COMPONENTS:

(1) Potassium chlorate; $KClO_3$; [3811-04-9]

(2) Ethanol; C_2H_6O; [64-17-5]

(3) Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Wright, R.

J. Chem. Soc. 1927, 1334-6.

VARIABLES:

Concentration of ethanol

T/K = 293, 373

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

t/°C	Concn of ethanol mass %	Concn of ethanol mol % (compiler)	soly of $KClO_3$ g/100g solvent	soly of $KClO_3$ mol kg^{-1} (compiler)
20	0	0	7.2	
			7.2	
			(Av) 7.2	0.59
	50	28	1.1	
			1.1	
			(Av) 1.1	0.090
100	0	0	56.8	
			56.0	
			(Av) 56.4	4.60
	50	28	14.0	
			14.2	
			(Av) 14.1	1.15

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

At 20°C, $KClO_3$ and water were placed in stoppered tubes and thermostated. Weighed aliquots were taken and the amount of solute estimated either by titrn or by evapn to dryness.

At 100°C care had to be taken to guard against alteration in the composition of the mixed solvent by evaporation. The method employed was as follows: To a test tube of 10 mm diameter and 5 cm^3 capacity was sealed a 20 cm length of tubing about 4 mm in diameter. A sufficient quantity of dry salt and about 3 cm^3 of solvent were placed in the tube. The tube was then bent round until it lay parallel with the test-tube and sealed off. The sealed U-tube was rocked in a bath at 100°C for 4 hours. After saturation, the excess solid was brought out into the narrow limb, the wide limb being left about three quarters full of the clear saturated sln. The tubes were removed from the bath and cooled to room temperature. The wide limb was cut off above the level of the sln.

The solubility of salt was found by evaporation to dryness and weighing.

SOURCE AND PURITY OF MATERIALS:

Nothing specified.

ESTIMATED ERROR:

Soly: rel error about 1 % (compiler).

Temp: nothing specified.

REFERENCES:

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) 1,4-Dioxane; $C_4H_8O_2$; [123-91-1]

(3) Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Ricci, J.E.; Nesse, G.J.

J. Am. Chem. Soc. 1942, *64*, 2305-11.

VARIABLES:

T/K = 298

Concentration of 1,4-dioxane

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Concn of Dioxane		Soly of KIO_3^a	
mass %	mol % (compiler)	mass %	mol dm^{-3}
0	0	8.472^b	0.4238
10	2.2	5.300	0.2598
20	4.9	3.172	0.1531
30	8.1	1.815	0.08770
40	12	0.8855	0.04273
50	17	0.4712	0.02277
60	23	0.1350	0.00653
70	32	0.0384	0.00186
80	45	0.0060	0.00029
90	65	0.0012	0.000059
100	100	0.0000	0.00000

[a] Each value is the average of at least one determination from supersaturation and undersaturation.
In the iodometric determinations the agreement between such values was about 2/1000.

[b] For the binary aqueous system at 25°C, the compiler computes the following:

soly of KIO_3 = 0.4325 mol kg^{-1}

= 0.7732 mole %

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Mixtures of dioxane and water of known proportions were stirred with excess KIO_3 in glass stoppered bottles for 2 to 7 days. Equilibrium was established from both under- and super-saturation.
Iodate was analyzed by reduction to iodide by sodium thiosulfate, the excess reagent being removed by acidification and boiling with dil H_2SO_4. Except in high dioxane solvents, the resulting iodine solution was analyzed volumetrically at a pH of 9-10 by titrn with standard $AgNO_3$ using eosin indicator. An appropriate blank was calcd from a series of standardizations using pure KIO_3 similarly treated. For very low solubilities the iodide was detd gravimetrically as AgI. The densities of the satd slns were detd by weighing filtered samples of slns delivered from calibrated pipets. The values were not reported in the original paper.

SOURCE AND PURITY OF MATERIALS:

"C.p. grade" potassium iodate was used. The dioxane was purified and its purity verified as described in ref 1.

ESTIMATED ERROR:

Soly: described above.
Temp: nothing specified.

REFERENCES:

1. Davis, T.W.; Ricci, J.E.; Sauter, C.G. *J. Am. Chem. Soc.* 1939, *61*, 3274.

COMPONENTS:

(1) Potassium chlorate; $KClO_3$; [3811-04-9]

(2) Glycine; $C_2H_5NO_2$; [56-40-6]

(3) Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Schnellbach, W.; Rosin, J.

J. Am. Pharm. Assoc. 1931, *20*, 227-33.

VARIABLES:

T/K = 298

PREPARED BY:

Hiroshi Miyamoto and Mark Salomon

EXPERIMENTAL VALUES:

Solubility at 25°C/g in 100 g solvent[a]

	Equilibration time/days[b]					
	5	12	13	14	21	42
I Undersaturation	1.04	--	--	--	--	--
II Undersaturation	--	--	--	1.06	1.04	--
	--	--	--	--	1.02	--
III Supersaturation	--	--	1.07	00	00	1.07
	--	--	1.06	--	--	1.07
IV Supersaturation	--	1.10	--	--	--	1.06
	--	1.11	--	--	--	--
	--	1.12	--	--	--	1.06

[a] According to the USP XXI (1985), two glycine solutions are defined.

(1) Glycine: not less than 98.5 % and not more than 101.5 % of $C_2H_5NO_2$ calculated on the dried basis.

(2) Glycine Irrigation: not less than 95.0 % and not more than 105.0 % of $C_2H_5NO_2$.

[b] The average of these results, excluding those of Experiment IV after 12 days which indicates supersaturation, is 1.055 g/100 g solvent.

The authors conclude the following:

(1) 1.055 g of potassium chlorate is soluble in 100 g of U.S.P. glycine sln at 25°C.

(2) One gram of potassium chlorate is soluble in 75.26 cm^3 (= 93.79 g) of U.S.P. glycine solution at 25°C.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The saturated solutions were prepared by the undersaturation and the supersaturation methods. Chlorate was reduced to chloride, and the resulting chloride determined volumetrically by Volhard's method or gravimetrically by precipitation as silver chloride. The reduction was effected by diluting a weighed quantity of the solution with water in an Erlenmeyer flask provided with a Bunsen valve. A moderate excess of acidic ferrous sulfate solution was added and the mixture heated. After cooling, the solution was treated with nitric acid, and excess 0.1 mol dm^{-3} silver nitrate added: the excess was titrated with 0.1 mol dm^{-3} sulfocyanate solution. For gravimetric determinations, the reduced solution, after treating with silver nitrate, etc. and the resulting silver chloride weighed.

SOURCE AND PURITY OF MATERIALS:

U.S. Pharmacopeia quality potassium chlorate and glycine were used.

ESTIMATED ERROR:

Soly: σ = 0.005 (compilers).

Temp: nothing specified.

REFERENCES:

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) N,N-Dimethylformamide; C_3H_7NO; [68-12-2]

(3) Water: H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Miyamoto, H.; Hasegawa, T.; Sano, H.

J. Solution Chem. in press.

VARIABLES:

Solvent composition

Temperature

PREPARED BY:

M. Salomon

EXPERIMENTAL VALUES:

Solubilities in mol dm^{-3} reported for 20°C, 25°C, and 30°C

t/°C = 20		t/°C = 25	
mass % DMF	KIO_3/mol dm^{-3}	mass % DMF	KIO_3/mol dm^{-3}
0	0.379	0	0.423
4.79	0.284	5.12	0.314
10.05	0.210	10.00	0.234
15.67	0.147	15.43	0.169
19.75	0.114	20.43	0.123
24.57	0.082	24.78	0.0923
30.22	0.055	29.71	0.0658
35.07	0.039	34.78	0.0454
41.99	0.023	40.02	0.0299

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Same as in reference (1).

SOURCE AND PURITY OF MATERIALS:

Guaranteed grade KIO_3 (Wako Pure Chemicals) was recrystallized two times from doubly distilled water.

Guaranteed grade dimethylformamide (Wako) was stored over BaO for two days, and then distilled three times under reduced pressure.

Doubly distilled water had an electrolytic conductance of 9.8 x 10^{-7} S cm^{-1}.

ESTIMATED ERROR:

Soly: standard deviations for measurements in pure water are 0.0001 at 20°C, and 0.001 at 25 & 30°C. For mixed solvents σ = 0.0002 to 0.0001.

Temp: not stated.

REFERENCES:

1. Miyamoto, H.; Shimura, N.; Sasaki, K. *J. Solution Chem.* 1985, *14*, 485.

2. Ricci, J. E. *J. Am. Chem. Soc.* 1934, *56*, 290.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Potassium iodate; KIO_3; [7758-05-6] (2) N,N-Dimethylformamide; C_3H_7NO; [68-12-2] (3) Water; H_2O; [7732-18-5]	Miyamoto, H.; Hasegawa, T.; Sano, H. *J. Solution Chem.* in press.

EXPERIMENTAL VALUES: (Continued)

t/°C = 30

mass % DMF	KIO_3/mol dm^{-3}
0	0.475
5.53	0.345
9.81	0.268
14.71	0.201
20.10	0.144
25.03	0.103
29.79	0.074
35.02	0.051
40.33	0.033

For the binary KIO_3-H_2O system, measured densities of saturated solutions permits conversion from mol dm^{-3} to mol kg^{-1} and mole fraction units.

t/°C	density/g cm^{-3}	c/mol dm^{-3}	m/mol kg^{-1}[b]	χ[b]
20	1.064	0.379	0.386	0.00690
25	1.071[a]	0.423	0.431	0.00771
30	1.078	0.475	0.487	0.00869

[a] Ref. (2)

[b] Calculated by the compiler.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Dimethylsulfoxide ; C_2H_6OS; [67-88-5]

(3) Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Miyamoto, H.; Hasegawa, T.; Sano, H.

J. Solution Chem. in press.

VARIABLES:

Solvent composition

Temperature

PREPARED BY:

M. Salomon

EXPERIMENTAL VALUES:

Solubility of KIO_3 in water-dimethylsulfoxide mixtures

mass % dimethylsulfoxide		Solubility in mol dm^{-3}		
	t/°C	20	25	30
0		0.379	0.423	0.475
5.03		0.295	0.326	0.367
10.02		0.226	0.250	0.281
20.09		0.126	0.142	0.155
30.01		0.0649	0.0746	0.0832
40.03		0.0311	0.0354	0.0401

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Experimental details given in reference (1)

SOURCE AND PURITY OF MATERIALS:

Guaranteed grade KIO_3 (Wako Pure Chemicals) was recrystallized two times from doubly distilled water.

Guaranteed grade dimethylsulfoxide (Wako) was distilled three times under reduced pressure.

Doubly distilled water had an electrolytic conductance of 9.8×10^{-7} S cm^{-1}.

ESTIMATED ERROR:

Soly: stnd deviation between 0.0002 and 0.001.

Temp: not stated.

REFERENCES:

1. Miyamoto, H.; Shimura, H.; Sasaki, K. *J. Solution Chem.* 1985, *14*, 485.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Methanol; CH_4O; [67-56-1]

ORIGINAL MEASUREMENTS:

Kolthoff, I.M.; Chantooni, M.K.

J. Phys. Chem. 1973, 77, 523-6.

VARIABLES:

T/K = 298

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

(1) Volumetric determination:

The authors reported the solubility of KIO_3 in methanol at 25°C (found iodometrically) to be 2.70×10^{-4} mol dm^{-3}.

The solubility product of KIO_3 in methanol was calculated from the solubility data assuming complete dissociation.

The solubility product is given as follows:

$pK_{s0} = 7.2$ (authors)

$K_{s0} = 6.3 \times 10^{-8}$ mol^2 dm^{-6} (compiler)

(2) Conductometric determination:

The authors reported $\log K_{s0} = -7.3_5$ from a measured specific conductivity $2.7_3 \times 10^{-5}$ S cm^{-1}. In these calculations the authors used $\Lambda^{\infty} = 99.2$ S cm^2 mol^{-1}, the Debye-Huckel equation, and probably the limiting law.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

(1) The iodate content was determined iodometrically. No other information given.

(2) Details of the conductivity cell and method are given in ref. 1.

SOURCE AND PURITY OF MATERIALS:

KIO_3 was dried in *vacuo* at 70°C for 3 hours. Matheson Spectroquality grade methanol was distilled once over magnesium turnings. The water content was 0.01 % by Karl Fischer Titration.

ESTIMATED ERROR:

The uncertainty in pK_{s0} is ± 0.1 log units.
Temp: not given.

REFERENCES:

1. Kolthoff, I.M.; Bruckenstein, S.; Chantooni, M.K. *J. Am. Chem. Soc.* 1961, 83, 3927.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) 6,7,9,10,17,18,20,21-Octahydrodibenzo [b,k] [1,4,7,10,13,16] hexaoxacyclooctadecin(dibenzo-18-crown-6); $C_{20}H_{24}O_6$; [14187-32-7]

(3) Methanol; CH_4O; [67-56-1]

ORIGINAL MEASUREMENTS:

Kolthoff, I.M.; Chantooni, M.K.

Anal. Chem. 1980, *52*, 1039-44.

VARIABLES:

Composition

T/K = 298

PREPARED BY:

Hiroshi Miyamoto and Mark Salomon

EXPERIMENTAL VALUES:

Solubilities of KIO_3 and dibenzo-18-crown-6 (DB-18) in methanol at 25°C

KIO_3 mol dm^{-3}	DB-18 mol dm^{-3}	electrolytic conductance of satd sln $10^5\kappa$/S cm^{-1}
$2.6_1 \times 10^{-4}$	0	2.30
4.66×10^{-3}	6.51×10^{-3}	24.6
0	1.38×10^{-3} [a]	---

[a] Result quoted from reference 1.

COMMENTS AND/OR ADDITIONAL DATA:

Dissociation constants $K_d(KIO_3)$ and $K_d(LKIO_3)$ were determined conductometrically and found to equal 2.5×10^{-3} mol^{-1} dm^3 and 6×10^{-3} mol^{-1} dm^3, respectively (L = DB-18).

From the total solubility of the ether in the absence of salt, C_L, the solubility of the ether in the presence of the salt, C_L(salt), the solubility of the salt and the activity of the salt, the formation constant of the ether-K^+ complex, $K_f(LK^+)$, was found to be 1.12×10^5 mol^{-1} dm^3. The selectivity for the K^+/Na^+ coordination with DB-18, $K_f(LK^+)/K_f(LNa^+)$, was reported to equal 3.

From activity measurements, authors report in pure methanol $[K^+] = 2.40 \times 10^{-4}$ mol dm^{-3}, $y_\pm^2 = 0.88$, and thus $K_{s0}^\circ = [M^+]^2 y_\pm^2 = 5 \times 10^{-8}$ mol^2 dm^{-6}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Solubilities of KIO_3 and DB-18 detd isothermally in pure methanol and methanol satd with DB-18. Satd slns prepd by adding 0.5 mmol of each compound to about 2 drops of alcohol, stirring, and decanting the liquid. To the residue about 10 ml of methanol was added, and the mixt magnetically stirred for 2 days. Two additional days of stirring did not affect the soly. The ether, DB-18, was detd spectrophotometrically in dichloroethane. Quantitative transfer of the ether to dichloroethane was found to be complete after 4 extractions, and Beer's law was followed to at least 1.3×10^{-4} mol dm^{-3}. KIO_3 was detd by 3 aq extractions from the satd sln and dichloroethane. The combined aq extracts were titrated idometrically. Complete extraction of the iodate was confirmed experimentally. A Markson No. 1002 K^+ specific ion electrode was used to detn the K^+ activity, and Nernstian behavior was observed. Conductivities were measured with an Industrial Instrument Model RC 16B1 bridge with Jones type cells.

SOURCE AND PURITY OF MATERIALS:

"C.p." grade (Fisher) KIO_3 recrystallized three times from water and dried at atm pressure at 70°C.
Aldrich dibenzo-18-crown-6 (DB-18) was recrystallized 4 times from water and dried at atm pressure at 50°C; m.p. = 163°C, lit, 164°C (2).
Methanol (Fisher "spectroquality" grade) was distilled once from Mg turnings.

ESTIMATED ERROR:

Soly: nothing specified.
Temp: nothing specified.

REFERENCES:

1. Pederson, C.J. *J. Am. Chem. Soc.* 1970, *92*, 388.
2. Pederson, C.J.; Frensdorff, H.K. *Angew. Chem., Int. Ed. Engl.* 1972, *11*, 16.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Dimethylsulfoxide(sulfinyl bis-methane); C_2H_6OS; [67-68-5]

ORIGINAL MEASUREMENTS:

Kolthoff, I.M.; Chantooni, M.K.

J. Phys. Chem. 1973, *77*, 523-6.

VARIABLES:

T/K = 298

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

(1) Potentiometric determination:

The authors reported $-\log K^\circ_{s0} = 7.7$ from $-\log a(K^+) = 3.85$, which was determined potentiometrically assuming $a(IO_3^-) = a(K^+)$.

The compiler computes $K^\circ_{s0} = 2.0 \times 10^{-8}$ mol^2 dm^{-6} from this value.

(2) Conductance determination:

The authors reported $\log K_{s0} = -7.4$ from a measured specific conductivity of 0.85×10^{-5} S cm^{-1}. Λ^∞ was given as 37.4 S cm^2 mol^{-1} (obtained from the literature), and presumably the limiting law was used to calculate the solubility. Activity coefficients were calculated from the "partially extended" Debye-Huckel equation.

The compiler calculates $K_{s0} = 4.0 \times 10^{-8}$ mol^2 dm^{-6} from this value.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

(1) The solubility product of KIO_3 in dimethylsulfoxide was determined potentiometrically from emf measurements made on the following cell:

$K(gl)/KIO_3(c_1)//AgNO_3(c_2)/Ag$

where $KIO_c(c_1)$ and $AgNO_3(c_2)$ are concentrations of the saturated KIO_3 solution and 0.01 mol dm^{-3} $AgNO_3$ solution, and // is a salt bridge containing 0.01 mol dm^{-3} tetraethylammonium perchlorate. The liquid junction potential calculated by the Henderson equation (ref 1) is -5 mV, and was neglected.

SOURCE AND PURITY OF MATERIALS:

KIO_3 was dried in *vacuo* at 70°C for 3 hours. Dimethylsulfoxide, Fisher certified reagent grade product, was purified as described in ref 3. The water content of the purified solvent as found by Karl Fischer titration was less than 0.0005 %.
Electrodes were prepared electrolytically (ref 4).

ESTIMATED ERROR:

The uncertainty of pK_{s0} is ± 0.1.
Temperature not given.

REFERENCES:

1. Ives, D.J.G.; Janz, G.J. *Reference Electrodes*. Academic Press. N.Y. 1961, p. 54.
2. Kolthoff, I.M.; Bruckenstein, S.; Chantooni, Jr., M.K. *J. Am. Chem. Soc.* 1961, *83*, 3927.
3. Kolthoff, I.M.; Reddy, T.B. *Inorg. Chem.* 1962, *1*, 189.
4. Ives, D.J.G.; Janz, G.J. *Reference Electrodes*. Academic Press. N.Y. 1961, p. 179: Kolthoff, I.M.; Chantooni, M.K. *J. Am. Chem. Soc.* 1965, *87*, 4428.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Ammonia; NH_3; [7664-41-7]

ORIGINAL MEASUREMENTS:

Hunt, H.; Boncyk, L.

J. Am. Chem. Soc. 1933, 55, 3528-30.

VARIABLES:

T/K = 298

PREPARED BY:

Hiroshi Miyamoto and Mark Salomon

EXPERIMENTAL VALUES:

The solubility of KIO_3 in liquid ammonia at 25°C was reported as

0.000 g/100 g NH_3

Compilers' note: In a subsequent paper (2) Hunt gives the solubility of KIO_3 in liquid ammonia as 3.044×10^{-5} mol kg^{-1} at 25°C. See the compilation of ref (2).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE

Two methods were used as described in (1).

Method I. 25 ml test tubes with a constriction at the middle were employed. About 10-25 g NH_3 were condensed in the bottom, and the dry salt contained in a small tube tightly covered with cotton cloth was added to the test tube; this small tube remained in the upper part of the test tube as it could not pass the constriction in the middle of the test tube. The top of the test tube was drawn to a tip and sealed, and the tube inverted and placed in a thermostat at 25°C. Equilibrium between NH_3 and the excess salt in the small covered tube required 1-3 weeks with periodic shaking. The test tube was then inverted and only the satd sln drained into the lower end (excess solid remained in the small tube covered with the cotton cloth). The sln was frozen and sealed at the constriction, and weighed. The seal was then broken and the NH_3 boiled off, and the residue weighed.

Method II. Excess NH_3 was condensed on a weighed amount of salt in a tube fitted with a stopcock. After thermostating at 25°C, NH_3 was slowly permitted to escape through the stopcock until a crystal of solid appeared and remained undissolved upon prolonged shaking.

Authors state that the error due to the condensation of gaseous NH_3 was not significant since the dead space was kept to a minimum of about 30 cm^3. However this amount of dead space was stated to limit the precision of the method to 0.5 %.

SOURCE AND PURITY OF MATERIALS:

Reagent grade KIO_3 was recrystallized three times from water and then from "a suitable" anhydrous solvent. The salt was dried to constant weight in a vacuum oven.

Purification of NH_3 not specified, but probably similar to that described in (1). In (1) commercial anhyd ammonia was stored over metallic sodium for several weeks before use.

ESTIMATED ERROR:

Soly: accuracy probably around ± 1-2 %. (compilers).

Temp: 25.00 + 0.025°C accuracy established by NBS calibration (see ref 1).

REFERENCES:

1. Hunt, H.; *J. Am. Chem. Soc.* 1932, 54, 3509.
2. Anhorn, V.J.; Hunt, H. *J. Phys. Chem.* 1941, 45, 351.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Potassium chloride; KCl; [7447-40-7]

(3) Liquid ammonia; NH_3; [7664-41-7]

ORIGINAL MEASUREMENTS:

Anhorn, V.J.; Hunt, H.

J. Phys. Chem. 1941, *45*, 351-62.

VARIABLES:

Concentration of KCl at 298.15 K

PREPARED BY:

Hiroshi Miyamoto and Mark Salomon

EXPERIMENTAL VALUES:

concentration of KCl mol dm^{-3}	 mol kg^{-1}	solubility of KIO_3 10^5 mol kg^{-1}
0	0	3.0441
0	0	3.0438
0	0	3.0412
0	0	3.0461
0	0	3.0448
0	0	3.044 (average value)
0.001907	0.003162	0.7439
0.002658	0.004407	0.8428
0.007624[a]	0.01264	1.4238

[a] Saturated

continued........

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The U-shaped Pyrex soly apparatus is shown in the figure on the next page. A glass float in which an iron nail was sealed was used to stir the slns by engaging solenoid E. B is a cotton plug in which a small glass tube was embedded to permit passage of NH_3 vapors. Both salts were placed in tube G which was then sealed at A, evacuated at F, and the entire apparatus heated in a flame. The apparatus was evacuated for 10 h and then flushed with dry air followed by flushing with NH_3. Ammonia was distd from a reservoir and condensed in tube G, and the apparatus sealed at F. Equilibrium was established by thermostating at 25°C, and was approached from above and below with stirring every 2 h. The satd sln was decanted into tube H, and the distance of the sln from etch mark C measured with a cathatometer. The ammonia was then dist back into tube G, cooled in a bath of solid CO_2-$CHCl_3$-CCl_4, and the tube H removed by breaking about 2 cm above the etch mark C. The KIO_3 content (residue) in H was detd by the method described in (1), and the non-saturating salt was detd gravimetrically by the method given in (2). The volume of

SOURCE AND PURITY OF MATERIALS:

Ammonia was stored over sodium and distd through glass wool into a reservoir prior to distn into the soly tube.
AR grade KIO_3 recrystallized three times from conductivity water, dried at 180°C, ground to a powder and analyzed as in (3).
KCl was crystallized three times from conductivity water and dried at 110°C.

ESTIMATED ERROR:

Soly: for the binary system, standard dev is .0018 (compilers). No information available for ternary systems.
Temp: accuracy ± 0.005 K (authors).

REFERENCES:

1. Anhorn, V.J.; Hunt, H. *Ind. Eng. Chem. Anal. Ed.* 1937, *9*, 591.
2. Willard; Furman, N.H. *Elementary Quantitative Analysis*. D. Van Nostrand. New York. 1935, p 295.
3. Scott; *Standard Methods of Chemical Analysis*. D. Van Nostrand. New York. 1939. p 372.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Potassium chloride; KCl; [7447-40-7]

(3) Liquid ammonia; NH_3; [7664-41-7]

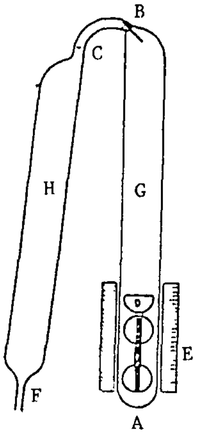
ORIGINAL MEASUREMENTS:

Anhorn, V.J.; Hunt, H.

J. Phys. Chem. 1941, *45*, 351-62.

COMMENTS AND/OR ADDITIONAL DATA:

The solubility apparatus used is shown below.



METHOD/APPARATUS/PROCEDURE: (Continued)

tube H was then calibrated. For very dilute solutions, standard (aq) solutions of the nonsaturating salt were prepared by weight and placed in a cup D, and the water evaporated slowly at 50°C. The cup D was then placed on the float, the KIO_3 added and the tube G sealed at A. The soly was then detd as described above. Densities of saturated solutions prepared by weight were measured pynometrically at 25°C, and the densities of saturated solutions detd above were obtained by graphical interpolation.

The soly in the binary system was detd five times, and an unspecified number of times in ternary systems. The nature of the solid phase was not discussed.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Sodium chloride; NaCl; [7647-14-5]

(3) Liquid ammonia; NH_3; [7664-41-7]

ORIGINAL MEASUREMENTS:

Anhorn, V.J.; Hunt, H.

J. Phys. Chem. 1941, *45*, 351-62.

VARIABLES:

Concentration of NaCl at 298.15 K

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Concentration of NaCl		Solubility of KIO_3
mol dm^{-3}	mol kg^{-1}	10^5 mol kg^{-1}
0	0	3.044 (av)
0.0003685	0.0006109	4.495
0.001655	0.002744	5.489
0.003543	0.005874	5.831
0.007738	0.01283	6.188
0.03063	0.05078	7.098
0.04352	0.07214	7.377
0.09376	0.1554	8.024
0.1154	0.1913	8.233
0.1554	0.2575	8.611
0.2101	0.3482	8.913
0.2746	0.4551	9.145

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

See the compilation of the KIO_3-KCl-NH_3 system reported by Anhorn and Hunt.

SOURCE AND PURITY OF MATERIALS:

Amonia was stored over sodium and distd through glass wool into a reservoir prior to distn into the soly tube.
Analytical reagent grade KIO_3 was recrystallized three times from conductivity water and dried at 180°C. The purity was tested by the method described in ref 1. Purified HCl gas was passed into a saturated solution of analytical reagent grade NaCl. The precipitated NaCl was then crystallized from conductivity water and fused in a platinum crucible. The fused salt was ground to a fine powder in an agate mortar.

ESTIMATED ERROR:

See the KIO_3-KCl-NH_3 compilation of the source paper.

REFERENCES:

Scott; *Standard Methods of Chemical Analysis* D. Van Nostrand. New York. 1939, p 372.

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Ammonium chloride; NH_4Cl; [12125-02-9]

(3) Liquid ammonia; NH_3; [7664-41-7]

ORIGINAL MEASUREMENTS:

Anhorn, V.J.; Hunt, H.

J. Phys. Chem. 1941, *45*, 351-62.

VARIABLES:

Concentration of NH_4Cl at 298.15 K

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Concentration of NH_4Cl		Solubility of KIO_3
mol dm^{-3}	mol kg^{-1}	10^5 mol kg^{-1}
0	0	3.044 (average value)
0.009398	0.001558	5.7782
0.002220	0.003670	7.1681
0.004161	0.006898	8.7650
0.007543	0.01251	10.662
0.01035	0.01715	11.820
0.01822	0.03020	14.025
0.02243	0.03718	14.920
0.03251	0.05389	16.580
0.04568	0.07572	18.045
0.07695	0.1275	20.688
0.1060	0.1758	22.189
0.1463	0.2424	23.975
0.1635	0.2710	24.590
0.2004	0.3320	25.745
0.2657	0.4402	27.480
0.3800	0.6299	30.018
0.4330	0.7180	30.980
0.5728	0.9528	33.160

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

See the compilation of the KIO_3-KCl-NH_3 system reported by Anhorn and Hunt.

SOURCE AND PURITY OF MATERIALS:

Ammonia was stored over sodium and distd through glass wool into a reservoir prior to distn into the soly tube.
Analytical reagent grade KIO_3 was recrystallized three times from conductivity water and dried at 180°C.
The source of NH_4Cl is not given.

ESTIMATED ERROR:

See the KIO_3-KCl-NH_3 compilation of the source paper.

REFERENCES:

COMPONENTS: (1) Potassium iodate; KIO_3; [7758-05-6] (2) Potassium bromide; KBr; [7758-02-3] (3) Liquid ammonia; NH_3; [7664-41-7]	**ORIGINAL MEASUREMENTS:** Anhorn, V.J.; Hunt, H. *J. Phys. Chem.* 1941, *45*, 351-62.
VARIABLES: Concentration of KBr at 298.15 K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Concentration of KBr		Solubility of KIO_3
mol dm^{-3}	mol kg^{-1}	10^5 mol kg^{-1}
0	0	3.044 (average value)
0.002492	0.004131	0.7392
0.004468	0.007407	0.8180
0.005864	0.009721	0.8595
0.007025	0.01165	0.8876
0.01170	0.01940	0.9062
0.02591	0.04295	1.0684
0.04867	0.08070	1.1350
0.07078	0.1173	1.1678
0.1195	0.1981	1.2090
0.1549	0.2568	1.2330

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

See the compilation of the KIO_3-KCl-NH_3 system reported by Anhorn and Hunt.

SOURCE AND PURITY OF MATERIALS:

Ammonia was stored over sodium and distd through glass wool into a reservoir prior to distillation into the solubility tube.
Analytical reagent grade KIO_3 was recrystallized three times from conductivity water and dried at 180°C.
KBr was recrystallized three times from conductivity water and dried at 110°C. The product was ground to a fine powder before final drying.

ESTIMATED ERROR:

See the KIO_3-KCl-NH_3 compilation of the source paper.

REFERENCES:

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Potassium iodide; KI; [7681-11-0]

(3) Liquid ammonia; NH_3; [7664-41-7]

ORIGINAL MEASUREMENTS:

Anhorn, V.J.; Hunt, H.

J. Phys. Chem. 1941, *45*, 351-62.

VARIABLES:

Concentration of KI at 298.15 K

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Concentration of KI		Solubility of KIO_3
mol dm^{-3}	mol kg^{-1}	10^5 mol kg^{-1}
0	0	3.044 (average value)
0.001709	0.002834	0.4238
0.004258	0.007058	0.4893
0.005154	0.008534	0.5165
0.01098	0.01819	0.5682
0.01801	0.02985	0.6188
0.03735	0.06191	0.7211
0.03774	0.06254	0.7370
0.05310	0.08801	0.7849
0.08446	0.1400	0.8868
0.1031	0.1709	0.9362
0.1234	0.2046	0.9886
0.2224	0.3693	1.1530
0.3018	0.5021	1.2140

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

See the compilation of the KIO_3-KCl-NH_3 system reported by Anhorn and Hunt.

SOURCE AND PURITY OF MATERIALS:

Ammonia was stored over sodium and distd through glass wool into a reservoir prior to distillation into the soly tube.
Analytical reagent grade KIO_3 was recrystallized three times from conductivity water and dried at 180°C.
KI was recrystallized three times from conductivity water and dried at 110°C. The product was ground to a fine powder before final drying.

ESTIMATED ERROR:

See the KIO_3-KCl-NH_3 compilation of the source paper.

REFERENCES:

COMPONENTS:

(1) Potassium iodate; KIO_3; [7758-05-6]

(2) Hydrazine; N_2H_4; [302-01-2]

ORIGINAL MEASUREMENTS:

Welsh, T.W.B.; Broderson, H.J.

J. Am. Chem. Soc. 1915, *37*, 816-24.

VARIABLES:

Room temperature (compiler's assumption)

PREPARED BY:

Mark Salomon and Hiroshi Miyamoto

EXPERIMENTAL VALUES:

The solubility of KIO_3 in hydrazine at room temperature was given as

$$0.01\ \text{g/1cm}^3\ N_2H_4$$

The authors stated that the chief object of this research was to obtain qualitative and approximate quantitative data.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility vessel was a glass tube to which a U-shaped capillary tube was attached to the bottom. A stopcock at the end of the capillary permitted the adjustment of the rate of flow of dry nitrogen. About 1 cc of anhydrous hydrazine was placed in the tube, and small amounts of $NaClO_3$ added from a weighing bottle.

After each addition of $NaClO_3$, a loosely fitting cork was placed in the top of the solubility tube. Nitrogen was bubbled through solution until the salt dissolved. The process was repeated until no more salt would dissolve. Temperature was not kept constant.

The accuracy of this method is very poor.

In addition, the authors stated that it was difficult to prevent the oxidation of hydrazine.

SOURCE AND PURITY OF MATERIALS:

Anhydrous hydrazine was prepared by first partially dehydrating commercial hydrazine with sodium hydroxide according to the method of Raschig (1). Further removal of water was distilled over barium oxide after the method of de Bruyn (2).

The form of distillation apparatus employed and the procedure followed in the respective distillations were those described by Welsh (3). The product was found on analysis to contain 99.7 % hydrazine. The hydrazine was stored in 50 cm^3 sealed tubes. Sodium chlorate was the ordinary pure chemicals of standard manufacture.

ESTIMATED ERROR:

Soly: accuracy ± 50 % at best (compilers).

REFERENCES:

1. Raschig, F. *Ber. Dtsch. Chem. Ges.* 1927, *43*, 1927.: Hale, C.F.; Shetterly, F.F. *J. Am. Chem. Soc.* 1911, *33*, 1071.
2. de Bruyn, L. *Rec. Trav. Chim. Pays-Bas.* 1895, *14*, 458.
3. Welsh, T.W. *J. Am. Chem. Soc.* 1915, *37*, 497.