n_s/n_ = 0.51 - 8.96 EXPERIMENTAL VALUES: continued</pre>	COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(3) tailing ride; CaO; (4) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: T/K = 1823 H_O D/Kpa = 38.4 (288 mmHg) Al_O_O/mass = 3.0 51.7 mass ratio n_s/n_4 = 0.51 - 8.96 EXPERIMENTAL VALUES: continued SiO<sub>2</sub> CaO 10 20 30 (100 mmHg) Al_O, for the second s</pre>	(1) Water; $H_2O$ ; [7732-18-5] (2) Aluminum oxide; $Al_2O_3$ ; [1344-28-1]	Iguchi, Y.; Ban-ya, S.; Fuwa, T.
<pre>(4) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: T/K = 1623 H<sub>2</sub>O P/KPa = 36.4 (288 mmHg) Al<sub>2</sub>O<sub>2</sub>/mass% = 3.0 51.7 mass ratio n<sub>3</sub>/n<sub>4</sub> = 0.51 - 8.96 EXPERIMENTAL VALUES: continued EXPERIMENTAL VALUES: continued</pre>	(3) Calcium oxide; CaO;	Trans. Iron Steel Inst. Jpn. <u>1969</u> ,
VARIABLES: T/K = 1823 H_O P/kPa = 38.4 (288 mmHg) Al O,/Mass% = 3.0 51.7 mass ratio n_/n = 0.51 - 8.96 EXTERIMENTAL VALUES: continued	[1305-78-8] (4) Silica; SiO₂; [7631-86-9]	<b>9,</b> 189 - 195.
VARIABLES: T/K = 1823 H_2O_FMARS# = 3.0 51.7 mass ratio n_7/n_a = 0.51 - 8.96 EXPERIMENTAL VALUES: continued		
Algo,/mass = 3.0 51.79 mass ratio n <sub>3</sub> /n <sub>4</sub> = 0.51 - 8.96 EXTERIMENTAL VALUES: continued 5.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 6.0, 7.0, 6.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0, 7.0,	VARIABLES: $T/K = 1823$ H O B/1ED2 = 38 4 (288 mmHg)	PREPARED BY:
EXPERIMENTAL VALUES: Continued Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0; Si0;	$Al_2O_3/mass = 3.0 51.7$ mass ratio $n_3/n_4 = 0.51 - 8.96$	M. Shinmei
Silver and the second s	EXPERIMENTAL VALUES: continued	
AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:	fig. 1 Solubility of H <sub>2</sub> O (ppm) in Al at $P_{H_2O} = 289$ mmHg. Dashed li	$\frac{1}{12}$
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: ESTIMATED ERROR: REFERENCES:	AUXILIARY	INFORMATION
ESTIMATED ERROR: REFERENCES:	METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
		ESTIMATED ERROR: REFERENCES:

.

COMPONENTS : ORIGINAL MEASUREMENTS: (1) Water; H<sub>2</sub>O; [7732-18-5] Ban-ya, S.; Iguchi, Y.; Nagata, S. (2) Alumina;  $Al_2O_3$ ; [1344-28-1] (3) Calcium oxide; CaO; Tetsu to Hagane 1985, 71 55 - 62. [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: PREPARED BY: T/K = 1673 K $H_2O P/kPa = various$ M. Shinmei  $n_2/n_3/n_4 = various$ EXPERIMENTAL VALUES: The authors reported the iso-water vapor capacities defined by:  $\log K' = \log(\max \ % H_2 O/P^{1/2}_{H_0})$ as shown in Fig. 1 for the Al<sub>2</sub>O<sub>3</sub> - CaO - SiO<sub>2</sub> melts at 1400°C, where  $\mathtt{P}_{\mathtt{H}\_O}$  is expressed in mm Hg. SIO2 80 20 ٨, cao mass , -106 -1.08 60 100 1400 °C 80 20 20 40 60 80 Al<sub>2</sub>O<sub>3</sub> mass % Fig. 1. Iso-contours of water-vapor capacity, log K'. AUXILIARY INFORMATION METHOD / APPARATUS / PROCEDURE : SOURCE AND PURITY OF MATERIALS: Synthesized slag melt was Al<sub>2</sub>O<sub>3</sub>: reagent grade alumina powder equilibrated with water vapor by CaO: made by fining reagent grade blowing one atm. of  $Ar + H_2O$  gas mixture over the melt. CaCO<sub>2</sub> SiO<sub>2</sub>: crushed quartz Water contents were detrmined by the method developed by the authors (1) (vacuum fusion with Al metal). ESTIMATED ERROR:  $\delta(ppm)/(ppm) = within 0.05 (Authors)$ **REFERENCES:** 1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u>, 225 - 232.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] (3) Calcium oxide; CaO; [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Walsh, J. H.; Chipman, J.; King, T. B.; Grant, N. J. J. Metals <u>1956</u> , 8, 1568 - 1576.
VARIABLES: $T/K = 1643$ , 1723, 1823 mass% Al <sub>2</sub> O <sub>3</sub> /CaO/SiO <sub>2</sub> = 20/40/40 H <sub>2</sub> O P/ <sub>k</sub> Pa: 1.0 - 101.3 (7.7 - 760 mmHg)	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in ppm of H as a function of  $P_{H_2O}^{1/2}$  in 20% Al<sub>2</sub>O<sub>3</sub> - 40% CaO - 40% SiO<sub>2</sub> (mass) melts at 1370, 1450, 1450,<sup>2</sup> and 1550°C, and in graphical form only.



COMPONENTS:	ORIGINAL MEASUREMENTS:		
<ul> <li>(1) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>(2) Calcium oxide; CaO; [1305-78-8]</li> <li>(3) Phosphorous oxide; P<sub>2</sub>O<sub>5</sub>; [1314-56-3]</li> <li>(4) Silica; SiO<sub>2</sub>; [7631-86-9]</li> </ul>	Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u> , 6, 225 - 232.		
VARIABLES: $T/K = 1773$ H <sub>2</sub> O P/ <sub>k</sub> P <sub>a</sub> = 38.5 (289 mmHg) mol% P <sub>2</sub> O <sub>5</sub> = 0-1.4 (0-3.5 mass%) mol ratio n <sub>2</sub> /n <sub>4</sub> = 0.63	PREPARED BY: M. Shinmei		
EXPERIMENTAL VALUES:			
The authors reported the solubili in CaO - $P_2O_5$ - SiO <sub>2</sub> melts of constant at 1500°C as a function of $P_2O_5$ conc and in graphical form only. The numerical data were provided in	ty of water as hydrogen content nt mass ratio of CaO/SiO <sub>2</sub> (= 0.59) entration at $P_{H_2O}$ = 38.5 kPa (289mmHg) by the authors.		
mass% mol%	mass ratio ppm(mass/mass)		
CaO P <sub>2</sub> O <sub>5</sub> SiO <sub>2</sub> CaO P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub> CaO/SiO <sub>2</sub> H H <sub>2</sub> O*		
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	61.3 0.59 48.5 433 60.7 0.59 49 439 60.4 0.59 51 456		
	E Solution S		
AUXILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE: The sample in a Pt crucible was equilibrated with the H <sub>2</sub> O + Ar stream of nearly one atm., and was quenched in a water cooled Cu mold. H <sub>2</sub> O in a quenched sample was reduced by Al at 1500 - 1600°C, and was measured volumetrically using a micro-Orsat gas analyzer.	<pre>SOURCE AND PURITY OF MATERIALS: CaO: Made by thermal decomposition of reagent grade carbonate (over 99.5%) at 900°C P<sub>2</sub>O<sub>5</sub>: Reagent grade chemical (over 99.8%) SiO<sub>2</sub>: Ground quartz (over 99.9%)</pre>		
	ESTIMATED ERROR: Analysis of $H_2$ : $\delta(ppm)/(ppm) = \pm 0.08$ (authors)		
	REFERENCES: 1. Fuwa, T.; Ban-ya, S.; Fukushima, T. Report of the 19th Committee of the Japan Society for Promotion of Science No. 7834, <u>May 1965</u> .		

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T.
[1305-78-8] (3) Phosphorous oxide; $P_2O_5$ ;	Trans. Iron Steel Inst. Jpn. <u>1969</u> ,
[1314-56-3] (4) Silica; SiO <sub>2</sub> ; [7631-86-9]	9, 189 - 195.
VARIABLES: $T/K = 1823$ H <sub>2</sub> O P/ kPa = 38.5 (289 mmHg)	PREPARED BY:
$mol \ P_2O_5 = 0-5.5 \ (0-11 \ mass \ )$	M. Shinmei
	<u> </u>
of constant mole ratio of CaO/SiO <sub>2</sub> concentration at $P_{H_o} = 38.5 \text{ kPa}$ (28	Lty of water in CaO - $P_2O_5$ - SiO <sub>2</sub> melts = 1.3) at 1550°C as a function of $P_2O_5$ 39 mmHg), and in graphical form only
The numerical data were provided by	the authors.
mol% mole ratio ppm*	[
$CaO P_2O_5 SiO_2 CaO/SiO_2 H_2O$	5 400
56.5 0 43.5 1.3 427	
55.1 2.5 42.4 1.3 397 54.3 4.0 41.7 1.3 379	Ca0/Si02= 1.3
53.4 5.5 41.1 1.3 357 53.4 5.5 41.1 1.3 357	8 350 (Mol ratio) 1550°C, P <sub>H2O</sub> = 38.5 KPa
* mass/mass	$300 \boxed{1.0} \frac{1}{2.0} \frac{1}{3.0} \frac{1}{4.0} \frac{1}{5.0}$
	Mol ¥ P <sub>2</sub> O <sub>5</sub>
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
<u> </u>	
The sample in a Pt crucible was equilibrated with the H <sub>-</sub> O +	CaO: Made by thermal decomposition
Ar stream of nearly one atm.,	(over 99.5%) at 900°C
Cu mold.	99.8%)
$H_2O$ in a quenched sample was reduced to $H_2$ by Al at 1500 -	S102: Ground quartz (over 99.9%)
volumetrically by using a micro-	
Orsat gas analyzer.	ESTIMATED ERROR:
	Analysis of $H_2$ : $\delta(ppm)/(ppm) = \pm 0.08$ (authors)
	REFERENCES:
	1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T.
	<b>Trans. Iron Steel Inst. Jpn.</b> <u>1966</u> , <b>6</b> , 225 - 232.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Silica; SiO<sub>2</sub>; [7631-86-9] (4) Titanium oxide; TiO<sub>2</sub>; [13463-67-7]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1969</u> , 9, 189 - 195.
VARIABLES: T/K = 1823 $H_2O P/ kPa = 38.5$ (289 mmHg) mass% TiO <sub>2</sub> = 5.0 - 47.5 mol ratio $n_2/n_3 = 0.59 - 1.31$	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in various CaO - SiO<sub>2</sub> - TiO<sub>2</sub> melts at 1550°C under the vapor pressure of  $H_2O$  at 289 mmHg in graphical form only. The original data were provided by the authors.

		mass%		mole ratio	ppm(mass/mas	;s)
Ca	aO	SiO₂	TiO2	CaO/SiO <sub>2</sub>	H <sub>2</sub> O	
22.	.0	36.2	39.1	0.65	330	
23.	.9	35.3	39.0	0.73	340	
25.	. 4	43.6	29.9	0.85	300	
27.	. 2	22.8	47.5	1.28	270	
27.	. 4	34.5	37.5	0.85	300	
27.	. 4	41.8	29.7	0.70	350	
29.	. 6	31.0	38.0	1.02	320	
30.	.1	49.9	19.1	0.65	360	
30.	. 9	39.0	29.1	0.85	320	
31.	. 9	47.4	20.2	0.72	360	
32.	. 3	27.2	38.7	1.27	320	
33.	.1	56.6	10.0	0.59	370	
34.	.1	55.1	10.3	0.66	390	
34.	. 4	44.1	19.5	0.84	320	
34.	. 8	36.0	28.7	1.04	340	continued

#### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The sample in a Pt crucible was equilibrated with the  $H_2O$  + Ar stream of nearly one atm., and was quenched in a canal made of thick Cu plate.  $H_2O$  in the sample was reduced to  $H_2$  by Al at 1550 -1600°C, and  $H_2$  was measured volumetrically by using a micro-Orsat gas analyzer.

## SOURCE AND PURITY OF MATERIALS:

CaO & TiO<sub>2</sub>: Reagent grade chemicals SiO<sub>2</sub>: Transparent high purity silica was washed and cleaned (over 99.9%).

ESTIMATED ERROR:

Analysis of  $H_2$ :  $\delta(ppm)/(ppm) < \pm 0.08$  (authors)

### **REFERENCES:**

 Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T.

> Trans. Iron Steel Inst. Jpn. 1966, 6, 225 - 232.

COMPONENTS:			ORIGINAL MEASU	REMENTS:	
(1) Water; $H_2O_2$ (2) Calcium ox:	<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO;</pre>		Iguchi, Y.;	Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
[1305-78-8] (3) Silica; Sid (4) Titanium oz [13463-67-7	] D <sub>2</sub> ; [7631- xide; TiO <sub>2</sub> 7]	-86-9] 2;	<b>Trans. Iro</b> r <b>9</b> , 189 - 19	n <b>Steel Inst. Jpn. <u>1969</u>,</b> 95.	
VARIABLES: $T/H$ $H_2O P/kP_a =$ mass% TiO mol ratio n <sub>2</sub>	BLES: $T/K = 1823$ H <sub>2</sub> O P/kP <sub>a</sub> = 38.5 (289 mmHg) mass% TiO <sub>2</sub> = 5.0 - 47.5 mol ratio n <sub>2</sub> /n <sub>3</sub> = 0.59 - 1.31		PREPARED BY:	M. Shinmei	
EXPERIMENTAL VALUES:	cont	cinued			
	mass%		mole ratio	ppm(mass/mass)	
CaO	SiO <sub>2</sub>	TiO₂	CaO/SiO <sub>2</sub>	H <sub>2</sub> O	
36.3 38.5 39.5 39.8 41.1 42.8 44.0 44.9 50.5 52.2	53.3 31.5 41.4 49.9 32.0 46.1 36.0 38.5 41.0 42.8	9.9 30.0 18.6 9.8 21.8 10.6 20.0 14.6 9.2 5.0	0.73 1.31 1.02 0.85 1.38 1.00 1.31 1.25 1.32 1.31	380 360 350 340 400 380 370 390 410 370 	
		AUXILI	ARY INFORMATION		
, ,	,		ESTIMATED EDD	OP-	
			REFERENCES:	UK:	

COMPONENTS :	ORIGINAL MEASUREMENTS:	
(1) Water; $H_2O$ ; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8]	Iguchi, Y.; Ban-ya, S.; Fuwa, T.	
<pre>(3) Silica; SiO<sub>2</sub>; [7631-86-9] (4) Titanium oxide; TiO<sub>2</sub>; [13463-67-7]</pre>	<b>Trans. Iron Steel Inst. Jpn. <u>1969</u>,</b> 9, 189 - 195.	
VARIABLES: $T/K = 1823$ $H_2O P/kPa = 38.5 (289 mmHg)$ mass% $TiO_2 = 5.0 - 47.5$ mol ratio $n_2/n_3 = 0.59 - 1.31$	PREPARED BY: M. Shinmei	
EXPERIMENTAL VALUES: mass(2)	mole ratio	
continued CaO SiO <sub>2</sub> Tic	$p_{pm}(mass/mass)$	
50.5 41.0 9	$H_2 \cap H_2 $	
32.2 42.8 5.	0 1.31 370	
	SUUZ See	
St St	st be	
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E a 2"		
A A A A A A A A A A A A A A A A A A A	2.100 · · · · · · · · · · · · · · · · · ·	
1730) - S - (40) - 210		
a a a a a a a a a a a a a a a a a a a		
No X No		
1 2 <sup>3</sup>	¥.	
0 10 20 30 40	50 60 70 80 90 100	
Co0 Ma	ss % 1i02 1i02	
Fig. 1, Solubility of water in CaC	$P - SiO_2 - TiO_2$ melts (ppm) at $P_{H_2O} =$	
Sold KPa and ISSUE.		
}		
AUXILIARY	INFORMATION	
METHOD / APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:	
	ESTIMATED ERROR:	
	REFERENCES :	
1		
1		
1		
1		
	-	

	511
COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Calcium oxide; CaO;	Ban-ya, S.; Iguchi, Y.; Yamamoto, S.
[1305-78-8] (3) Titanium oxide; TiO <sub>2</sub> ; [13463-67-7] (4) Silica: SiO <sub>2</sub> : [7631-86-9]	<b>Tetsu to Hagane <u>1986</u>, 72,</b> 2210 - 2217.
VARIABLES: T/K = 1723 $H_2O P/kPa = various$ $n_2/n_3/n_4 = various$	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the iso- log K' = log	water vapor capacities defined by: (mass % H <sub>2</sub> O/P <sup>ª</sup> H <sub>2</sub> O)
as shown in the figure, where $P_{H_2}$	$_{\circ}$ is expressed in mm Hg.
20,	
× 40×	
Ĕ Ĭ\\	700 12
60/ (()	$-\frac{1.20}{1.22}$ , $\frac{1.40}{1.22}$
	(12) ·····
80	(1117 · · · · · · · · · · · · · · · · · ·
0 20 4	$\begin{array}{c} 2 \\ 0 \\ 6 \\ 0 \\ 6 \\ 0 \\ 6 \\ 0 \\ 6 \\ 0 \\ 0$
TiO <sub>2</sub>	
· · · ·	
Fig. 1 Iso-water vapor capacit melts at 1450°C.	ty lines in CaO - SiO <sub>2</sub> - TiO <sub>2</sub>
AUXILIARY	τητορματίου
	TROUBER AND DUDTER OF MATERIALS.
ALIHOD/AFFARAIDS/FROCEDORE:	SUBCE AND FURITE OF MATERIALS;
Synthesized slag was	CaO: made by fining reagent grade
blowing nearly one atm. of Ar +	TiO <sub>2</sub> : reagent grade TiO <sub>2</sub> powder.
H <sub>2</sub> O gas mixture over the melt. Water contents were dete-	SiO <sub>2</sub> : crushed quartz.
by the authors(1).	
	ESTIMATED ERROR:
	Not described, but is estimated to be of the same order as in ref. 1.
	REFERENCES :
	<pre>1. Ban-ya, S.; Iguchi, Y.; Nagata, S. Tetsu to Hagane <u>1985</u>, 71, 55 - 62.</pre>

51	12
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Water; H <sub>2</sub> O; [7732-18-5]	
(2) Calcium oxide; CaO;	Abe, Y.
<pre>(3) Manganese oxide; MnO;</pre>	<b>Tetsu to Hagane</b> <u>1961</u> , <b>47</b> , 693 - 698.
[1344-43-0] (4) Silica: SiO : [7631-86-9]	
(4) SIIICA, SIC <sub>2</sub> , [7051-00 7]	
VARIABLES:	PREPARED BY:
T/K = 1673	
$H_2O P/kPa = 2.7 (20 mmHg)$ mass% CaO/MgO/SiO <sub>2</sub> = 35/30/35	M. Shinmei
EVERTMENTAL VALUES.	
The author reported the solubility SiO <sub>2</sub> melt at 1400°C and at $P_{H_0} = 20$ However, two points should be <sup>2</sup> raised only one hour passing of a N <sub>2</sub> + H <sub>2</sub> O assure the equilibrium state. ii) Us container might change the above con	y of H <sub>2</sub> O in 35% CaO - 30% MnO - 35% ) mmHg as (H) = 27.5 (ppm, mass/mass). I regarding this study : (i) Whether stream over the sample was enough to sing of an Al <sub>2</sub> O <sub>3</sub> boat as the sample mposition by dissolution of Al <sub>2</sub> O <sub>3</sub> .
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The sample in an $Al_2O_3$ boat was heated for one hour at 1400°C under a stream of $N_2$ + $H_2O$ at near one atm.	Not given.
	ESTIMATED ERROR:
	[
	Not given.
	KEFEKENCES:

	513
COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Iron oxide; FeO; [1345-25-1] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Imai, M.; Ooi, H.; Emi, T. Tetsu to Hagane <u>1962</u> , <b>48</b> , 111 - 117.
VARIABLES: mol% FeO = 22.8 - 34.0 mol ratio $n_2/n_4$ = 0.4 - 3.14 T/K = 1623 - 1823 continued	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubility melts at 1623, 1723 and 1823 K and a shows the relation between H content Effect of temperature and of basicity shown in Table 1 and in Fig. 2, resp	ity of $H_2O$ in various CaO - FeO - SiO <sub>2</sub> at $P_{H_{O}} = 2.8$ and 10.1 kPa. Fig. 1 and <sup>2</sup> square root of $H_2O$ pressures. by on the H content of the melts are pectively.
Composition (mol%)       40         CaO       FeO       SiO2         A       21.6       26.4       52.0       20         B       29.1       24.5       46.4       52.0       20         B       29.1       24.5       46.4       50       20         G       18.8       34.0       47.2       10         H       26.6       32.8       40.6       10         K       46.7       29.8       23.5       0         Fig. 1       Solubility of water in CaO square root of water vapor       10	$ \begin{array}{c}                                     $
	INFORMATION
The samples in Pt crucibles were equilibrated with the stream of Ar + $H_2O$ nearly one atm., and were quenched in either Hg or $H_2O$ . $H_2O$ in the samples was determined by the method of analysis described in ref. 1	All materials used were reagent grade chemicals.
	ESTIMATED ERROR:
	Not described explicitly.
	<pre>REFERENCES: 1. Imai, M.; Nakayama, T.; Ooi, H.; Emi, T. Tetsu to Hagane 1959, 45, 1080 - 1082.</pre>

514	4
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COMPONENTS :		ORIGINAL MEAS	UREMENTS :		
(1) Water; H <sub>2</sub> O; [7732-18-5 (2) Calcium oxide; CaO;	Imai, M.; Ooi, H.; Emi, T.				
[1305-78-8] (3) Iron oxide; FeO; [1345 (4) Silica; SiO <sub>2</sub> ; [7631-86	-25-1] -9]	<b>Tetsu to Hagane</b> <u>1962</u> , <b>48</b> , 111 - 117.			
		<u> </u>			
VARIABLES: $H_2O P/kPa = 2.8 (21.1 \\ 10.1 (76 mmHg)$	.mmHg),	PREPARED BY:	M. Shinme	əi	
EXPERIMENTAL VALUES:		l			
continued					
Effect of Temperature o	Ta n Hydroge	ble 1 n Content of	E CaO - FeO	- SiO <sub>2</sub> Melts	
Composition of mel	.ts/mol%	Hydro	ogen content	:/ppm	
CaO FeO	SiO₂	1350°C	1450°C	1550°C	
29.1 24.5	46.4	11.7	16.0	19.8	
26.6 32.8 33.4 33.6	40.6	16.1 15.1	18.5	19.3 19.1 19.7	
				t	
METHOD/APPARATUS/PROCEDURE:	AUXILIARY	INFORMATION SOURCE AND P	URITY OF MATER	RIALS :	
		ESTIMATED ER	ROR:		
				-	



COMPONENTS: ORIGINAL MEASUREMENTS: (1) Water; H<sub>2</sub>O; [7732-18-5] Imai, M.; Ooi, H.; Emi, T. (2) Calcium oxide; CaO; [1305-78-8] Tetsu to Hagane 1964, 50, 878 - 887. (3) Iron oxide; FeO; [1345-25-1]
(4) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: mol% FeO = 3.1 - 39.2PREPARED BY: mol% CaO = 18.8 - 57.6H<sub>2</sub>O P/kPa = 2.8 - 90.9M. Shinmei T/K = 1823 & 1873**EXPERIMENTAL VALUES:** The authors studied the solubility of  $H_2O$  in various CaO - FeO - SiO<sub>2</sub> melts coexisting with liquid iron at 1550 and 1600°C. Considering the dissolution reaction of H<sub>2</sub>O takes place:  $H_2O(g) + O(melt) = 20H(melt)$ (1) $K_1 = C_{OH}^2 / P_{H_0} \times a_0$ they obtained:  $\log K_1 = -2160/T + 8.144$ (2) where  $C_{OH}$  is the concentration of OH in the melt expressed in ppm (mass/ mass),  $P_{H}$  ois the pressure of  $H_2O$  expressed in atm, and  $a_o$  is the activity <sup>2</sup>of oxygen which was assumed to equal the activity of FeO. The compiler obtained the following as solubility of H<sub>2</sub>O:  $logC_{H_O}(ppm, mass/mass) = -1080/T + 2.789 + (1/2)logP_{H_O}(KPa) +$ (1/2)loga\_  $logC_{H}(ppm, mass/mass) = -1080/T + 1.838 + (1/2)logP_{H_{P}O}(KPa) +$  $(1/2)\log_a$ The original data are shown in Tables 2 and 3. (authors). AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The samples in  $SiO_2$  crucibles were equilibrated with the stream All materials used were reagent grade chemicals. of  $Ar + H_2O$  at near one atm., and were quenched. The analysis of H in the sample was made by the method described in ref. 1. ESTIMATED ERROR: Not given. **REFERENCES:**  Imai, M.; Nakayama, T.; Ooi, H.; Emi, T. . Tetsu to Hagane 1959, 45, 1080 -1082.

COMPONENTS :	UKIGINAL MEASUREMENTS:
(1) Water; $H_2O$ ; [7732-18-5] (2) Calcium ovide: CaO:	Wahlster, M.; Reichel, HH.
[1305-78-8] (2) Trop order Prov [1245 25 1]	Arch. Eisenhuttenwes. <u>1969</u> , 40, 19 -
(4) Silica; SiO <sub>2</sub> ; [7631-86-9]	23.
VARIABLES: mol% $n_3 = 20 \& 35$ mol ratio $n_2/n_4 = 20/20 \& 30/35$	PREPARED BY:
$H_2O P/kPa = 101.3 (760 mmHg)$ T/K = 1683 - 1873	M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubili as a function of temperature at P	ty of H <sub>2</sub> O in CaO - FeO - SiO <sub>2</sub> melts , = 101.3 <sub>kPa</sub> .
For 20 mol% CaO - 30 mol% FeO - 35 m	
logH(mag)	-625/T + 2.04
(maa)*0 <sub>c</sub> H pol	= -625/T - 1.01
and for 20 mol% CaO - 60 mol% FeO -	20 mol% SiO <sub>2</sub> melt:
loaH(max) = -	1940/T + 2.89
logH <sub>2</sub> O*(ppm) =	-1940/T - 0.159
* Calculated by the compiler.	
	. I
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The samples in Pt crucibles	Not described.
were equilibrated with the stream of $Ar + H_2O$ at nearly one atm.,	
and were quenched. The solubility of H-O was	]
determined by the method described in ref. 1.	
	1
	ESTIMATED ERROR:
	Analysis of hydrogen
	$o(ppm)/(ppm) = \pm 0.05$
	REFERENCES:
	1. Obst, KH.; Malissa, H.
	Arch. Eisenhuttenwes. 1959, 30,
	601 - 603.

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Iron oxide; FeO; [1345-25-1] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Wahlster, M.; Reichel, H. H. Arch. Eisenhuttenwes. <u>1969</u> , <b>40</b> , 19 - 25.
VARIABLES: $T/K = 1873 (1600 °C)$ H <sub>2</sub> O P/kPa = 101.3 (760 mmHg) mol% FeO = 0 - 100 mol% SiO <sub>2</sub> = 0 - 50	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubil melts at 1873 K and at $P_{H_O} = 101.3$ out at $P_{H_O} = 31.2$ kPa). <sup>2</sup> The numer ppm (mass <sup>2</sup> /mass) of hydrogen. Si0,	ity of H <sub>2</sub> O in various CaO - FeO - Sio <sub>2</sub> kPa (actual measurements were carried ical values in the figure are
2 Co0 · Si0 2 2 Co0 · Si0 2 2 Co0 · Si0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The samples in Pt crucibles were equilibrated with the stream of Ar + $H_2O$ at near one atm. and were quenched. The solubility of $H_2O$ was determined by the method described in ref. 1.	Not described.
1	ESTIMATED ERROR:
	analysis of hydrogen $\delta(ppm)/(ppm) = \pm 0.05$ (authors)
	REFERENCES :

1. Obst, K.-H.; Malissa, H.

Arch. Eisenhuttenwes. <u>1959</u>, 30, 601 - 603.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Iron oxide; FeO; [1345-25-1] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1969</u> , 9, 189 - 195.
VARIABLES: $T/K = 1823$ $H_2O P/kP_a = 38.5 (289 mmHg)$ mass% reO = 3.9 - 19.8 mol ratio $n_2/n_4 = 0.62 - 1.28$	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in various CaO - FeO - SiO<sub>2</sub> melts at 1550°C under the vapor pressure of  $H_2O$  at 289 mmHg in graphical form, and the original data were provided by the authors.

		mass %		mole ratio	ppm(mass/mass)	
	CaO	FeO	SiO <sub>2</sub>	CaO/SiO <sub>2</sub>	H <sub>2</sub> O	
	$\begin{array}{c} 30.1 \\ 30.7 \\ 32.8 \\ 34.7 \\ 35.7 \\ 38.1 \\ 38.2 \\ 39.6 \\ 40.7 \\ 41.1 \\ 42.7 \\ 42.9 \\ 43.5 \\ 44.3 \\ 46.1 \\ 46.6 \\ 48.6 \\ 49.2 \end{array}$	$     \begin{array}{r}       19.7 \\       14.5 \\       10.4 \\       5.3 \\       14.8 \\       9.6 \\       19.8 \\       5.5 \\       14.7 \\       19.0 \\       9.2 \\       19.3 \\       14.0 \\       4.8 \\       9.2 \\       13.1 \\       4.6 \\       8.4 \\    \end{array} $	49.1 53.2 56.2 58.3 48.1 51.3 40.9 54.2 43.6 39.0 46.0 36.6 41.6 48.7 43.9 39.2 46.1 41.1	0.66 0.62 0.63 0.64 0.80 1.00 0.78 1.00 1.13 0.98 1.26 1.12 0.97 1.13 1.27 1.13 1.27 1.13 1.28	430 450 410 500 470 460 400 570 440 610 510 540 670 600 700 520 830	
	51.4	3.9	43.9	1.25	640	
			AUXIL	IARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: The sample in a Pt crucible was equilibrated with the H <sub>2</sub> O + Ar stream of nearly one atm., where the oxygen potential was maintained to keep 1.5 x 10 <sup>6</sup> atm. at 1550°C, and was quenched in a canal made of thick Cu plate. H <sub>2</sub> O in the sample was measured as H <sub>2</sub> volumetrically by a micro-Orsat gas analyzer after reducing with Al at 1550 - 1600°C.		SOURCE AND PUR All oxi grade chemi was transpa ground to t and washed SiO <sub>2</sub> ), FeO ferrous oxa in the Ar s	RITY OF MATERIALS: ides used were reagent icals except silica, w arent high purity sili the size of 100 mesh and cleaned (over 99. was prepared by heati alate at 500°C for 5 h stream.	hich ca 9% ng rs.		
				ESTIMATED ERRC analysis δ(ppm)/(p	DR: of $H_2$ : opm) = less than $\pm 0.00$ (authors)	4
				REFERENCES: 1. Fukushim Ban-ya, Trans. 1 <u>1966</u> , 6,	na, T.; Iguchi, Y.; S.; Fuwa, T. I <b>ron Steel Inst. Jpn.</b> , 225 - 232.	

COMPONENTS :	ORIGINAL MEASUREMENTS:
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8] (3) Iron oxide; FeO; [1345-25-1] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T. <b>Trans. Iron Steel Inst. Jpn.</b> <u>1969</u> , 9, 189 - 195.
VARIABLES: $T/K = 1823$ H <sub>2</sub> O P/kPa = 38.5 (289 mmHg) mass% FeO = 3.9 - 19.8 mol ratio n <sub>2</sub> /n <sub>4</sub> = 0.62 - 1.28	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES: continued $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10}$ $4^{10$	SiO <sub>2</sub> SiO <sub>2</sub>
1550°C and $P_{H_2O} = 38.5 \text{ kPa}$ .	er (ppm) in CaO - FeO - SiO <sub>2</sub> meits at
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS;
	ESTIMATED ERROR: REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Water; H<sub>2</sub>O; [7732-18-5]</li> <li>Calcium oxide; CaO; [1305-78-8]</li> <li>Germanium oxide; GeO<sub>2</sub>; [1310-53-8]</li> <li>Silica; SiO<sub>2</sub>; [7631-53-8]</li> </ol>	Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u> , 6, 225 - 232.
VARIABLES: $T/K = 1773$ $H_2O P/kPa = 38.5 (289 mmHg)$ mol% GeO <sub>2</sub> = 3 - 9 mol ratio $n_2/n_4 = 0.63$	PREPARED BY: M. Shinmei

The authors reported the solubility of  $H_2O$  in various CaO - GeO<sub>2</sub> - SiO<sub>2</sub> melts at 1500°C and at 289 mmHg of  $H_2O$  in graphical form (the numerical data are given in ref. 1).

	Mass%			Mol %		Mole Ratio	ppm(ma	ass/mass)
CaO	GeO₂	SiO₂	CaO	Ge0₂	SiO₂	CaO/SiO <sub>2</sub>	н	H₂0*
35.3 33.4 31.5 31.5	5 10 15 15	59.7 56.6 53.5 53.5	37.7 36.5 35.2 35.2	2.9 5.8 9.0 9.0	59.4 57.7 55.8 55.8	0.63 0.63 0.63 0.63	48 50 51 50	428 450 460 450

\* Calculated by the compiler

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The sample in a Pt crucible was equilibrated with the $H_2O$ + Ar stream at nearly one atm., and was quenched in a water cooled Cu mold. $H_2O$ in a quenched sample was reduced to $H_2$ by Al at 1500 - 1600°C, and was measured volumetrically by using a micro- Orsat gas analyzer. (ref. 1)	<pre>CaO: Made by thermal decomposition of reagent grade carbonate (over 99.5%) at 900°C. GeO<sub>2</sub>: Reagent for semi-conductor materials (over 99.999999%) SiO<sub>2</sub>: Ground guartz (over 99.9%)</pre>			
	ESTIMATED ERROR:			
	$\delta(ppm)/(ppm) = \pm 0.08$ (authors)			
•	REFERENCES:			
	<ol> <li>Fuwa, T.; Ban-ya, S.; Fukushima, T. Report of the 19th Committee of the Japan Society for Promotion of Science, No. 7834, <u>May 1965</u>.</li> </ol>			

COMPONENTS	OPTOTNAL MEASUDEMENTS.
(1) Water, W O = [7733, 10, 5]	ONTOTARE REMOUREMENTS:
(1) water; $H_2O$ ; $[7/32-18-5]$ (2) Potassium oxide: $K_2O$ :	Russell, L. E.
[12136-45-7]	
(3) Sodium oxide; $Na_2O$ ;	J. Soc. Glass Tech. <u>1957</u> , 41,
[1313-59-3] (4) Lead oxide: PbO: $[1317-36-8]$	304T - 31/T.
(5) Silica; SiO <sub>2</sub> ; [7631-86-9]	
	DEDADED DV.
$H_{\rm a}O P/kPa = 101.3$	FREFRRED DI:
mol ratio $K_2O/Na_2O/PbO/SiO_2 =$	M. Shinmei
8/5/30/57	
EXPERIMENTAL VALUES:	
The author reported the solubilit melt at $P_{H_2O} = 101.3 \text{ kPa}$ in the temp Temperatu	y of $H_2O$ in commercial lead glass erature range 1490 - 1520 K. are, °C
	1200
0.07-	
0.06	]
° 0.05	-
₹ 0.04	/ -
u t	
<u>۳</u> ۵.03	
ê	
l F	
5.0 6.0	7.0 8.0
104	к/т
AllXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The stream of 4 0 st near one	Commorgial loss along
atm. was bubbled up through the	Commeterar read grass.
melt in a mullite tube. The	
determination of the solubility	
purging method with dry O <sub>2</sub> .	
	ESTIMATED FREOR
	LOTITALED BROK
	o(ppm)/(ppm): within : 0.10 (author)
	REFERENCES :
1	
COMPONENTS:	ORIGINAL MEASUREMENTS:
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
<pre>(1) Water; H<sub>2</sub>O; [7732-18-5] (2) Calcium oxide; CaO; [1305-78-8]</pre>	Iguchi, Y.; Ban-ya, S.; Fuwa, T.
<pre>(3) Iron oxide; FeO; [1345-25-1] (4) Magnesium oxide; MgO; [1309-48-4]</pre>	Trans. Iron Steel Inst. Jpn. <u>1970</u> , 10, 29 - 35.
(5) Šilica; SiO <sub>2</sub> ; [7631-86-9]	
VARIABLES: $T/K = 1823$	PREPARED BY:
$\begin{array}{r} H_2O P/RPa = 38.5 (289 \text{ mmHg})\\ \text{mol ratio } n_2/n_5 = 1.1\\ \text{mol% FeO=0-11.8, mol% MgO=17.0-21.3} \end{array}$	M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubili $SiO_2$ melts at 1550°C and at $P_{H} = 3$ original data were provided by <sup>2</sup> the a	ity of $H_2O$ in various CaO - FeO -MgO - 38.5 kPa in graphical form only. The authors.
mol%	mole ratio ppm(mass/mass)
CaO FeO MgO SiO <sub>2</sub>	CaO/SiO <sub>2</sub> H <sub>2</sub> O
39.8 0 21.3 38.9	1.02 616
40.5 3.8 18.5 37.2	1.09 650 1.09 577
37.1 11.8 17.0 34.1	1.09 635
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The samples in Pt crucibles were equilibrated with the stream of Ar + $H_2O$ at near one atm., and were quenched. Details of experimental procedure and analysis of $H_2O$ in the sample are described in refs. 1 and 2.	All materials were reagent grade chemicals.
	ESTIMATED ERROR:
	Analysis of $H_2O$ : $\delta(ppm)/(ppm) = \pm 0.06$ (authors)
	<pre>REFERENCES: 1. Fukushima, T.; Iguchi, Y.; Ban-ya, S.; Fuwa, T. Trans. Iron Steel Inst. Jpn. <u>1966</u>, 6, 225 - 232. 2. Iguchi, Y.; Ban-ya, S.; Fuwa, T. Ibid. <u>1969</u>, 9, 189 - 195.</pre>

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Nitrogen; N<sub>2</sub>; [7727-37-9]</li> <li>Calcium oxide; CaO; [1305-78-8]</li> <li>Sodium oxide; Na<sub>2</sub>O; [1313-59-3]</li> <li>Calcium oxide; Na<sub>2</sub>O;</li> </ol>	Mulfinger, HO. J. Amer. Ceram. Soc. <u>1966</u> , <b>49</b> , 462 - 467.
(4) Silica; $SiO_2$ ; [/631-86-9]	
VARIABLES: T/K = 1673 $N_2 P/kPa = 101.3$ $n_2/n_3/n_4 = 10/16/74$	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES: The author reported the solubilit Na <sub>2</sub> O - SiO <sub>2</sub> melts at 1400°C.	ty of N <sub>2</sub> (physically melted) in CaO -
Melt Composition (mol%)	Solubility of $N_2$ (ml(STP)/ml glass)
CaO Na <sub>2</sub> O SiO <sub>2</sub>	
10 16 74	4.2 x 10 <sup>-4</sup>
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE: The melted glass was saturated by bubbling N <sub>2</sub> at nearly one atm. at 1400°C for 16 hr. The concentration of N <sub>2</sub> was determined by hot extraction and gas chromatographic analysis described in the reference.	SOURCE AND PURITY OF MATERIALS: Not described.

COMPONENTS :		ORIGINAL MEASUREMENTS:				
<pre>(1) Nitrog (2) Alumin (3) Calciu [1305- (4) Silica</pre>	en; N <sub>2</sub> ; [7727-37-9] a; Al <sub>2</sub> O <sub>3</sub> ; [1344-28-1] m oxide; CaO; 78-8] ; SiO <sub>2</sub> ; [7631-86-9]	Kamyshov, V. M.; Esin, O. A.; Chuchmrev, S. K. Izv. Vyssikh. Uchebn. Zavedeii, Chern, Met. <u>1964</u> , 7(7), 24 - 28; Chem Abstr; <u>1964</u> , 61, 13021h (*)				
VARIABLES: N <sub>2</sub> P/kPa m <sub>2</sub> /m <sub>3</sub> /m <sub>4</sub>	T/K = 1773 = 93.2; CO P/kPa = 8.1 = 10-50/ 23-50/ 30-57	PREPARED BY: M. Shinmei				
EXPERIMENTAL VA	LUES:					
The aut the Al <sub>2</sub> O <sub>3</sub> under the	hors reported the solub - CaO - SiO <sub>2</sub> melt conta stream of $N_2$ + CO (92 v	lity of $N_2$ in various compositions of ned in a carbon crucible at 1773 K 1.% $N_2$ and 8 vol.% CO).				
		Mass %				
	Al <sub>2</sub> O <sub>3</sub> CaO	SiO <sub>2</sub> N				
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{ccccccc} 40.0 & 0.435 \\ 57.0 & 0.237 \\ 50.0 & 0.153 \\ 30.0 & 0.210 \\ 35.0 & 0.442 \\ & 1.460 \end{array}$				
(*)	Data taken from the ab	tract				
	AUXILIA	RY INFORMATION				
METHOD/APPARAT	US/PROCEDURE :	SOURCE AND PURITY OF MATERIALS:				
The sam crucible w and $N_2$ + C through a in the mel established	ples in a graphite ere melted at 1773 K O mixture was blown capillary tube immersed t. The equilibrium was d within 2 hrs.					
		ESTIMATED ERROR:				
		REFERENCES :				

COMPONENTS .	ORTGINAL MEASUREMENTS .
<pre>(1) Nitrogen; N<sub>2</sub>; [7727-37-9] (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] (3) Calcium oxide; CaO;       [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>	Shimoo, T.; Kimura, H.; Kawai, M. Nippon Kinzoku Gakkaishi, <u>1971</u> , 35, 1103 - 1108.
VARIABLES: T/K = 1673; 1723; 1773; 1823 N P/kPa = 93.2; CO P/kPa = 8.1 m <sub>2</sub> /m <sub>3</sub> /m <sub>4</sub> = 0-50/ 10-50/ 0-72	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the solubil: 40SiO <sub>2</sub> (mass%) melt with graphite sa 1723 and 1773 K under the stream of solubility for the melt was expresse	ty of N in the $20Al_2O_3 - 40CaO - Aturation at the temperatures 1673, N_2 + CO mixture. The apparent as:$
logC <sub>N</sub> (mass%) =	23400T <sup>-1</sup> + 12.7
under $P_{N_2} = 93.2$ kPa; $P_{CO} = 8.1$ kPa. The authors also reported the solubility of N in various compositions of the Al <sub>2</sub> O <sub>3</sub> - CaO - SiO <sub>2</sub> melts whose compositions are shown in Fig. 1 and in Table 1, with graphite saturation at 1773 K. The form of	5:0, 10, 50 20, 60 50, 70 50, 70
N dissolved in the melts was supposed to be ions such as CN <sup>-</sup> , N <sup>3-</sup> CN <sub>2</sub> <sup>2-</sup> . Fig. 1. Slag compositions investigat molten CaO - SiO <sub>2</sub> - Al <sub>2</sub> O <sub>3</sub> slag at 17 composition limit at this temperatur	red on solubilities of nitrogen in 73 K. Bold lines show liquid
	(Continued)
AUXILIARY	INFORMATION
METHOD /APPARATUS / PROCEDURE :	SOURCE AND PURITY OF MATERIALS:
The sample in a graphite crucible was equilibrated with the $N_2$ + CO stream of nearly one atm. The sampling for chemical analysis was made by quenching the melt with a stainless steel rod. Nitrogen was analyzed by the combustion method described in the previous report (1).	<pre>Al<sub>2</sub>O<sub>3</sub>: Chemicals, more than 99.8 mass% purity CaO : Reagent grade CaCO<sub>3</sub> was fired SiO<sub>2</sub> : Pulverized quartz</pre>
	ESTIMATED ERROR:
	δ(mass)/(mass) = ± 0.03 - 0.12 Authors (2)
	<pre>REFERENCES: 1. Kimura, H.; Izumi, T.; Dan, T.; Shimoo, T.; Kawai, M. Nippon Kinzoku Gakkaishi 1970, 34, 884 - 887. 2. Shimoo, T.; Kimura, H.; Kawai, M. Nippon Kinzoku Gakkaishi 1971, 35, 417 - 422.</pre>

COMPONENTS:	_		_	ORIGINAL MEAS	SUREMENTS:			_	
(1)	000 · 11	ריבין	-01	chimas' m		. U	wai i		
(1) Nitro (2) Alumi	yen; N <sub>2</sub> ; na; Al <sub>2</sub> 0.	ניובו-37 s; [1344-	-9] -28-1]	Shimoo, T.; Kimura, H.; Kawai, M.					
(3) Calci	um oxide	; CaO;	-	Nippon Ki	nzoku Gal	kkaishi <u>1</u>	<u>.971</u> , 35		
(4) Silic	-/0-8] a; SiO-:	[7631-86	-9]	1103 - 110	00.				
			-						
VARIABLES:				PREPARED BY:					
T/K =	1673, 172	23, 1773,	1823	M	. Shinme:	i			
$\begin{array}{c} m_2 P/KPa \\ m_2/m_3/m_4 \end{array}$	= 0 - 50	10 - 50	/ 1 - 72						
EXPERIMENTAL V	ALUES:			•					
	-		<b>.</b>	-	<b>_ 1</b> -		<b>N</b>		
Tabl	e l Solu	ubility o (P. =	or N in Al: : 93.2 kPa	$_{2}O_{3} - CaO -$	S1O₂ Me. kPa)	its at 17	73 K		
		1-N 2	AEd	, -co - v+1					
	mass	9 			mass	9 	<u></u>		
Al <sub>2</sub> O <sub>3</sub>	CaO	SiO₂	N	Al <sub>2</sub> 0 <sub>3</sub>	CaO	SiO2	N		
0	40	60	0.24	16	20	64	0.17		
3	37	60	0.18	18	40	42	0.24		
67	47 53	47 40	0.45 0.55	20 20	10 20	70 60	0.07		
8	32	60	0.16	20	25	55	0.14		
10	18 27	63	0.04 0.16	20	32 40	48 40	0.15 0.26		
10	36	54	0.49	21	30	49	0.15		
10	45 50	45 40	0.56 0.53	24 24	16 20	ь0 56	0.05 0.10		
12	28	60	0.15	25	25	50	0.14		
12	40 30	48 56	0.52	30	10 28	63 42	0.07 0.25		
15	15	70	0.05	30	30	40	0.25		
15	25 50	60 35	0.⊥4 0.52	30 35	35	35 30	0.29		
		-		_		-	cont	'd	
			AUXILIARY	INFORMATION		······································	·		
METHOD ADDADA	TUS /PROCEDU	URE :		SOURCE AND D	URITY OF Y	ATERIATE -	·····		
				SUUNCE AND P	UNII UF P	arentaro;			
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	,								
1				1					
				1					
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1				ESTIMATED FP	ROR:		· · · · · · · · · · · · · · · · · · ·		
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				<b>REFERENCES</b> :					
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COMPONENTS :			ORIGINAL MEA	SUREMENTS	:
<pre>(1) Nitrogen; N<sub>2</sub>; [7] (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; (3) Calcium oxide; Ca [1305-78-8] (4) Silica; SiO<sub>2</sub>; [76]</pre>	727-37-9] [1344-28-1 40; 531-86-9]	]	Shimoo, T Nippon Ki 1103 - 11	.; Kimu nzoku G 08.	ra, H.; Kawai, M. <b>akkaishi</b> <u>1971</u> , 35,
VARIABLES:			PREPARED BY: M.	Shinmei	•
EXPERIMENTAL VALUES:					
continued					
-		mas	S %		
_	Al <sub>2</sub> 0 <sub>3</sub>	CaO	SiO <sub>2</sub>	N	
	40 40 45 50	30 40 45 50	30 20 10 0	0.21 0.07 0.45 0.50	
-			<u></u>		
1					
	AUX:	ILIARY	INFORMATION		
METHOD/APPARATUS/PROCEDURE:			SOURCE AND F	URITY OF	MATERIALS':
1					
					,
			ESTIMATED EN	RROR:	······································
			REFERENCES:		

							529
COMPONENTS:					ORIGINAL ME	CASUREMENTS:	
<pre>(1) Nitroge (2) Alumina (3) Calcium [1305-7 (4) Silica;</pre>	n; N <sub>2</sub> ; [7 ; Al <sub>2</sub> O <sub>3</sub> ; oxide; C 8-8] SiO <sub>2</sub> ; [7	727-37 [1344- aO; 631-80	7-9] -28-1] 5-9]		Davies, Metal. 3	M. W.; Mehera Frans. <u>1971</u> , 2	li, S. G. , 2729 - 2733.
VARIABLES: T/K = 177 N <sub>2</sub> P/kPa	3; 1823; = 20.3 -	1873 70.9	continue	ed	PREPARED BY	Y: M. Shinme	ei
EXPERIMENTAL VAL	UES:			1		·····	
The auth melts with to major co	ors studi compositi nstituent	ed the ons cl s.	e equili lose to	bri tho	um solubi ose of bla	ility of N in a ast furnace sla	aluminosilicate ag with respect
	aturation	Under	r Variou	us C	Sas Mixtur	$res of N_2 + CO$	+ Ar
Mel	t Atm	osphei	ce %		N Solu	bility	
T/K (mo	p. 1%) N <sub>2</sub>	со	Ar	ć	atom%"	mass%	No. of Experiments
1773 Al <sub>2</sub> 12 CaO 47	$D_3 = 20$ $\cdot 1 20$ = 50 $\cdot 1$	60 40 40	20 40 10	0.5	511±0.03 319±0.03 329±0.10	0.116±0.007 0.195±0.01 0.303±0.02	5 8 7
510 37 1823	2 = .9 50 20 40 20	40 40 60 60	10 40 0 20	2.9 1.9 1.6 1.1	06 ±0.09 00 ±0.13 57 ±0.07 19 ±0.06	$\begin{array}{c} 0.673 \pm 0.02 \\ 0.428 \pm 0.03 \\ 0.379 \pm 0.016 \\ 0.264 \pm 0.012 \end{array}$	8 13 12 5
							continued
			AUXILIA	ARY	INFORMATION	1	
METHOD/APPARATUS	/PROCEDURE:				SOURCE AND	PURITY OF MATERI	ALS:
N <sub>2</sub> + CO nearly one a the samples crucible at After equil samples were into a bath quenched sar pieces and a similar met N extraction	+ Ar gas a atm. were contained 5 ml/sec ibrium wa e quenched of dried nples were analyzed nod as in n method of	mixtur passe d in a s atta d by 1 oil. e brok for N ref.1 of mel	tes at a carbon a carbon towering The ten into by a . ( the tting	e	High-pu "Analar CaO: ma of Graphit el Ar: 99. N <sub>2</sub> : 99. CO: 97%	arity SiO <sub>2</sub> " grade Al <sub>2</sub> O <sub>3</sub> ; de by thermal CaCO <sub>3</sub> for 16 ce Crucible: hi ectrode graphi 995% 99% 5, remainder N <sub>2</sub>	; CaCO <sub>3</sub> decomposition hrs. at 1373 K. igh quality ite
with oxidiz:	ing flux :	in a v	acuum).		ESTIMATED	ERROR:	
					δ(mas	s)/(mass) = wi (Authors)	thin ± 0.015 s)
					REFERENCES	:	
					1. Chuc Kamy	chmarev, S. K.; shov, V. M.	
					Zavo	o <b>dsk. Lab.</b> <u>1964</u>	<u>4</u> , <b>30</b> , 1034.

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COMPONENTS	:					ORIGINAL P	MEASUREMENT	s:	
(1) Ni (2) Al (3) Ca [1] (4) Si	trogen; N umina; Al lcium oxio 305-78-8] lica; SiO	2; [7 203; le; Ca 2; [70	727-3 [1344 aO; 631-8	7-9] -28-1] 6-9]		Davies Metal.	5, M. W.; Trans.	Meher <u>1971</u> ,	ali, S. G. 2, 2729 - 2733.
$n_2/n_2$	CO P/kPa = ₃/n₄ = 12 55	= 20. 1 - 1/30	3 - 6 12.4/ .95 -	0.8 47.05 37.9	-	PREPARED	ы: М. :	Shinme	i
EXPERIMENT	AL VALUES:		ontin	ued					
T/K	Melt Comp. (mol%)	Atmo Na	co	re % Ar	a	N Sol	ubility	20	No. of Experiments
-/									
1823	Al <sub>2</sub> O <sub>3</sub> = 12.0 CaO =	70 55 50 20 40 20	20 25 40 40 60 60	10 20 10 40 0 20	4.2 3.1 1.6 1.1 0.9 0.7	1 ±0.31 0 ±0.19 8 ±0.04 0 ±0.09 3 ±0.08 84±0.10	0.975±0 0.703±0 0.378±0 0.247±0 0.211±0 0.177±0	0.076 0.03 0.009 0.021 0.019 0.02	9 8 6 8 10 9
1873	55.1 SiO <sub>2</sub> == 31.0	20 50 55	60 40 25	20 10 20	1.1 2.9 6.0	9 ±0.07 8 ±0.16 2 ±0.3	0.264±0 0.674±0 1.424±0	.02	7 6
				AUXI	LIARY	INFORMATIO	אכ		
ME THOD /AP P	ARATUS/PROC	EDURE:				SOURCE AN	ID PURITY O	F MATER	IALS:
						ESTIMATE	D ERROR:		

0000					10	0711				·		
COMPONENTS:					ORI	GINAL	MEASUREME	NTS:				
(1) Nitrogen; N <sub>2</sub> ; [7727-37-9] (2) Alumina: Al <sub>2</sub> O <sub>2</sub> : [1344-28-1]						Dancy, E. A.; Janssen, D.						
(3) Calci	lum oxi	de; CaC	);	20-1]		Can.	Metallur	gical	. Quar	t. <u>1976</u> ,	15,	
(4) Silic	ca; SiC	D₂; [763	1-86	-9]		103 -	110.				l	
VARIABLES:	с/к = 1	723 - 1	923		PRE	PARED	BY:					
1 m /m /m	$V_2 P/kI$	a = 101	.3	0 - 45			Μ.	Shir	mei			
EXPERIMENTAL	VALUES:											
The au	thore	reporte	d +h	a solubi	1:++	of N	in 31 C	) <u> </u>	'a0 -	sio ela	as.	
under a v with grap N content of temper	variety phite a at or cature	of hig and thos atm. (graphi	hly $r = wit$ N <sub>2</sub> with N	reducing th vario ith grap form onl	cond us re hite y).	ditio educi: is g	ns. In T ng agent iven in	able s are Fig.	l are in T 1 as	a functi	ults on	
Table 1.	N Cor	tent of	Var:	ious Al <sub>2</sub> at	0 <b>₃ -</b> 1823	CaO K	- SiO <sub>2</sub> S	lags	Under	One Atm	. N <sub>2</sub>	
Compositi	Lon (ma	ISS %)				N Con	tent (ma	iss %)	*			
CaO Si	L0 <sub>2</sub>	Al <sub>2</sub> 0 <sub>3</sub>	Hot	Extract	ion	HF	+HC1+H2C	)2		HF+H₂SO₄		
			-50	-30+50	+30	-50	-30+50	+30	-50	-30+50	+30	
55 4	15			1.06		.61	.70	.71				
51 4 45 5	14 50	5 5		.98 .68 .63			.63 .48	.63 .53		.73 .59		
* As det partic	cermine cles (e	d by di xpresse	ffere d in	ent anal "mesh")	ytic: •	al me	thods or	ı diff	erent	size		
		<u> </u>	<u>u</u>	AUXILIAR	Y INF	ORMATI	ION					
METHOD/APPARA	ATUS/PRO	CEDURE:			SO	URCE A	ND PURITY	OF MA	TERIALS	5:		
N solu	ubility	v in Alz	0, -	CaO -		No	t descri	bed.				
SiO <sub>2</sub> slag	gs in g ed usin	raphite o an ap	was	tus and								
technique	e simil	ar to t	hose	of								
were held	l'in th	ie appro	pria									
and then	quench	the request the request of the reque	ower	ing								
was deter	N con mined	tent of both by	the hot	slags								
extractic by Chuchm	on simi narev e	lar to t al. (	that 2) an	used nd bv	ES	TIMATE	D ERROR.					
the Kjeld	lahl me	thod wi	th to	vo and								
HF and HC	1 + HF	' + H₂O.		g		No	t evalua	ited.				
					RE	FERENC	CES:					
							wied M	1.1	Mah		<u> </u>	
						Me 2. Ch Ka Za	vies, M. t. Trans uchmarev myshov,V vodsk. I	w.; . <u>197</u> , S. . M. Lab. <u>1</u>	Mener <u>1</u> , 2, K.; .964,	2729 - 30, 1034	2733.	
L					1							

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COMPONENTS :			ORI	GINAL	MEASUREME	ENTS:			
<pre>(1) Nitrogen; N<sub>2</sub>; [77 (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [ (3) Calcium oxide; Ca [1305-78-8] (4) Silica; SiO<sub>2</sub>; [76</pre>		Dancy, E. A.; Janssen, D. <b>Can. Metallurgical Quart.</b> <u>1976</u> , <b>15</b> , 103 - 110.							
VARIABLES:	·····	· · · · · · · · · · · · · · · · · · ·	PRE	PARED	BY:				
					м	. Shin	mei		
EXPERIMENTAL VALUES: CC	ontinue	d							
Composition (mass %)			1	N Cont	ent (ma	ass %)	*		
CaO SiO <sub>2</sub> Al <sub>2</sub> O <sub>3</sub>	Hot I	Extract:	ion	HF-	HCl+H₂	0₂		HF+H₂SO₄	
	-50 -	-30+50	+30	-50	-30+50	+30	-50	-30+50	+30
50 40 10 42.75 42.25 10 50 30 20		.90 .28 2.56		.77 .24 2.19	.84 .28 2.19 2.01	.84 .27 2.08			
47.5 32.5 20 40 40 20		1.82		.44 .34	1.75	1.78	.29	1.91	
40 30 30 35 35 30 35 35 30		1.01 .26 .41			.28 .31	.33 .36 .33	.30		
50         10         40           50         10         40           30         30         40		2.71 2.21 .40		3.03 2.29	2.43 2.18 .41	2.04			
40 10 50 49 2 49	1.92	1.90	2.42		1.91	1.61 1.30 1.78		1.73	
50 50		1.13		1.17		1.75		1.23	
		AUXILIAR	Y INF	ORMATI	ОN				
METHOD/APPARATUS/PROCEDURE:			SOL	JRCE AN	D PURITY	OF MA1	ERIALS	:	
			RE	FERENC	£S ;				

			LODT CTW				
COMPONENTS:			ORIGINAL	MEASUREMEN	NTS:		
(1) Nitroger	n; N <sub>2</sub> ; [7727-37-9]	1	Dancy	. E. A.:	Janssen	. D.	
(2) Alumina;	Al <sub>2</sub> O <sub>3</sub> ; [1344-28-	-1]		, ,		, 2.	
(3) Calcium	oxide; CaO;		Can. 102	Metallur	gical Qu	art.	<u>1976</u> , 15,
(4) Silica;	SiO <sub>2</sub> ; [7631-86-9]	1	103 -	110.			
VARTABLES			DDEDADED	DV.			
T/K =	= 1723 -1823		I KEI AKED	D1.			
N <sub>2</sub> P/	′kPa = 101.3			М.	Shinmei		
EXPERIMENTAL VALU	JES: continued						
Table 2. Ni	trogen Content of	Three	Slage A	ftor Mro	stmont u	ith N	lituagan
in the Pres	sence of Various F	Reducin	g Agents	in the	Absence	of Gr	aphite
·							
Slag	Reducing Agent	Cruc	Temp.	Time	Atmos	N	Content
5 g Charge	(g)	Matl	(°C)	(hrs)	nemos.	(n	ass %)
						Hot	Kiekdahl
						Ext	KJCKUUNI
<u></u>			·				
	Si, 0.06	Fe	1450	4	N <sub>2</sub>	0.33	0.30
	si, 0.05	Fe	1500	2	N <sub>2</sub>	0.48	0.36
Mass &	Si/Fe, 0.25/2.5	MgO MgO	1500	2	N <sub>2</sub>	0.26	0.25
mass 6	Si, 0.25	MgO	1500	2		1.64	1.41 1.40
$Al_2O_3 = 40$	Si, 0.50	MgO	1500	2	N <sub>2</sub>	2.90	2.63
$C_{a0} = 50$	A1, 0.05 A1/Fo 0.25/2.5	Fe	1450	3	N <sub>2</sub>	0.04	0.01
040 - 50	Al/Fe, 0.25/2.5	MgO	1550	2		0.10	0.14
$SiO_2 = 10$	A1, 0.25	MgO	1450	2	N <sub>2</sub>	1.22	0.71
	Al, 0.50 Si N 0.50	MgO MgO	1450	2	N <sub>2</sub>	1.15	0.81
	$CaC_2$ , 0.25	Mg0 Mg0	1500	2		3.92	3.30
	$CaC_{2}, 0.25$	MgO	1550	2	N <sub>2</sub> (	0.06	0.05
	$CaC_{2}, 0.50$	MgO	1500	2	$N_2$ (	0.47	0.41
	Â	UXILIARY	INFORMATI	ON			
	(DD00000000		1				
METHOD/APPARATUS	/PROCEDURE:		SOURCE A	ND PURITY	OF MATERIA	LS:	
	,						
			ESTIMATE	D ERROR:			
			REFERENC	ES:	<u> </u>		
			1				

534
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COMPONENTS:		ORIGINAL MEASUREMENTS:					
<pre>(1) Nitrogen; N<sub>2</sub>; [7727-37-9] (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] (3) Calcium oxide; CaO; [1305-78-8] (4) Silica; SiO<sub>2</sub>; [7631-86-9]</pre>		Dancy <b>Can.</b> 103 -	Metallurg 110.	Jansse <b>ical Q</b>	n, D. Mart.	<u>1976</u> , 15,	
VARIABLES:			PREPARED	BY:	••••••		
				M. :	Shinme	i	
EXPERIMENTAL VALU	ES: continued						
	CaC <sub>2</sub> , 0.50 CaC <sub>2</sub> , 0.50	MgO MgO	1500 1550	5 2	N2 N2	0.23 0.17	0.25 0.10
$Al_2O_3 = 40$ CaO = 30 SiO <sub>2</sub> = 30	Si, 0.05 Si/Fe, 0.125/2.5 Si/Fe, 0.125/2.5 Si, 0.05 Si, 0.25 Si, 0.25 Si, 0.25 Al, 0.25 Si <sub>3</sub> N <sub>4</sub> , 0.25 Si <sub>3</sub> N <sub>4</sub> , 0.25 Si <sub>3</sub> N <sub>4</sub> , 0.50 Si <sub>3</sub> N <sub>4</sub> , 0.50 Si <sub>3</sub> N <sub>4</sub> , 1.00 Si <sub>3</sub> N <sub>4</sub> , 0.25 CaC <sub>2</sub> , 0.50	Fe Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3 Al_2O_3	1450 1500 1450 1450 1450 1450 1450 1450	2 2 2 2 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	N2 N2 N2 N2 N2 N2 N2 N2 N2 N2 N2 N2 2/75Ar N2 N2	$\begin{array}{c} 0.37\\ 0.06\\ 0.16\\ 0.09\\ 0.20\\ 0.21\\ 0.18\\ 0.045\\ 1.54\\ 2.75\\ 2.52\\ 3.57\\ 3.21\\ 3.91\\ 0.13\\ 0.39 \end{array}$	$\begin{array}{c} 0.39\\ 0.04\\ 0.06\\ 0.14\\ 0.16\\ 0.09\\ 0.04\\ 1.20\\ 1.41\\ 2.07\\ 2.50\\ 2.53\\ 2.32\\ 2.88\\ 0.14\\ 0.24 \end{array}$
$Al_2O_3 = 20$ $CaO = 40$ $SiO_2 = 40$	Si, 0.25 Al, 0.25 Si <sub>3</sub> N <sub>4</sub> , 0.50 CaC <sub>2</sub> , 0.25 CaC <sub>2</sub> , 0.50 CaC <sub>2</sub> , 0.50	MgO Al₂O₃ MgO MgO MgO MgO	1450 1450 1550 1500 1550	2 2 2 2 2 2 2 2	N2 N2 N2 N2 N2 N2	0.13 0.04 2.19 0.02 0.54 0.67	0.12 0.10 2.18 0.02 0.42 0.53
	AUX	ILIARY	INFORMAT	ION			
METHOD /APPARATUS /	PROCEDURE :		SOURCE A ESTIMATE REFERENC	ND FURITY OF	F MATER.	IALS :	



COMPONENTS: ORIGINAL MEASUREMENTS: (1) Nitrogen; N<sub>2</sub>; [7727-37-9]
(2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] Chuchmarev, S. K.; Esin, O. A.; Kamyshev, V. M. (3) Calcium oxide; CaO; Izv. Vysshikh. Uchebn. Zavedenii, [1305-78-8] Chern. Met. <u>1965</u>, 8(2), 5 - 9; Chem. Abstr; <u>1965</u>, 62, 14233g (\*\*) (4) Silica; SiO<sub>2</sub>; [7631-86-9] VARIABLES: PREPARED BY:  $T/K = 1673\&1773 N_2 P/kPa=32.4-93.2$ CO P/kPa = 11.1 - 68.9 M. Shinmei  $m_2/m_3/m_4 = 12.1/47.6/40.3$ EXPERIMENTAL VALUES: The authors reported the solubility of N in the 12.1 Al<sub>2</sub>O<sub>3</sub> - 47.6 CaO -40.3 SiO<sub>2</sub> (mass %) melt saturated with graphite at 1673 K and 1773 K under the various  $N_2$  + CO gas mixtures, and they interpreted that the form of N in the melt was  $CN^-$  by the following reactions:  $3C + O^{2-} + N_2 = 2CN^- + CO$ , at 1673 K  $3C + O^{2-} + C_2^{2-} + 2N_2 = 4CN^- + CO$ , at 1773 K N<sub>2</sub> P/kPa CO P/kPa N at 1673 K N at 1773 K (mass %)\* (mass %)\* 0.325 93.2 8.1 0.139 82.1 11.1 0.088 0.178 35.5 0.063 65.8 32.4 68.9 0.031 0.114 \* Original report gave the solubility as "ml/100 g". The compiler converted to "mass %". \*\* Data taken from the abstract AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: The sample was saturated with N and C by bubbling  $N_2$  and CO gases under nearly one atm. at 1673 K and 1773 K. ESTIMATED ERROR:

**REFERENCES:** 

COMPONENTS	ORTGINAL MEASUREMENTS.
<pre>(1) Nitrogen; N<sub>2</sub>; [7727-37-9] (2) Alumina; Al<sub>2</sub>O<sub>3</sub>; [1344-28-1] (3) Calcium oxide; CaO;     [1305-78-8] (4) Magnesium oxide; MgO;     [1309-48-4]</pre>	Davies, M. W.; Meherali, S. G. Metal. Trans. <u>1971</u> , 2, 2729 - 2733.
(5) Silica; SiO <sub>2</sub> ; [7631-86-9]	
VARIABLES: $T/K = 1823$ $N_2 P/kPa = 50.7$ ; CO P/kPa = 40.5 $n_2/n_3/n_4/n_5 = 12.1-12.5/32.6-47.0$ 7.3-14.8/24.7-37.9	PREPARED BY: M. Shinmei
EXPERIMENTAL VALUES:	
The authors reported the equilibration with compositions close to those of major constituents at 1823 K.	rium solubility of N in the slag melts blast furnace slag with respect to
Table Solubility of Nitrogen in A Carbon Saturation in an Atmosphere	$Al_2O_3$ - CaO - MgO - SiO <sub>2</sub> Melts with of 50% N <sub>2</sub> , 40% CO, 10% Ar at 1823 K
melt composition (mole%) Al <sub>2</sub> O <sub>3</sub> CaO MgO SiO <sub>2</sub> atomic	N Solubility Number of c % mass % Experiments
12.1       39.8       7.3       37.8       3.04 ±         12.15       32.55       14.55       37.9       2.87 ±         12.2       35.15       14.7       35.6       2.34 ±         12.3       40.3       14.7       31.0       1.68 ±         12.3       43.4       14.8       28.2       1.29 ±         12.4       41.4       7.45       36.2       2.49 ±         12.5       46.7       7.5       31.5       1.80 ±	0.08       0.706 ± 0.018       20         0.02       0.677 ± 0.005       5         0.03       0.539 ± 0.007       4         0.09       0.395 ± 0.021       16         0.04       0.302 ± 0.09       6         0.10       0.574 ± 0.024       10         0.15       0.240 ± 0.035       12         0.07       0.414 ± 0.015       6
Definition is given by (No. of g- g-mol oxide).	-atom N)/(No. of g-atom N + No. of
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
$N_2$ + CO + Ar gas mixtures at nearly one átm. were passed over the samples contained in a carbon crucible at a rate of 5 ml/sec. After equilibrium was attained the samples were broken into pieces and analyzed for N by a similar method to that in ref. 1 (extraction method with oxidizing flux in a vacuum).	<pre>High-purity SiO<sub>2</sub> "Analar" grade Al<sub>2</sub>O<sub>3</sub>; MgO; CaCO<sub>3</sub> CaO: made by thermal decomposition     of CaCO<sub>3</sub> at 1373 K for 16 hrs. Graphite crucible: high-quality     electrode graphite Ar = 99.995% N<sub>2</sub> = 99.99% CO = 97%, remainder N<sub>2</sub></pre>
	ESTIMATED ERROR:
	δ(mass)/(mass) = within ± 0.015 (Authors)
	REFERENCES:
	<ol> <li>Chuchmarev, S. K.; Kamyshov, V. M.</li> </ol>
	Zavodsk. Lab. <u>1964</u> , 30, 1034.
1	1

## SYSTEM INDEX

Page numbers preceded by E refer to evaluation texts whereas those not preceded by E refer to compilation tables.

Acetic acid, potassium salt (ternary)	
+ hydrogen	65
+ water	390
Acetic acid, sodium salt (ternary)	
+ hydrogen	65
+ water	390
Aluminium chlorido (tornaru)	550
+ chloring	160-172
T Chiorine	109-175
Aluminium iluoride (multicomponent)	
+ Carbon dioxide	275
Aluminium oxide (ternary)	
+ carbon dioxide	270-272
Aluminium oxide (multicomponent)	
+ carbon dioxide	275
+ nitrogen	525-537
+ oxygen	94
+ water	501-505
Barium chloride	
+ carbon monovide	194
+ carbon monoxide	2/1
+ Carbon Groxide	241
+ nydrogen chloride	321
Barium chioride (ternary)	
+ carbon dioxide	269
Barium chloride (multicomponent)	
+ chlorine	178
Barium oxide (ternary)	
+ carbon dioxide	269
+ water	468
Barium oxide (multicomponent)	
+ water	494-496
Beryllium fluoride (ternary)	
+ argon	46 47
+ aryon	261
+ Carbon dioxide	201 202
+ deuterium fluoride	291, 292
+ nelium	E9, 10-12
+ hydrogen	61
+ hydrogen fluoride	280-285
+ neon	16
+ xenon	54, 55
Beryllium fluoride (multicomponent)	
+ boron trifluoride	448
+ hydrogen fluoride	290
Boron oxide (multicomponent)	
+ water	500
- #4061	500
Cadmium chlorido (tornary)	
cadmium chioride (cernary)	166
+ Chiorine	100
Calcium bromide	
+ bromine	182
Calcium chloride	
+ carbon dioxide	239
+ carbon monoxide	192
+ chlorine	142
+ hydrogen chloride	319
Calcium chloride (ternary)	-
+ carbon diovide	262. 266. 267
, carbon droxtde	202, 200, 201

.

•

Calcium chloride (multicomponent)	
+ chlorine	177
Calcium oxide (ternary)	
+ carbon dioxide	266, 267
+ water	461-466
Calcium oxide (multicomponent)	
+ nitrogen	524-537
+ oxygen	94
+ water	474-521
Carbonic acid, dilithium salt	
+ carbon monoxide	195
+ oxygen	72
Carbonic acid, dilithium salt (ternary)	
+ carbon monoxide	200, 201
+ hydrogen	64
+ oxygen	E77, E78, 79-82
Carbonic acid, dilithium salt (multicomponent	2) 2 -
+ carbon dioxide	273, 274
+ carbon monoxide	203, 204
+ hydrogen	67
+ nitrogen	110
+ oxygen	E90, E91, 92, 93
Carbonic acid, dipotassium salt (ternary)	~~~ ~~~
+ carbon monoxide	201, 202
+ (ternary) + oxygen	81-83
Carbonic acid, dipotassium salt (multicompone	ent)
+ carbon dioxide	273, 274
+ carbon monoxide	203, 204
+ nyarogen	67
+ nitrogen	
+ oxygen Carbonia poid diopdium calt	E90, E91, 92, 93
carbonic acid, disodium sait	255
	200
+ oxygen Carbonia acid diaodium calt (tornaru)	15
t garbon monovido	200-202
+ budrogen	64
+ nyurogen	E77 E78 79 80
i oxygen	83 88
Carbonic acid disodium salt (multicomponent)	
+ carbon diovide	273. 274
+ carbon monovide	203, 204
+ hudrogen	67
+ nitrogen	110
+ oxygen	E90. E91. 92. 93
Cesium bromide + water	361
Cesium chloride	001
+ argon	41
+ carbon dioxide	237
+ chlorine	E136, 137-139
+ bydrogen chloride	E314, 315, 316
+ titanium tetrachloride	430-432
+ water	357
Cesium chloride (ternary)	
+ chlorine	159, 172, 173
Cesium fluoride	
+ hydrogen fluoride	279
Cesium oxide (ternarv)	
+ argon	52
+ oxvgen	87
+ water	460
Cobalt chloride	
+ fluorine	111
Cobalt oxide (ternary)	
- ·	470

.

,

Cryolite (ternary) + carbon dioxide 270-272 Cupric chloride + fluorine 113 Dichromic acid, potassium salt (ternary) + water 389 Dilithium beryllium fluoride 7 + helium + hydrogen 60 Dilithium beryllium fluoride (ternary) + deuterium 66, 68 + hydrogen 66 N-Ethylpyridinium chloride 324 + hydrogen chloride N-Ethylpyridinium chloride (ternary) 337 + hydrogen chloride Germanium oxide (multicomponent) 521 + water Iron oxide (ternary) + water 469, 470 Iron oxide (multicomponent) 513-520, 523 + water Lead bromide + bromine 184 Lead chloride + chlorine 143 Lead chloride (ternary) 167, 168 + chlorine Lead oxide (multicomponent) 522 + water Lithium bromide 179 + bromine Lithium bromide (ternary) 185 + bromine Lithium chloride E114, 115-117 + chlorine 293 + hydrogen chloride Lithium chloride (ternary) 262 + carbon dioxide E145-E147, 148-151 + chlorine E325, 326, 327 + hydrogen chloride 189, 190 + iodine 435-437 + titanium tetrachloride + water 386 Lithium chloride (multicomponent) 338, 339 + hydrogen chloride Lithium fluoride (ternary) 46 + argon 291, 292 + deuterium fluoride + helium E9, 10, 11 + hydrogen 61 280-283 + hydrogen fluoride + neon 16 54 + xenon Lithium fluoride (multicomponent) 53 + argon + boron trifluoride 448 + carbon dioxide 275 14 + helium 290 + hydrogen fluoride + neon 18 Lithium oxide (ternary) 449-452 + water

Lithium oxide (multicomponent)	
+ water	474-479
Magnosium chlorido	
Magnesium Chioride	220
+ carbon dioxide	238
+ carbon monoxide	191
+ chlorine	140, 141
+ hydrogen chloride	317, 318
+ titanium tetrachloride	433, 434
Magnesium chloride (ternary)	,
Magnesium enteride (cernary)	264 265
+ carbon dioxide	100
+ carbon monoxide	199
+ chlorine	E161, 162-165
+ hydrogen chloride	333-335
Magnesium chloride (multicomponent)	
+ chlorine	175-178
Magnesium oxide (multicomponent)	
+ nitrogen	538
i mitigen	197-193 523
+ water	407-495, 525
Manganese Oxide (ternary)	
+ water	471
Manganese oxide (multicomponent)	
+ water	512
N-Methylpyridinium chloride	
h hedrogen chloride	303
	525
N-Methylpyridinium chloride (ternary)	
+ hydrogen chloride	336
Nickel chloride	
+ fluorine	112
Nitric acid barium salt (ternary)	
Michie acid, Dallum Sait (Cernary)	201 202
+ water	381, 302
Nitric acid, cadmium salt (multicomponent)	•
+ water	398
Nitric acid, calcium salt (ternary)	
+ water	381
Nitric acid calcium salt (multicomponent)	
Aitic acta, calcium sait (maiticomponent)	306 308
	390, 390
Nitric acid, cesium salt	
+ carbon dioxide	219
+ nitrogen	106
+ oxygen	71
+ water	351
Nitric acid. cesium salt (ternary)	
Alerto abia, costam baic (cornary)	382
T Waler	562
Nitric acid, cesium sait (multicomponent)	
+ water	394, 399
Nitric acid, lithium salt	
+ ammonia	E405, E406, 407, 408
+ argon	19. 20
+ combon dioxido	F205 206 207
+ carbon dioxide	200, 200, 201
+ nelium	1
+ nitrogen	95, 96
+ water	E341, 342, 343
Nitric acid, lithium salt (ternary)	
+ ammonia	411-414
+ combon diovido	256-258
	196
+ carbon monoxide	100
+ hydrogen deuteride	403
+ hydrogen sulfide	404
+ iodine	188
+ oxvaen	75
+ 2-nronanone	447
· Z-propanone	116
T ULICHIOTOMETHANE	340 B367 360 373
+ water	300, E307, 308-373,
	385

-

		+ ammonia	417
		+ water	392-397, 400, 401
Nitric	acid,	magnesium salt (multicomponent)	
		+ water	395
Nitric	acid,	potassium salt	
		+ ammonia	410
		+ argon	E28, 29, 30
		+ carbon dioxide	E213, 214-217
		+ nitrogen	104, 105
		+ 020200	70
		+ wator	F346 347-350
Nitrio	anid	notaggium galt (tornaru)	1040, 94, 000
NICIIC	acru,	+ ammonia	411-415
			411-415
		+ argon	106 107
		+ Carbon monoxide	190, 197
		+ carbon dioxide	257-259
		+ nelium	8
		+ hydrogen	62
		+ hydrogen deuteride	403
		+ hydrogen sulfide	404
		+ iodine	188
		+ methane	445
		+ nitrogen	108, 109
		+ nitrogen dioxide	276
		+ oxygen	75, 76
		+ 2-propanone	447
		+ trichloromethane	446
		+ water	E367, 368-373, E374,
			E375, 376-379, 381,
			384, 387, 389
Nitric	acid,	potassium salt (multicomponent)	
		+ ammonia	417
		+ water	391-396, 402
Nitric	acid,	rubidium salt	·
		+ argon	31, 32
		+ carbon dioxide	218
Nitric	acid,	rubidium salt (ternarv)	
		+ carbon dioxide	260
Nitric	acid,	silver salt	
		+ argon	E33, 34, 35
		+ helium	6
Nitric	acid.	silver salt (ternary)	
	,	+ water	383
Nitric	acid,	silver salt (multicomponent)	
		+ water	397-399
Nitric	acid.	sodium salt	
	,	+ ammonia	409
		+ argon	E21. E22. 23-27
		+ carbon dioxide	$E_{208} = 209 - 212$
		+ belium	$E_{2}$ , $3-5$
		+ nitrogon	$E_{2}^{2}$ $C_{2}^{2}$ $C_{2$
			60
		+ oxygen	244 245
114 to and a		+ water	344, 343
NITTIC	acia,	sodium sait (ternary)	41 E
			410
		+ argon	45
		+ carbon dioxide	256, 259, 260
		+ carbon monoxide	TA1
		+ nelium	8
		+ nydrogen	
		+ methane	445
		+ nitric acid	340
		+ nitrogen	108, 109
		+ nitrogen dioxide	276
		+ oxygen	76

Nitric acid, sodium salt (ternary) + water	366, E374, E375, 376-379, 380
Nitric acid, sodium salt (multicomponent) + ammonia + water	417
Nitric acid, thallium salt (ternary) + water	383
Nitric acid, thallium salt (multicomponent)	
+ water Nitrous acid, potassium salt (ternary)	398-400
+ water	385
+ water	400, 401
Nitrous acid, sodium salt + water	352
Nitrous acid, sodium salt (ternary)	204
+ water Nitrous acid, sodium salt (multicomponent)	384
+ water	400, 401
Perchloric acid, lithium salt	
+ water Perchloric acid. lithium salt (ternarv)	362
+ ammonia	416
+ ammonia	416
Phosphorus oxide (multicomponent) + water	506, 507
Potassium bisulfite (ternary)	
+ oxygen Potassium bromide	89
+ argon	43
+ bromine	181
+ carbon dioxide	E248, 249-251
+ water	359
Potassium bromide (ternary)	105
+ bromine Potaggium chlorido	185
	F37 38 39
+ carbon dioxide	226. E228. 229-235
+ chlorine	E126, 127-132
+ fluorine	111. 112. 113
+ hydrogen chloride	E302, E303, 304-308
+ silicon tetrachloride	419
+ titanium tetrachloride	424-426
+ vanadyl chloride	443
+ water	355
Potassium chloride (ternary)	
+ carbon dioxide	262-265
+ carbon monoxide	198, 199
+ chlorine	E145-E147, 148-151,
	E152, 153-158,
	E161, 162-168, 174
+ hydrogen chloride	E325, 326, 327, F328, 329, 332-335
+ iodine	189. 190
+ silicon tetrachloride	420
+ titanium tetrachloride	435-441
+ vanadvl chloride	444
+ water	386, 387
Potassium chloride (multicomponent)	-
+ chlorine	175-178
+ hydrogen chloride	338, 339
+ water	402

.

,

ł

Potassium fluoride 247 + carbon dioxide Potassium fluoride (multicomponent) 53 + argon + helium 14 18 + neon Potassium hydroxide 59 + hydrogen Potassium hydroxide (ternary) + hydrogen 63 388 + water Potassium iodide 44 + argon + carbon dioxide 253, 254 + iodine 187 Potassium oxide (ternary) 50, 51 + argon 85, 86 + oxygen 458, 459 + water Potassium oxide (multicomponent) 484-486, 522 + water Rubidium bromide 360 + water Rubidium chloride 40 + argon + carbon dioxide 236 E133, 134, 135 + chlorine E309, 310-313 + hydrogen chloride 427-429 + titanium tetrachloride + water 356 Silicon dioxide (ternary) 449-474 + water Silicon dioxide (multicomponent) 524-537 + nitrogen + oxygen 94 474-523 + water Silver bromide + bromine 183 Silver chloride 144 + chlorine Silver chloride (ternary) + chlorine 174 180 Sodium bromide + bromine 358 + water Sodium chloride 36 + argon E220, 221-225, 227 + carbon dioxide E118, 119-125 + chlorine + hydrogen chloride E294, E295, 296-301 + silicon tetrachloride 418 421-423 + titanium tetrachloride + vanadyl chloride 442 + water 353, 354 Sodium chloride (ternary) 263 + carbon dioxide 198 + carbon monoxide E152, 153-160, + chlorine 169-171 + hydrogen chloride E328, 329-332 88 + oxygen 420 + silicon tetrachloride 438-441 + titanium tetrachloride + vanadyl chloride 444 Sodium chloride (multicomponent) 175-178 + chlorine

Sodium fluoride	<b>.</b>
+ carbon dioxide	246
Sodium fluoride (ternary)	47 48
+ argon + carbon dioxide	261
+ belium	12. 13
+ hydrogen fluoride	284-289
+ neon	18
+ xenon	55, 56
Sodium fluoride (multicomponent)	
+ argon	53
+ helium	14, 15
+ neon	18
+ xenon	57
Sodium hydroxide	<b>E</b> 9
+ nyarogen	20 263-365
+ water	303-303
+ budrogen	63
+ water	388
Sodium iodide	500
+ iodine	186
Sodium oxide (ternary)	
+ argon	49
+ oxygen	84
+ water	453-457
Sodium oxide (multicomponent)	
+ nitrogen	524
+ water	480-483, 522
Stannous chloride	
+ carbon dioxide	245
Strontium chloride	040
+ carbon dioxide	240
+ carbon monoxide	220
+ nydrogen chioride	320
+ carbon dioxide	268
Strontium oxide (ternary)	200
+ carbon dioxide	268
+ water	467
Strontium oxide (multicomponent)	
+ water	497-499
Sulfuric acid, dipotassium salt (terna	ary)
+ oxygen	89
Sulfuric acid, disodium salt	
+ oxygen	74
+ sulfur dioxide	277, 278
Thorium fluoride (multicomponent)	449
+ boron trifiuoride	440
Tin chlorido d hudrogen chlorido	220
Titanium Oxido (multicomponent)	522
+ water	508-511
- Habbi	000 011
Uranium fluoride (multicomponent)	
+ boron trifluoride	448
+ helium	15
+ hydrogen fluoride	290
+ xenon	57
Vanadium oxide (ternary)	
+ argon	49-52
+ oxygen	84-87

•

Zinc bromide	
+ carbon dioxide	252
Zinc chloride + argon	42
+ carbon dioxide	E242, 243, 244
+ nitrogen	107
Zinc chloride (ternary)	
+ hydrogen chloride	336, 337
Zinc chloride (multicomponent)	
+ hydrogen chloride	338, 339
Zinc oxide (ternary)	
+ water	473
Zirconium fluoride (ternary)	
+ argon	48
+ helium	13
+ hydrogen fluoride	286-289
+ neon	17
+ xenon	56
Zirconium fluoride (multicomponent)	
+ boron trifluoride	448
+ helium	15
+ hydrogen fluoride	290
+ xenon	57

### **REGISTRY NUMBER INDEX**

.

Page numbers preceded by E refer to evaluation text whereas those not preceded by E refer to compiled tables.

67-64-1 67-66-3 74-82-8 124-38-9	447 446 445 E205, 206, 207, E208, 209-212, E213, 214-219, E220, 221-227, E228, 229-241, E242, 243-247, E248, 249-275
127-08-2	65, 390
127-09-3	65, 390
497-19-8	64, 67, 73, E77, E78, 79, 80, 83, 88, E90, E91, 92, 93, 110, 200, 202-204, 255, 273, 274
554-13-2	64, 67, 72, E77, E78, 79-82, E90, E91, 92, 93, 110, 195, 200, 201, 203, 204, 273, 274
584-08-7	67, 81-83, E90, E91, 92, 93, 110, 201-204, 273, 274
630-08-0	191-204
1303-86-2	500
1304-28-5	269, 468, 494-496
1305-78-8	94, 266, 267, 460-466, 474-521, 523-537
1307-96-6	472
1309-48-4	487-493, 523, 537
1310-53-8	521
1310-58-3	59, 63, 388
1310-73-2	58, 63, 363-365, 388
1313-59-3	49, 84, 86, 453-457, 522, 524
1314-11-0	268, 467, 497-499
1314-13-2	473
1314-56-3	506. 507
1314-62-1	49-52, 84-87
1317-36-8	522
1333-74-0,	58-67
1244-20-1	04 070 070 501 505 505 507
1344-20-1	94, 270-272, 301-303, 323-337
1344-70-3	JIZ A71
1345-25-1	4/1 160 170 513-520 523
1906-79-2	304 337
1900 79 2	524, 557
7344-28-1	275
7440-01-9	16-18
7440-37-1	19, 20, E21, E22, 23-27, E28, 29-32, E33, 34-36, E37, 38-53
7440-59-7	1, E2, 3-8, E9, 10-15
7440-63-3	54-57
7446-09-5	277, 278
7446-70-0	169-173
7447-39-4	113
7447-40-7	E37, 38, 39, 111-113, E126, 127-132, E145-E147,
	148-151, E152, 153-158, E161, 162-168, 174-178,
	189, 198, 199, 226, E228, 229-235, 262-265, E302,

.

7447-40-7	E303, 304-308, E325, 326, E328, 329-335, 338, 339, 355, 386, 387, 402, 419, 420, 424-426, 435-441, 443, 444
7447-41-8	E114, 115-117, E145-E147, 148-151, 189, 262, 293, E325, 326, 327, 338, 339, 386, 435-437
7550-35-8 7550-45-0 7553-56-2 7631-86-9 7631-99-4	179, 185 421-441 186-190 94, 449-537 E2, 3-5, 8, E21, E22, 23-27, 45, 62, 69, 76, E97, 98-103, 108, 109, 197, E208, 209-212, 256, 259, 260, 276, 340, 344, 345, 366, E374, E375, 376-380, 391-393, 397, 402, 409, 415, 417, 445
7632-00-0 7637-07-2 7646-78-8 7646-79-9 7646-85-7	352, 384, 400, 401 448 322 111 42, 107, E242, 243, 244, 336, 337-339
7646-93-7 7647-01-0	89 293, E294, E295, 296-301, E302, E303, 304-308, E309, 310-313, E314, 315-325, E326, 327, 328,
7647-14-5	E329, 330-339 36, 88, E118, 119-125, E152, 153-160, 169-171, 175-178, 198, E220, 221-225, 227, 263, E294, E295, 296-301, E328, 329-332, 353, 354, 418, 420, 421-423, 438-442, 444
7647-15-6 7647-17-8	180, 358 41, E136, 137-139, 172, 173, 237, E314, 315, 316, 357, 430-432
7664-39-3 7664-41-7 7680-73-1 7681-11-0 7681-49-4	279-290 E405, E406, 407-417 323, 336 44, 187, 190, 253, 254 12-15, 17, 18, 47, 48, 53, 55-57, 246, 261, 284- 289
7681-82-5 7697-37-2 7699-45-8 7718-54-9 7726-95-6	186 340 252 112 179-185
7727-37-9 7732-18-5 7757-79-1	95, 96, E97, 98-110, 524-537 E341, 342-345, E346, 347-366, E367, E368, 369-373, E374, E375, 376-402, 442-444, 449-523 8, E28, 29, 30, 45, 62, 70, 75, 76, 104, 105, 108, 109, 188, 196, 197, E213, 214-217, 257-259, 276, 340, E346, 347-350, E367, E368, 369-371, E374, E375, 376-379, 384, 385, 387, 389, 391-396, 402-404, 410-415, 417, 445-447
7757-82-6 7758-02-3	74, 277, 278, 448, 449 43, 181, 185, E248, 249-251, 359
7758-09-0 7758-95-4 7761-88-8 7772-99-8 7778-50-9	400, 401 143, 167, 168 6, E33, 34, 35, 383, 397-399 245 389
7778-74-7 7778-80-5 7782-39-0	416 89 66, 68

7782-41-4 111, 112 7782-44-7 69-76, E77, E78, 79-89, E90, E91, 92-94 E114, 115-117, E118, 119-125, E126, 127-132, E133, 7782-50-5 134, 135, E136, 137-144, E145-E147, 148-151, E152, 153-160, E161, 162-165 7783-06-4 404 13, 15, 17, 48, 56, 57, 286-290, 448 7783-64-4 7783-90-6 144, 174 7784-18-1 275 7785-23-1 183 7786-30-3 140, 141, 160, E161, 162-165, 175-178, 191, 199, 238, 264, 265, 317, 318, 333-335, 433, 434 7787-69-1 361 71, 106, 219, 351, 382, 394, 399 7789-18-6 7789-23-3 14, 18, 53, 247 7789-24-4 E9, 10, 11, 14, 16, 18, 46, 53, 54, 61, 275, 280-283, 290-292, 448 7789-39-1 360 7789-41-5 182 7789-49-7 E9, 10-12, 16, 46, 47, 54, 55, 61, 261, 280-285, 290-292, 448 1, 19, 20, 75, 95, 96, 188, 196, E205, 206, 207, 256, 257, 258, 259, E341, 342, 343, 366, E367, E368, 369-373, 385, 391-396, 400, 401, 403, 404, E405, 7790-69-4 E406, 407, 408, 411, 414, 417, 446, 447 7791-03-9 364, 416 7791-11-9 40, E133, 134, 135, 236, E309, 310-313, 356, 427-429 10022-31-8 381, 382 10026-04-7 418-420 184 10031-22-8 10043-52-4 142, 177, 192, 239, 266, 267, 319 10049-14-6 15, 57, 290, 448 10102-44-0 276 10102-45-1 383, 397-399 10108-64-2 166 10124-37-5 380, 396 10325-94-7 398 10361-37-2 178, 194, 241, 269, 321 10377-51-2 190 10377-60-3 395 10476-85-4 193, 240, 268, 320 11105-15-0 403 12057-24-8 449-452, 474-479 50, 51, 85, 86, 458, 459, 484-486, 523 12136-45-7 13126-12-0 31, 32, 218, 260 13400-13-0 279 13463-67-7 508-511 13709-59-6 290, 448 15096-52-3 270-272 20281-00-9 52, 87, 460

#### **AUTHOR INDEX**

Page numbers preceded by E refer to evaluation texts whereas those not preceded by E refer to compilation tables.

Abe, Y. 512 Abraham, M. 383, 397-399 Abraham, M.C. 397-399 Aganesova, S.B. 75, E367, 373 Al-Muslih, E. 388 Albright, L.F. 340, E346, 350, E374, E375, 379, 387, 402 Allulli, S. 196, 404, E405, E406, 408, 413, 414, 416, 417, 446, 447 418-421, 426, 440, 442-444 73, 74, E118, 122, 123, E126, 128, 129, E133, Amirova, S.A. Andresen, R.E. 134, E136, 137, 255, 277, 278 72, E77, E78, 79, 82, 83, 88, E90, E91, 93, Appleby, A.J. 110, 195, 200-203, 274 Banus, M.D. 58, 59 Ban-ya, S. 462-465, 477-486, 493-504, 506-511 519, 520, 521, 523 Bartholomew, R.F. 352 Bartocci, V. 65, 390 Bezukladnikov, A.B. E220, 227, E228, 235, 237 E208, 212, E242, 243, 245, 252, 254 E341, 343, 366, E367, E368, 372 Beniko, H. Bertozzi, G. Blander, M. 14, 18, 53 Block-Bolten, A. 183 Bombi, G.G. 188 Borodzinski, A. 42, 107, E242, 244 Borucha, A. 204 Bratland, D. E208, 210, E220, 222-225, E228, 230-232, 246, 247, E248, 250, 252, 253, 254, 270, 271, 272, 275 E367, 369 Braunstein, J. Bretsznajder, S. 354 Broers, G.M. E77, E78, 80, E90, E91, 92 Bukun, N.G. E114, 117, E118, 120, E126, 130, E136, 138 Burkhard, W.J. 386 Cady, G.H. 279 Camahart, J.L. E145-E147, 150 Cardetta, V.L. E374, E375, 376, 377 169, 170 Carpio, R.A. 65, 390 Cescon, P. Chipman, J. 457, 461, 471, 505 Christie, J.H. 276 Christie, J.R. E2, E21, E22, E33, E97 Chuchmrev, S.K. 525, 536 Claes, P. 323, 324, 336, 337 1, E2, 4, 20, E21, E22, 24, 31, 32, E33, 34, Cleaver, B. 96, E97, 99 Comtat, M. 89 E2, 5, 6, E21, E22, 25-27, 35, E97, 100, 101 Copeland, J.L. Coppe, C.R. 323, 324, 336, 337 Corbett, J.D. 386 Dancy, E.A. 531-534 Davies, M.W. 529, 530, 537 Desimoni, E. 62, 63, 76, 197

36, E37, 38, 40, 41, E220, 227, E228, 233, 235, Devyatkin, V.N. 237, 293, E294, E295, 296-299, E302, E303, 304-306, E309, 310-312, E314, 315, 319-321, E328, 329-331 362, 391, 392 132, 141, 158, 175-178 Doan, Jr., A.S. Dronayaeva, O.N. Dubois, P. 273 362, 391, 392 Duke, F.R. Eluard, A. 63 513-516 Emi, T. Esin, O.A. 525, 536 Evans, III, R.B. E9, 11, 12, 16, 46, 47, 54, 55, 261 Fedorov, A.A. 49-52, 84-87 E2, 3, 19, E21, E22, 23, 29, 95, E97, 98, Field, P.E. 104, E208, 211, 280, 281, 291, 292 Fiorani, M. 188 Flengas, S.N. 183, 437, 441 Frame, J. 69-71, E97, 102, 105, 106, 345, E346, 347, 351, 380-382, 389 462, 463, 480, 500, 506, 521 Fukushina, T. 462-465, 477-492, 494-503, 506-510, 519, Fuwa, T. 520, 521, 523 Glibert, J.E. 323, 324, 336, 337 457, 461, 471, 505 Grant, N.J. E2, 3, 19, E21, E22, 23, E28, 29, 95, E97, 98, Green, W.J. 104, E208, 211, E213, 216, 217 Greenberg, J. E145-E147, 151, 185, 189, 190 E228, 233, E294, E295, 298, 299, E302, E303, Grilova, E.I. 306, E309, 312, E314, 315, 319-321 E9, 11-18, 46-48, 53-57, 287-289, 448 Grimes, W.R. Grjotheim, K. E220, 221-225, E228, 229-232, E248, 250, 251, 253, 254, 270-272, 275 Gusteri, M. 65 Harrington, G.W. 167, 168 340, E346, 350, E374, E375, 379, 387, 402 Haug, H. Heggelund, P. E220, 221, E228, 229 Howald, R.A. 322 Hoyt, E.B. 363, 364 Hull, H.S. 384 Huss, E. 111-113 Ichise, E. 267-269 Iguchi, Y. 463-465, 477-504, 506-511, 519, 520, 521, 523 Imai, M. 513-516 Imato, H. E145, 148, 166 Iredale, P.J. 388 Iritani, H. 267-269 Iwase, A. 267-269 Janssen, D. 531-535 Johnson, S. 58, 59 Kamyshev, V.M. 525, 536 Kapelner, S. 81 Katoh, S. E205, 207, E208, 212, E213, 215, 218, 219, E220, 226, E228, 234, 236, E242, 243, 245, E248, 249, 252, 254, 256, 260, 262, 263 Kawai, M. 526-528 Kawamura, K. 103, 109 E208, 212, E242, 243, 245, 252, 254 Kayano, M. Ketelaar, J.A.A. E77, E78, 80, E90, E91, 92

Ketov, A.N. 50, 84 422-425, 427-432, 435, 436, 438, 439 Khaimenov, A.P. Kimura, H. 526-528 169, 170 King, L.A. King, T.B. 451, 452, 457, 461, 469, 471-476, 505 Kinoshita, Y. 94 Klemm, W. 111-113 Kowalski, M. 167, 168 Kozlowski, T.R. 352 E294, E295, 301, E302, E303, 308, E309, 313, Krasilnikova, N.A. E314, 316, 320 191-194, 238-241 Krivoruchko, N.P. E208, 210, E220, 221-225, E228, 229-232, Krohn, C. 246, 247, E248, 250, 251, 253, 254, 270-272, 275 Kruger, H.J. 365 449, 450, 453-455, 458, 459 Kurkjian, C.R. 418-421, 426, 440, 442-444 Kurmaev, R. Kh. Ladani, P. E367, 373 132, 141, 158, 175-178 Lebedev, O.A. E133, 135, E152, 153-155 Leonova, L.S. Ll'ichev, V.A. 198 E220, 227, E228, 235, 237 Ll'icheva, O.N. Loskutkin, V.A. 64 E161, 164, 165, 199, 264, 265, E294, E295, 300, Lukmanova, T.L. E302, E303, 307, 318, E328, 332-334 L'vov, A.L. 64, 67 Maeda, M. 266 Maksimov, V.S. 422-425, 427-436, 438- 439 7, E9, 10, 60, 61, 66, 68 Malinauskas, A.P. Marassi, R. 65, 390 1, E2, 4, 20, E21, E22, 24, 31, E33, 34 Mather, D.E. 96, E97, 99 E220, 221-225, E228, 229-232, E248, 250, 251, Matzfeldt, K. 253, 254, 270-272, 275 Maund, J.K. 388 Mclean, A. 266 529, 530, 537 Meherali, S.G. Minh, N.Q. E325, 327, 338, 339 Morachevskii, A.G. 75, E367, 373 Mui, J.H. 437 Mulfinger, H.-O. 524 Muzhzhavlev, K.D. 132, 141, 158, 175-178 505 Nagata, S. Nakajima, T. E145, 148, 166 E145, 148, 166 Nakanishi, K. 49-52, 84-87 Nalimova, E.G. 36, E37, 38, 40, 41, E228, 233, E294, E295, Novozhilov, A.L. 298, 299, E302, E303, 306, E309, 312, E314, 315, 317, 319-321, 335, 336, E346, 349, 353, 355-361 Olander, D.R. E145-E147, 150 Ooi, H. 513-516 276 Osteryoung, R.A. E118, 122, 124, 125, E126, 128, E133, 134, Ostvald, T. E136, 137, 139, 159, 169-173 E118, 122-124, E126, 128, 129, E133, 134, Oye, H.A. E136, 137, 139, 169-171, 173 E294, E295, 301, E302, E303, 308, E309, 313, Ozeryanaya, I.H. E314, 316 63, 125, 159 Palmisano, F.

8, 45, 62, 63, 76, 108, 123, 129, 197, E205, 206, E208, 209, E213, 214, 257-259, E405, Paniccia, F. E406, 407, 409-412, 415, 445 36, E37, 38, 40, 41, E346, 349, 353, 355-357 Pchelina, E.I. Peleg, M. E341, 342, 344, E346, 348 Petrescu, V. 174 Ponomarev, V.E. 49-52, 84-87 Prisyashnyi, V.D. 191-194, 238-241 Prutskov, D.V. 191-194, 238-241 Pucciarelli, F. 390 Radak, S. 6, E33, 35 Rahmel, A. 365 Ratvik, A.P. 124, 139, 169-171, 173 Reichel, H.H. 466, 470, 517, 518 Rhodes, E. 69-71, E97, 102, 105, 106, 346, E346, 347, 351, 380-382, 389 Richardson, D.M. 7, E9, 10, 60, 61, 66, 68 Russell, L.E. 449, 450, 453-455, 458-460, 467, 468, 522 Ryabukhin, Yu.M. E114, 117, E118, 120, 121, E126, 130, 131, E136, 138, 140, E152, 153-157, 160, E161, 162, 163 Sabbatini, L. 63 Sacchetto, G.A. 188 Sada, E. E205, 207, E208, 212, E213, 215, 218, 219, E220, 226, E228, 234, 236, E242, 243, 245, E248, 249, 252, 256, 260, 262, 263 383, 397-399 Sangster, J. Sasabe, M. 94 E9, 10, 61 Savolainen, J.E. Schenke, M. E77, E78, 80, E90, E91, 92 Seibles, L. E21, E22, 25, E97, 100, 101 E9, 10, 61, 280-292, 448 Shaffer, J.H. Sheil, R.J. 261 Shibata, K. 267-269 Shimoo, T. 526-528 Shiomi, N. E205, 207, E208, 212, E213, 215, 218, 219, E220, 226, E228, 234, 236, E248, 249, 256, 260, 263 Signorile G. E374, E375, 376, 377 Simonis, L.A. 323, 324, 336, 337 E294, E295, 301, E302, E303, 308, E309, 313, E314, 316, 422-425, 427-436, 438, 439 Smirnov, M.V. Smith, N.V. E9, 11, 13-18, 46, 48, 53-57, 261 Smith, S.W. 81 42, 107, E242, 244 Sokolowskii, A. Sternberg, S. 174 Sullivan, E.A. 58, 59 Sundheim, B.R. E145-E147, 151, 185, 189, 190 Suski, 1. 42, 107, E242, 244 Suzuki, Y. 103, 109 Takemoto, I. E205, 207, E208, 212, E213, 215, 218, 219, E220, 226, E228, 234, 236, E248, 249, 256, 260, 263 Tatakin, A.N. 132, 141, 158, 175-178 Teramato, y. 103, 109 143, 144, E145, 149, 179, 184, E325, 326 Tivers, R.J. Tomlinson, J.W. 457 Topal, L.E. 276 Tricklebank, S.B. E114, 116 E367, E368, 369-371, 385, 393-396, 400, 401, Tripp, T.B. 403 Trudelle, M.-C. 383 Turnbull, A.G. 384

Twardoch, U. E374, E375, 378 Ubbeholde, A.R. 69-71, E97, 102, 105, 106, 345, E346, 347, 351, 380-382, 389 E133 ,135, E152, 153-155, 293, E294, E295, 296 Ukshe, E.A. 297, E302, E303, 304, 305, E309, 310, 311, E328, 329-331 Uys, J.M. 451, 452, 469, 472-476 Valgin, M.A. 64 Van Drunen, C. 72, E77, E78, 79, 82, 83, 88, E90, E91, 93, 

 110, 195, 200-203, 274

 Van Norman, J.D.

 143, 144, E145, 149, 179, 184, E325, 326

 Vil'nyanskii, Ya.E. E161, 164, 165, 199, 264, 265, E294, E295, 300, E302, E303, 307, 318, E328, 332-334

 Vogel, W.M. 81 Voglin, M.A. 64, 67 Vothi, N.D. 89 Waernes, O. 125, 159, 172 466, 470, 517, 518 Wahlster, M. 457, 461, 471, 505 Walsh, J.H. Ward, W.T. 12, 47, 55 Wartenberg, H.V. E114, 115, E118, 119, E126, 127, 142, 180-182, 186, 187 E145, 148, 166 Watanabe, N. E9, 10-18, 46-48, 53-57, 261, 282-290, 448 E325, 327, 338, 339 E374, E375, 378 Watson, G.M. Welch, B. White, S.H. Willard, J.E. 322 Williams, J.F. 32 Winsor, R.V. 279 Woelk, H.U. E28, 30, E37, 39, 43, 44 Yamamoto, S. 493, 511 Yasuda, K. 262 Yoshii, H. E205, 207, E208, 212, E213, 215, 218, 219, E220, 226, E228, 234, 236, E242, 243, 245, E248, 249, 252, 256, 260, 262, 263 Yurkinskii, V.P. 75, E367, 373 Zagrivnyi, V.N. 75 Zambonin, P.G. 8, 45, 62, 63, 76, 108, 123, 129, 197, E205, 206, E208, 209, E213, 214, 257-259, E374, E375, 376, 377, E405, E406, 407, 407-412, 415, 445 Zezyanov, S.P. 198 Zybko, W.C. E2, 5, E21, E22, 26, 27

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