COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Aqueous Electrolyte and Nonelectrolyte Solutions	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1986, June

CRITICAL EVALUATION:

An Evlauation of the Solubility of Mercury in Aqueous Electrolyte and Nonelectrolyte Solutions.

The solubility of metallic mercury in aqueous elctrolyte solutions has been reported in seven papers. Not enough workers have measured the solubility of mercury in any one electrolyte system over common ranges of temperature and electrolyte concentration to recommend solubility values. Most of the available data are classed as tentative values. Some mercury nonelectrolyte + water systems are included in the section.

The solubility values have been converted to Sechenov salt effect parameters in order to have a common basis of comparison of the effect of the electrolyte on the mercury solubility. The notation used for the Sechenov salt effect parameter is discussed in detail in Solubility Series Volume 10, pp. xxix to xlii. Most of the mercury solubility data are given in one of two forms:

$$k_{scc}/\mathrm{dm}^3\ \mathrm{mol}^{-1} = (1/(c_2/\mathrm{mol\ dm}^{-3}))\ \log(c^{\circ}_{1,\mathrm{sat}})/(c_{1,\mathrm{sat}})$$

and

$$k_{smm}/\mathrm{kg\ mol}^{-1} = (1/(m_2/\mathrm{mol\ kg}^{-1}))\ \log(m^{\circ}_{1,\mathrm{sat}})/(m_{1,\mathrm{sat}})$$

where subscripts 1 and 2 refer to mercury and electrolyte, respectively, and the superscript "o" refers to the mercury solubility in pure water.

The Sechenov salt effect parameters for the mercury containing systems are of a similar magnitude to the parameters for typical nonelectrolyte gas, liquid, and solid solutes. The mercury salt effect parameters are probably of a larger uncertainty than for other solutes because the mercury solubility values are of larger uncertainty. Some of the same electrolytes that salt-in typical solutes also salt in mercury. For example tetramethylammonium bromide, tetraethylammonium bromide and sodium thiocyanate. The change in the sign of the salt effect parameter with temperature observed for other solutes is also observed for mercury. The k_{smm} value of sodium chloride changes sign at 324 K from salting-out to salting-in as the temperature increases.

Alpha amino acids and some of their hydrochlorides are included in this section. They appear to abnormally "salt-in" at very low concentrations. All of these data come from one paper, and it would be desirable to have these systems studied further.

Most of the salt effect data come from three papers. These three papers deserve some special comments. Glew and Hames (ref. 2) measured the solubility of mercury in water and in 6.1 mol kg⁻¹ NaCl solution from 278 to 343 K under oxygen free conditions in the presence of trace amounts of reducing agent. The study appears to be a carefully executed experiment and the results are considered to be reliable. The results are compatible with the results of Chviruk and Koneva (ref. 3) who measured the solubility of mercury at four temperatures in 3.42 mol dm⁻³ sodium chloride.

Sanemasa, Haraguchi, and Nagai (ref. 6) measured the solubility of mercury as a function of electrolyte concentration up to one mol dm⁻³ at 298.15 K. The data appears to be internally consistent and the salt effect parameters of the expected magnitude. The evaluator does have some doubts about the method used by the authors. The method does not exclude air, and it seems the times used to establish both liquid mercury liquid-vapor equilibrium and mercury aqueous solution equilibrium are very short. These problems were discussed in more detail in the mercury + water evaluation. However, the 293 - 303 K mercury solubility values in water agree well with the results of other studies. We believe the salt effect data at 298.15 K are reliable.

Kawakara *et al.* (ref. 5) report the mercury solubility values in the alpha-amino acid and alpha amino acid hydrochloride solutions in water and in Hanks' balanced salt solutions (composition given on p. 87). For many of these systems the mercury solubility is four to seven times larger in the presence of only 0.0002 to 0.01 mol dm^{-3} amino acid or its hydrochloride than it is in pure water. It is not clear why there should be such a large enhancement of solubility in these solutions. It is not clear whether or not oxygen was rigously excluded, or if some chemical interaction might be involved. The results are classed as tentative, but the systems deserve further study.

The individual systems are discussed below. The systems are given in the order of the standard arrangement for inorganic compounds used by the US National Bureau of Standards publications. The number before each system is the standard order number for the cation. The amino acid, amino acid hydrochlorides, and nonelectrolyte systems are at the end.

1 Mercury + Hydrochloric acid [7647-01-0] + Water

Baltisberger *et al.* (ref. 4) report the only salt effect parameter for the system. The k_{scc} = 0.072 at 296.15 K is classed tentative.

18(1) Mercury + Ammonium nitrate [6484-52-2] + Water

Tammann (ref. 1) reports no quantitative data.

18(2) Mercury + Tetramethylammonium bromide [64-20-0] + Water
18(3) Mercury + Tetraethylammonium bromide [71-91-0] + Water

Sanemasa *et al.* (ref. 6) measured the solubility of mercury in four solutions of different tetraalkylammonium bromide concentrations at 298.15 K. Mercury is salted in by both salts. The salt effect parameters below are classed tentative.

Electrolyte	k_{scc}	k_{scx}
Tetramethylammonium bromide	-0.0779	-0.112
Tetraethylammonium bromide	-0.116	-0.176

35 Mercury + Mercury (II) sulfide [1344-48-5] + Water
Mercury + Cinnabar [19122-79-3] + Water

Mukimova and Bykovskaya (ref. 11) experimentally determined the mercury solubility from mercury containing cinnabar in distilled and natural waters in contact with shales and carbonate rocks. This is not a real salt effect study, but a study of a natural system. According to the abstract the mercury dissolves in concentration of (0.2 - 2) x 10^{-6} g dm^{-3}. The original paper was not available.

96 Mercury + Barium chloride [10361-37-2] + Water

Sanemasa *et al.* (ref. 6) measured the solubility of mercury in solutions of 0.250, 0.500, and 0.750 molar barium chloride at 298.15 K. The mercury is salted out. The salt effect parameters are:

$$k_{scc}/dm^3\ mol^{-1} = 0.115$$
$$k_{scx}/dm^3\ mol^{-1} = 0.121$$

The values are smaller than expected for a 2-1 electrolyte. They are classed tentative, but should be used with caution.

99(1) Mercury + Sodium fluoride [7681-49-4] + Water

Sanemasa *et al.* (ref. 6) measured the solubility of mercury in solutions of 0.250, 0.500, and 0.750 molar sodium fluoride at 298.15 K. The mercury is salted out. The salt effect parameters are:

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Aqueous Electrolyte and Nonelectrolyte Solutions

EVALUATOR:

H. Lawrence Clever
Chemistry Department
Emory University
Atlanta, Georgia 30322 USA

1986, June

CRITICAL EVALUATION:

$$k_{scc}/\text{dm}^3\ \text{mol}^{-1} = 0.157$$
$$k_{scx}/\text{dm}^3\ \text{mol}^{-1} = 0.174$$

The values are classed as tentative.

99(2) Mercury + Sodium chloride [7647-14-5] + Water

Glew and Hames (ref. 2), Chviruk and Koneva (ref. 3), Baltisberger *et al.* (ref. 4), Sanemasa *et al.* (ref. 6), and Hursh (ref. 7) report the solubility of mercury in aqueous solutions of sodium chloride. The salt effect parameters from the five papers are given in the following table.

T/K	Salt effect parameter, k_{scc}					k_{smm}
	Chviruk, Koneva (ref. 3)	Baltisberger *et al.* (ref. 4)	Sanemasa *et al.* (ref. 6)	Hursh (ref. 7)	Glew and Hames (ref. 2)	
273.2						0.112
278.2						0.095
283.2					(0.099)	0.080
288.2						0.065
293.2	0.119					0.053
295.2				0.54		-
296.2		0.70, 0.22				-
298.2			0.079			0.041
303.2						0.031
308.2					(0.056)	0.022
313.2	0.051					0.014
318.2						0.007
323.2					(0.027)	0.001
328.2						-0.004
333.2	0.000					-0.009
338.2						-0.013
343.2					(0.000)	-0.015
348.2						
353.2	-0.041					

The k_{smm} values of Glew and Hames are the authors' smoothed values. The values in ( ) are k_{scc} values calculated by the evaluator from the Glew and Hames results. The other values are calculated from the individual solubility values. The Baltisberger *et al.* and the Hursh values are for sodium chloride concentrations of 0.01, 0.1, and 0.155 mol dm^{-3}, respectively. Salt effect parameters measured at these low electrolyte concentrations are seldom reliable, and these are classed as doubtful. Chviruk and Koneva did not measure the solubility of mercury in water. The evaluator calculated the salt effect parameters using evaluated mercury solubilities in water. The results agree well with the Glew and Hames results including agreement on a change from salting out to salting in by sodium chloride between 333 K and 343 K. The results of Chviruk and Koneva, Sanemasa *et al.*, and Glew and Hames are classed as tentative. We prefer the use of the Glew and Hames data as a self-consistent data set extending over a 70 degree temperature interval.

Wu and Qi (ref. 10) report a study titled "Solubility factors of elemental mercury, mercury oxides and mercury sulfides". They give data and discuss the effect of chloride ion concentration as well as humic acids and weathered coal fulvic acids on the solubility of Hg, HgO, and HgS. We were unable to obtain a reliable translation of their paper and no data sheet was prepared.

99(3) Mercury + Sodium bromide [7647-15-6] + water
99(4) Mercury + Sodium iodide [7681-82-5] + Water
99(5) Mercury + Sodium perchlorate [7601-89-0] + Water
99(6) Mercury + Sodium sulfate [7757-82-6] + Water
99(7) Mercury + Sodium nitrate [7631-99-4] + Water
99(8) Mercury + Sodium thiocyanate [540-72-7] + Water

Sanemasa, Haraguchi, and Nagai (ref. 6) reported the salt effect parameters for the above sodium salts. They measured the solubility of mercury at four electrolyte concentrations at 298.15 K. The salt effect parameter is taken as the slope of a plot of log (solubility) *vs.* electrolyte concentration. The plot was not forced through the origin. Sodium thiocyanate salts in which has been observed for some other nonelectrolyte solutes. Sodium perchlorate salts out more than the sodium halides which is not the usual trend with other solutes. No data were obtained for the sodium iodide. Use of the iodide ion gave abnormal results possibly due to some chemical reaction with the mercury. Although we have expressed some doubt about the authors' method we believe their data at 298 K are reliable and the values are classed tentative. The salt effect parameters are summarized below.

Salt	k_{scc}	k_{scx}
Sodium bromide	0.017	0.023
Sodium perchlorate	0.117	0.114
Sodium sulfate	0.308	0.319
Sodium nitrate	0.062	0.065
Sodium thiocyanate	-0.035	-0.034

100 Mercury + Potassium chloride [7447-40-7] + Water

Sanemasa *et al.* (ref. 6) measured the solubility of mercury in four concentrations of potassium chloride between 0.250 and 1.000 mol dm^{-3} at 298 K. See section above for comments about method and reliabliity. The results are classed as tentative.

$$k_{scc}/dm^3\ mol^{-1} = 0.070$$
$$k_{scx}/dm^3\ mol^{-1} = 0.074$$

Mercury + Alpha-amino acids and hydrochlorides + Water

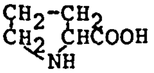
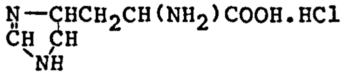
Kawakara *et al.* (ref. 5) have measured the solubility of mercury in water and in Hanks' balanced salt solution in the presence of up to 0.01 mol dm^{-3} alpha-amino acids and some of their hydrochlorides. The solubility of mercury is greater in the presence of the alpha-amino acid component than in either pure water or Hanks' salt solution. Mercury is 2.35 times more soluble in Hanks' balanced salt solution than in water. When alpha-amino acid or hydrochloride is added to either water or balanced salt solution the solubility is often increased by a factor of between four to seven. Salt effect parameters have not been calculated for these systems. The increase in mercuy solubilities are summarized below. The alpha-amino acids are identified by their Chemical Abstracts Registry Number, IUPAC abbreviation, and semiempirical formula.

Alpha-amino acid or Hydrochloride	Solvent	c_2	c_1/c_1°
[56-41-7] Ala $CH_3CH(NH_2)COOH$	water	0.00056	5.9
[56-84-8] Asp $HOOCCH(NH_2)CH_2COOH$	water	0.00045	5.9
[72-19-5] Thr $CH_3CHOHCH(NH_2)COOH$	water	0.00050	7.7

Table continued on next page.

COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Aqueous Electrolyte and Nonelectrolyte Solutions	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1986, June

CRITICAL EVALUATION:

Alpha-amino acid or Hydrochloride	Solvent	c_2	c_1/c_1°
[147-85-3] Pro	water	0.00035	5.0
			
[56-85-9] Gln	water	0.00068	12.4
$HOOCCH(NH_2)CH_2CH_2CONH_2$		0.01	10.6
[63-68-3] Met	water	0.00020	1.1
$CH_3SCH_2CH_2CH(NH_2)COOH$		0.01	4.9
	Hanks'	0.01	2.2
[61-90-5] Leu	water	0.000915	4.2
$(CH_3)_2CHCH_2CH(NH_2)COOH$			
[73-32-5] Ile	water	0.00030	2.6
$CH_3CH_2CH(CH_3)CH(NH_2)COOH$			
[63-91-2] Phe	water	0.0003	6.2
$C_6H_5CH_2CH(NH_2)COOH$			
[60-18-4] Tyr	water	0.00022	5.9
$p-HOC_6H_4CH_2CH(NH_2)COOH$		0.01	3.1
[52-89-1] Cys.HCl	water	0.00000063	19.4
$HSCH_2CH(NH_2)COOH.HCl$		0.01	908.
	Hanks'	0.01	479.
[645-35-2] His.HCl	water	0.01	10.8
	Hanks'	0.01	17.3
[3184-13-2] Orn.HCl	water	0.01	1.8
$NH_2(CH_2)_3CH(NH_2)COOH.HCl$			
	Hanks'	0.01	4.7
[657-27-2] Lys.HCl	water	0.00038	1.8
$NH_2(CH_2)_4CH(NH_2)COOH.HCl$		0.01	1.6
	Hanks'	0.01	5.8
[1119-34-2] Arg.HCl	water	0.00033	4.8
$NH=C(NH_2)NH(CH_2)_3CH(NH_2)COOH.HCl$		0.01	3.6
	Hanks'	0.01	1.6

The solubility ratios for the amino acid containing systems in Hanks' balanced salt solution are referenced to the solubility of mercury in the Hanks' balanced salt solution. The superscript "o" in the c_1/c_1° ratio refers to the mercury solubility in either water or Hanks' balanced salt solution.

Several trends show in the data. Solutions containing 0.0002 to 0.0007 mol dm^{-3} amino acid enhance the mercury solubility 4 to 8 times over its solubility in water, but there is a decrease in the ratio when one increases the concentration to 0.01. However, solutions containing methionine, ornithine HCl, or lysine HCl are exceptions to the trend. A compound containing -SH greatly enhances the mercury solubility, but one containing C-S-C does not. Mercury in the presence of alpha amino acid hydrochlorides is more soluble in the Hanks' balanced salt solutions than in the corresponding water solutions. Arginine HCl is an exception.

The reliability of these data is impossible to judge. It is not clear whether or not oxygen was rigoursly excluded, nor is it clear whether or not a direct chemical interaction occurs in some of the systems. These data need confirmation by further experimental studies. For now they are classed as tentative.

Another paper from the same laboratory, Kawahara *et al.* (ref. 9), reports the solubility of mercury from high copper, conventional, and copper dental amalgams in a tissue culture medium (YLH). Data sheets containing the graphical results were prepared (pp. 100 - 1). The data are classed tentative.

Mercury + Humus + Water

Gjessing and Rogne (ref. 8) have measured the solubility of mercury in various natural humus containing waters. They conclude that the presence of humus enhances the solubility of mercury. From our knowledge of the behavior of other humus containing systems we suspect this is true. However, the present study is not conclusive because it reports a mercury solubility in water that is much too small. The data are classed doubtful.

Mercury + Blood and Various Blood Components

Hursh (ref. 7) has measured the solubility of mercury vapor in whole blood, plasma, and aqueous hemoglobin solutions. Care was taken to prevent the oxidation of mercury by the oxygen of the air. The results are consistent with the hemoglobin of whole blood binding up to one-half the mercury dissolved. The experiments appear to have been carefully done, and the results are classed tentative.

REFERENCES:

1. Tammann, G. *Z. Anorg. Allgem. Chem.* 1922, *121*, 275.

2. Glew, D. N.; Hames, D. A. *Can. J. Chem.* 1972, *50*, 3124.

3. Chviruk, A. P.; Koneva, N. V. *Urk. Khim. Zh.* 1975, *41*, 1162; *Sov. Prog. Chem. (Engl. Transl.)* 1975, *41(11)*, 39.

4. Baltisberger, R. J.; Hildebrand, D. A.; Grieble, D.; Ballintine, T. A. *Anal. Chem. Acta* 1979, *111*, 111.

5. Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S. *Shika Rikogaku Zasshi* 1979, *20*, 137.

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7. Hursh, J. B. *JAT, J. Appl. Toxicol.* 1985, *5*, 327.

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9. Kawahara, H.; Yamada, T.; Nakamura, M.; Tomoda, T.; Kobayashi, H.; Saijo, A.; Kawata, Y.; Hikara, S. *Shika Rikogaku Zasshi* 1981, *22(60)*, 285; *Chem. Abstr.* 1982, *96*, 91615a.

10. Wu, D.; Qi, S. *Huanjing Kexue* 1984, *5(1)*, 30 - 3; *Chem. Abstr.* 1984, *100*, 161509w.

11. Mukimova, D. S.; Bykovskaya, L. P. *Vopr. Reg. Geol. Petrol. Sredn. Azii* 1975, 148 - 54; *Chem. Abstr.* 1977, *87*, 26346p.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Hydrogen chloride; HCl; [7647-01-0]

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

ORIGINAL MEASUREMENTS:

Baltisberger, R. J.; Hildebrand, D. A.; Grieble, D.; Ballintine, T. A.

Anal. Chim. Acta 1979, *111*, 111 - 2.

VARIABLES:

T/K = 296.15, 303.15

PREPARED BY:

H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Hydrogen chloride	Mercury solubility		Salt Effect Parameter
$t/°C$	T/K	c_2/mol dm^{-3}	ppb[a]	Concentration[c] $10^7 c_1$/mol dm^{-3}	k_{scc}/dm^3 mol^{-1}
30	303.15	0	63 ± 2[b]	3.1_4 ± 0.10	-
23	296.15	0.1	59	2.9_4	0.072

[a] ppb = parts per billion.

[b] Standard deviation of ten analyses.

[c] Calculated by compilers. The molar solubility was calculated assuming grams of mercury per 1 x 10^9 cm^3 of solution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solutions were sparged with nitrogen gas for 45 minutes, a drop of mercury was added, and then the mixture sparged another 30 minutes with nitrogen. Solutions were stirred for 24 hours with a glass-covered stirring bar. Samples of solution were withdrawn by syringe with a maintained nitrogen flow to prevent oxygen diffusion into the solutions.

An aliquot of the saturated solution was transferred to a non-reducing cell. The mercury was collected by nitrogen sparging and analyzed by cold vapor atomic absorption.

The non-reducing cell was a cell that had never contacted reducing agents.

Hg + H_2O was quite prone to oxidation. The presence of Cl^- prevented the disproportionation of any Hg(I).

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by distillation from mercury(II) oxide under a N_2 atmosphere.

(2) Hydrogen chloride. From analytical grade reagent and solution.

(3) Water. Triple distilled.

ESTIMATED ERROR:

See standard deviation of solubility in water above.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Ammonium nitrate; NH_4NO_3; [6484-52-2] (3) Water; H_2O; [7732-18-5]	Tammann, G. *Z. Anorg. Allgem. Chem.* 1922, *121*, 275 - 80.
VARIABLES: Room temperature to solution boiling point.	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Tammann confirmed the report of Hodgkinson and Coot [*Chem. News* 1904, *90*, 142] that mercury was insoluble in 50 % aqueous ammonium nitrate. The report is of doubtful value considering present methods of measuring small amounts of mercury.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

SOURCE AND PURITY OF MATERIALS:

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) N,N,N-Trimethylmethanaminium bromide or Tetramethylammonium bromide; $(CH_3)_4NBr$; [64-20-0]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.00$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	0.968		-0.056	
		0.500	0.923		-0.070	
		0.750	0.886		-0.070	
		1.00	0.845		-0.073	
				0.0051[a]	-0.0779[a]	-0.112

[a] Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 114.28$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Tetramethylammonium bromide. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6\, \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.
2. Omang, S. H. *Anal. Chim. Acta* 1971, *53*, 415.
3. Sanemasa, I. *Bull. Chem. Soc. Jpn.* 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) N,N,N-Triethylmethanaminium bromide or Tetraethylammonium bromide; $(C_2H_5)_4NBr$; [71-91-0]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 0.995$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	0.933		-0.120	
		0.500	0.870		-0.120	
		0.746	0.812		-0.121	
		0.995	0.766		-0.116	
				-0.0022^a	-0.116^a	-0.176

^{a}Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 173.83$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Tetraethylammonium bromide. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta 1971, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Cinnabar; HgS; [19122-79-3]

ORIGINAL MEASUREMENTS:

Mukimova, D. S.; Bykovskaya, L. P.

Vopr. Reg. Geol. Petrol. Sredn. Azii 1975, 148 - 54.

Chem. Abstr. 1977, *87*, 26346p.

VARIABLES:

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

The paper was not available. Part of the abstract is reproduced below.

"The experimental solubility of mercury was determined in cinnabar and rocks of the primary dispersion haloes, which had mercury content: shale 0.001, dolostone 0.015, volcanic rocks 0.0001, and effusive-sedimentary rocks 0.005 weight %, in distilled, natural (pH 6.5 and 5.5), and aggressive natural (pH 6.5 and 5.5) waters. The mercury was dissolved from the mercury containing minerals and rocks and subsequently absorbed with the shales absorbing more mercury than the carbonate rocks. The mercury in intrusive and effusive rocks dissolved in concentrations of (0.2 to 2) x 10^{-6} g dm^{-3}; its concentration continually increased over a six month period. Zones with high and low content of mercury in water were observed during the dissolution because of dissolution and absorption of mercury in the rocks."

The paper may contain pertinent data but its usefulness can not be determined from the abstract. The paper is discussed in the salt effect evaluation, although it is not a salt effect study. It appears to be a study of a natural system of mercury containing minerals and rocks in contact with water.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

SOURCE AND PURITY OF MATERIALS:

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Barium chloride; $BaCl_2$; [10361-37-2]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$

$c_2/\text{mol dm}^{-3} = 0 - 0.750$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.080		0.134	
		0.500	1.148		0.120	
		0.750	1.233		0.121	
				0.0039[a]	0.115[a]	0.121

[a]Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 23.19$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Barium chloride. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$

$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$

$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.
2. Omang, S. H. *Anal. Chim. Acta* 1971, *53*, 415.
3. Sanemasa, I. *Bull. Chem. Soc. Jpn.* 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium fluoride; NaF; [7681-49-4]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$

$c_2/\text{mol dm}^{-3} = 0 - 0.750$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^\circ/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1°/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.102		0.169	
		0.500	1.207		0.163	
		0.750	1.321		0.161	
				0.0029[a]	0.157[a]	0.174

[a] Authors' values which are the intercept and slope of $\log(c_1^\circ/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^\circ/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = -2.37$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^\circ/c_1)$; $k_{scx} = (1/c_2)\log(x_1^\circ/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium fluoride. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$

$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$

$\delta(c_1^\circ/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta 1971, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Glew, D. N.; Hames, D. A.

Can. J. Chem. 1972, *50*, 3124 - 8.

EXPERIMENTAL VALUES:

Temperature		Sodium chloride	Mercury Solubility		Salt Effect Parameter
t/°C	T/K	m_2/mol kg^{-1}	$10^8 m_1$/mol kg^{-1}	$10^9 x_1$^{a}	k_{smm}/kg mol^{-1}^{a}
5.24	278.37	0.0	21.8	3.93	0.104
		6.10	5.05	0.746	0.101
		6.10	5.25	0.775	0.096
		6.10	5.65	0.775	0.096
		6.10	6.35	0.938	0.088
5.35	278.48	0.0	21.8	3.93	-
		6.10	5.89	0.870	0.093
10.17	283.32	0.0	23.1	4.16	-
		6.10	7.40	1.093	0.081
		6.10	7.44	1.106	0.080
		6.10	7.61	1.124	0.079
15.01	288.16	0.0	24.7	4.45	-
		6.12	10.8	1.594	0.059
		6.12	11.2	1.653	0.056
19.92	293.07	0.0	26.8	4.83	-
		6.13	12.1	1.93	0.051
		6.13	13.7	2.02	0.048
		6.13	15.1	2.23	0.041
		6.13	15.2	2.24	0.040
25.02	298.17	0.0	29.3	5.28	-
		6.14	15.6	2.30	0.045
		6.14	15.6	2.30	0.045
		6.14	16.7	2.46	0.040
		6.14	16.9	2.49	0.039
30.27	303.42	0.0	32.5	5.85	-
		6.09	18.7	2.76	0.039
		6.09	19.6	2.90	0.036
		6.09	20.4	3.01	0.033
		6.09	20.4	3.01	0.033
34.96	308.11	0.0	36.0	6.49	-
		6.18	25.1	3.70	0.025
		6.18	26.3	3.88	0.022
		6.18	27.5	4.05	0.019
		6.18	27.6	4.07	0.019
40.02	313.17	0.0	40.3	7.26	-
		6.21	31.3	4.61	0.0177
		6.21	32.9	4.84	0.0143
44.86	318.01	0.0	45.4	8.18	-
		6.18	37.1	5.47	0.0142
		6.18	38.8	5.72	0.0110
		6.18	41.2	6.07	0.0068
50.07	323.22	0.0	51.8	9.33	-
		6.09	46.5	6.87	0.0077
		6.09	49.8	7.36	0.0028

[a] Calculated by compiler.

Continued on the next page.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Glew, D. N.; Hames, D. A.

Can. J. Chem. 1972, *50*, 3124 - 8.

VARIABLES:

$T/K = 278.39 - 342.92$
$m_2/\text{mol kg}^{-1} = 6.09 - 6.29$

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Sodium chloride	Mercury Solubility		Salt Effect Parameter
$t/°C$	T/K	$m_2/\text{mol kg}^{-1}$	$10^8 m_1/\text{mol kg}^{-1}$	$10^9 x_1{}^a$	$k_{smm}/\text{kg mol}^{-1}{}^a$
54.99	328.14	0.0	59.1	10.65	-
		6.29	58.9	8.65	0.0002
		6.29	61.9	9.09	-0.0032
		6.29	67.4	9.90	-0.0091
		6.29	68.7	10.09	-0.0104
		6.29	68.9	10.12	-0.0106
60.12	333.27	0.0	68.1	12.27	-
		6.18	74.3	10.95	-0.0061
		6.18	76.0	11.20	-0.0077
65.28	338.43	0.0	79.1	14.25	-
		6.18	96.8	14.26	-0.0142
		6.18	97.5	14.37	-0.0147
69.77	342.92	0.0	90.4	16.29	-
		6.18	112	16.5	-0.0151
		6.18	119	17.5	-0.0193

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility cell and temperature researching equipment were described earlier (ref. 1 and 2).

The water and mercury were distilled into the evacuated solubility cell. Sufficient NaCl was added under He to make the solution about 6.1 molal. About 0.001 molal hydrazine hydrate was added to ensure no Hg was oxidized by residual air.

The solubility cell was continuously stirred and Hg solubilities were determined at preselected temperatures starting from both above and below saturation.

The stirrer was stopped 2 hours before sampling, and 5 to 15 g samples of solution were expersed into a tared flask containing 1 ml 2% $K_2Cr_2O_7$ and 1 ml 20% H_2SO_4. The flask was reweighed and heated to boiling to oxidize the Hg.

The sample was cooled and transferred quantitatively to a wash bottle in the train for the atomic absorption spectrophotometer. The Hg^{2+} was reduced to Hg by $SnCl_2$. The mercury was vaporized into the quartz cell of the spectrophotometer. The spectrophotometer was calibrated by a standard Hg solution prepared from $HgCl_2$.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Technical electrolytic grade; purified as follows: agitated with air and washed with 10% NaOH, distilled water, 5% HNO_3; filtered through Au foil; rewashed with 5% HNO_3 and distilled water, distilled three times.

(2) Sodium chloride. Fischer Scientific Co.; ASC Grade.

(3) Water. Distilled.

ESTIMATED ERROR:

$\delta T/K = \pm 0.01$
$\delta x_1/x_1 = \pm 0.077$ Standard error on a single determination (authors).
$\delta k/\text{mol kg}^{-1} = \pm 0.0054$ Standard error on a single determination (authors).

REFERENCES:

1. Glew, D. N.; Hames, D. A. *Can. J. Chem.* 1969, *47*, 4651.

2. Glew, D. N.; Hames, D. A. *Can. J. Chem.* 1971, *49*, 3114.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Glew, D. N.; Hames, D. A.

Can. J. Chem. 1972, *50*, 3124 - 8.

ADDITIONAL INFORMATION:

Authors' smoothed data. Solubility of mercury in 6.10 mol/kg^{1} aqueous sodium chloride.

Temperature $t/°\text{C}$	T/K	Molality $10^8 m_1/\text{mol kg}^{-1}$	Standard Deviation σ	Salt Effect Parameter $k_{\text{smm}}/\text{kg mol}^{-1}$ [a]	Standard Deviation σ
0.0	273.2	4.31	0.10	0.1120	0.0028
5.0	278.2	5.75	0.12	0.0950	0.0020
10.0	283.2	7.58	0.14	0.0795	0.0014
15.0	288.2	9.91	0.16	0.0654	0.0011
20.0	293.2	12.8	0.17	0.0528	0.0011
25.0	298.2	16.5	0.20	0.0413	0.0012
30.0	303.2	21.0	0.24	0.0311	0.0012
35.0	308.2	26.5	0.30	0.0220	0.0012
40.0	313.2	33.2	0.39	0.0140	0.0011
45.0	318.2	41.3	0.54	0.0069	0.0011
50.0	323.2	51.1	0.74	0.0008	0.0011
55.0	328.2	62.8	1.0	-0.0044	0.0012
60.0	333.2	76.7	1.4	-0.0089	0.0015
65.0	338.2	93.1	1.9	-0.0125	0.0019
70.0	343.2	112.	2.5	-0.0153	0.0024

[a] $k_{\text{smm}}/\text{kg mol}^{-1} = (1/(m_2/\text{mol kg}^{-1}))\log((m_1^\circ/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))$

The authors' smoothing equations were

$$\log(m_1/\text{mol kg}^{-1}) = -6.043 - 1639.8/(T/\text{K}) + 1.9230 \log(T/\text{K})$$

with a standard error on a single determination of 7.7%, and

$$k_{\text{smm}} = -20.373 + 1072.2/(T/\text{K}) + 6.7966 \log(T/\text{K})$$

with a standard error on a single determination of 0.0054.

The salting out constant changes sign at 50.8 ± 1.0 °C (324.0 K).

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Chviruk, A. P.; Koneva, N. V.

Urk. Khim. Zh. 1975, *41*, 1162 - 4.

**Sov. Prog. Chem. (Engl. Transl.)* 1975, *41(11)*, 39 - 41.

VARIABLES:

$T/\mathrm{K} = 293.15 - 353.15$
$p_1/\mathrm{kPa} = 0 - 0.0112$
$c_2/\mathrm{mol\ dm}^{-3} = 3.42$

PREPARED BY:

H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Pressure[a]	Sodium chloride[b]	Henry's Constant[c]	Mercury Solubility[d]
$t/°\mathrm{C}$	T/K	p_1/mmHg	$c_2/\mathrm{g\ dm}^{-3}$	p_1/c_1	$c_1/\mathrm{mg\ dm}^{-3}$
20	293.15	1.1×10^{-3}	200	0.63	0.0192
40	313.15	5.7×10^{-3}		1.0	0.0591
60	333.15	24×10^{-3}		1.45	0.158
80	353.15	84×10^{-3}		2.1	0.377

[a] Calculated by compilers from literature equation (ref. 1) given in paper, $\log p_1 = 10.55 - 0.84 \log T - (3348/T)$, p_1/mmHg and T/K.

[b] Equivalent to 3.42 mol dm^{-3} (compiler).

[c] Henry's constant defined as $K = (p_1/\mathrm{mg\ dm}^{-3})/(c_1/\mathrm{mg\ dm}^{-3})$. The authors' equation for K is $\log K = 0.34 + 0.28 \log(p_1 \mathrm{mg\ dm}^{-3})$.

[d] Calculated by the compiler from authors' equation $\log(c_1/\mathrm{mg\ dm}^{-3}) = 9.781 - 1.325 \log(T/\mathrm{K}) - 2411/(T/\mathrm{K})$.

The authors also measured the solubility of mercury in a solution of 600 g dm^{-3} of sodium hydroxide at 20°C. They give no numerical data for the system, but they say that the results agree with the aqueous NaCl data.

Systems undersaturated, saturated snd supersaturated with mercury were studied. The authors show a fiqure which shows that the undersaturated solutions obey Henry's law, and the supersaturate solutions are in contact with mercury vapor at its equilibrium pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Formed in the solution by reduction of $HgCl_2$ by $SnCl_2$ (15 g dm^{-3}) at pH 2.

(2) Sodium chloride. Specified as "cp".

(3) Water. Distilled.

ESTIMATED ERROR:

REFERENCES:

1. Moelwyn - Hughes, E. A. *Physical Chemistry, Russian translation*, IL Press, Moscow.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Baltisberger, R. J.; Hildebrand, D. A.; Grieble, D.; Ballintine, T. A.

Anal. Chim. Acta 1979, *111*, 111 - 2.

VARIABLES:

T/K = 296.15, 303.15

PREPARED BY:

H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Sodium chloride	Mercury solubility		Salt Effect Parameter
$t/°C$	T/K	c_2/mol dm^{-3}	ppb[a]	Concentration[c] 10^7c_1/mol dm^{-3}	k_{scc}/dm^3 mol^{-1}
30	303.15	0	63 ± 2[b]	$3.1_4 \pm 0.10$	-
23	296.15	0.01	59	2.9_4	0.70
		0.1	57	2.8_4	0.22

[a] ppb = parts per billion.

[b] Standard deviation of ten analyses.

[c] Calculated by compilers. The molar solubility was calculated assuming grams of mercury per 1 x 10^9 cm^3 of solution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solutions were sparged with nitrogen gas for 45 minutes, a drop of mercury was added, and then the mixture sparged another 30 minutes with nitrogen. Solutions were stirred for 24 hours with a glass-covered stirring bar. Samples of solution were withdrawn by syringe with a maintained nitrogen flow to prevent oxygen diffusion into the solutions.

An aliquot of the saturated solution was transferred to a non-reducing cell. The mercury was collected by nitrogen sparging and analyzed by cold vapor atomic absorption.

The non-reducing cell was a cell that had never contacted reducing agents.

Hg + H_2O was quite prone to oxidation. The presence of Cl^- prevented the disproportionation of any Hg(I).

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by distillation from mercury(II) oxide under a N_2 atmosphere.

(2) Sodium chloride. From analytical grade reagent and solution.

(3) Water. Triple distilled.

ESTIMATED ERROR:

See standard deviation of solubility in water above.

REFERENCES:

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn 1981, *54*,

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.00$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \rightarrow 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.050		0.0848	
		0.501	1.105		0.0866	
		0.752	1.154		0.0827	
		1.00	1.204		0.0806	
				0.0025[a]	0.0788[a]	0.0872

[a] Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 16.62$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium chloride. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta 1971, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]
Mercury-203; ^{203}Hg; [13982-78-0]

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

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

ORIGINAL MEASUREMENTS:

Hursh, J. B.

JAT, J. Appl. Toxicol. 1985, *5*, 327 - 32.

VARIABLES:

$T/K = 295$

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Temperature		NaCl	Carrier Gas	Ostwald Coefficient[a]	Concentration[b]
$t/°C$	T/K	c_2/mol dm^{-3}		Av. ± SE (no.)	$10^7 c_1$/mol dm^{-3}
22	295.15	0	-	(3.22)	2.61
		0.155	Air	2.65 ± 0.07(5)	2.15

[a] The Ostwald coefficient is ((ng Hg/mL fluid)/(ng Hg/mL air)). Given above is the average ± standard error (number of determinations).

[b] The concentrations were calculated by the compiler for mercury vapor in equilibrium with pure liquid mercury from the vapor pressure evaluation of Ambrose and Sprake (ref. 1). The mercury vapor pressure and vapor concentration at 295.15 K are 19.90 Pa and 16.27 ng Hg/mL air, respectively.

The author describes the solution as 0.9 wt. % NaCl. The compiler calculated the concentration as 0.155 mol dm^{-3} NaCl.

The water values in ( ) were added by the compiler for comparison. They were calculated from data in the mercury + water evaluation.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The equilibrium cell is a 50 mL syringe thermostated in a Dewar flask. A 10 mL liquid sample and a 40 mL carrier gas with Hg vapor sample are drawn into the cell. The cell is turned and rolled on the cylinder axis for 120 to 300 sec. Equilibrium is rapidly attained through the large contact area between liquid and vapor phases. Both the liquid and vapor phases are sampled. The liquid phase is aerated and the Hg adsorbed on Hopcalite. The Hg radioactivity is measured on a liquid scintillation counter. Corrections are applied for the counter efficiency, and for radioactive decay of the Hg.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by reduction of $^{203}HgCl_2$. The Hg vapor is swept into a leak-proof Saran bag.

(2) Sodium chloride. No information given. Solution specific gravity Handbook value of 1.0064.

(3) Water. Deionized and doubly distilled.

ESTIMATED ERROR:

REFERENCES:

1. Ambrose, D.; Sprake, C. H. S. *J. Chem. Thermodynam.* 1972, *4*, 603.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium bromide; NaBr; [7647-15-6]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. <u>1981</u>, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.01$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.253	1.023		0.039	
		0.506	1.038		0.032	
		0.750	1.046		0.026	
		1.01	1.055		0.023	
				0.0063[a]	0.0173[a]	0.0227

[a]Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3 \text{ mol}^{-1} = 23.50$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3 \text{ mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium bromide. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta <u>1962</u>, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta <u>1971</u>, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. <u>1975</u>, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium perchlorate; $NaClO_4$; [7601-89-0]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.00$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^{\circ}/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1°/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.093		0.154	
		0.500	1.172		0.138	
		0.750	1.252		0.130	
		1.00	1.338		0.126	
				0.0098^a	0.117^a	0.114

^{a}Authors' values which are the intercept and slope of $\log(c_1^{\circ}/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^{\circ}/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 42.91$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-8} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^{\circ}/c_1)$; $k_{scx} = (1/c_2)\log(x_1^{\circ}/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium perchlorate. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^{8}\delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^{\circ}/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta 1971, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium sulfate; Na_2SO_4; [7757-82-6]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

T/K = 298.15
c_2/mol dm^{-3} = 0 - 0.501

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	log(c_1°/c_1) at lim	Salt Effect Parameter	
t/°C	T/K	c_2/mol dm^{-3}	c_1°/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.125	1.104		0.344	
		0.250	1.216		0.340	
		0.375	1.314		0.316	
		0.501	1.447		0.320	
				0.0053[a]	0.308[a]	0.319

[a] Authors' values which are the intercept and slope of log(c_1°/c_1) vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^{\circ}/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/cm^3\ mol^{-1} = 11.56$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/dm^3\ mol^{-1} = (1/(c_2/mol\ dm^{-3}))\log(c_1^{\circ}/c_1)$; $k_{scx} = (1/c_2)\log(x_1^{\circ}/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium sulfate. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$$\delta T/K = \pm 0.05$$
$$10^6 \delta c_1/g\ dm^{-3} = \pm 0.1$$
$$\delta(c_1^{\circ}/c_1) = \pm 0.005$$

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.
2. Omang, S. H.
Anal. Chim. Acta 1971, *53*, 415.
3. Sanemasa, I.
Bull. Chem. Soc. Jpn. 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium nitrate; $NaNO_3$; [7631-99-4]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.00$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \rightarrow 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.037		0.063	
		0.500	1.074		0.062	
		0.753	1.106		0.058	
		1.00	1.156		0.063	
				-0.0002^a	0.0616^a	0.0652

^{a}Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 27.79$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium nitrate. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.
2. Omang, S. H. *Anal. Chim. Acta* 1971, *53*, 415.
3. Sanemasa, I. *Bull. Chem. Soc. Jpn.* 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Sodium thiocyanate; NaSCN; [540-72-7]

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. <u>1981</u>, *54*, 1040 - 3.

VARIABLES:

$T/\text{K} = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.062$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^\circ/c_1)$ at lim	Salt Effect Parameter	
$t/°\text{C}$	T/K	$c_2/\text{mol dm}^{-3}$	c_1°/c_1	$c_2 \rightarrow 0$	k_{scc}	k_{scx}
25	298.15	0.266	0.977		-0.038	
		0.531	0.964		-0.030	
		0.797	0.944		-0.031	
		1.062	0.917		-0.035	
				0.0008^a	-0.0345^a	-0.0338

^{a}Authors' values which are the intercept and slope of $\log(c_1^\circ/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^\circ/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 34.49$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^\circ/c_1)$; $k_{scx} = (1/c_2)\log(x_1^\circ/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Sodium thiocyanate. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/\text{K} = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^\circ/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* <u>1962</u>, *27*, 325.
2. Omang, S. H. *Anal. Chim. Acta* <u>1971</u>, *53*, 415.
3. Sanemasa, I. *Bull. Chem. Soc. Jpn.* <u>1975</u>, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

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

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

ORIGINAL MEASUREMENTS:

Sanemasa, I.; Haraguchi, K.; Nagai, H.

Bull. Chem. Soc. Jpn. 1981, *54*, 1040 - 3.

VARIABLES:

$T/K = 298.15$
$c_2/\text{mol dm}^{-3} = 0 - 1.00$

PREPARED BY:

S. H. Johnson
H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Electrolyte	Solubility Ratio	$\log(c_1^0/c_1)$ at lim	Salt Effect Parameter	
$t/°C$	T/K	$c_2/\text{mol dm}^{-3}$	c_1^0/c_1	$c_2 \to 0$	k_{scc}	k_{scx}
25	298.15	0.250	1.046		0.078	
		0.500	1.095		0.079	
		0.750	1.120		0.066	
		1.00	1.188		0.075	
				0.0018[a]	0.0703[a]	0.0743

[a] Authors' values which are the intercept and slope of $\log(c_1^0/c_1)$ vs. c_2.

The other k_{scc} values were calculated by the compiler from:

$$k_{scc} = (1/c_2) \times \log(c_1^0/c_1)$$

The k_{scx} values were calculated by the authors from:

$$k_{scx} = k_{scc} + (0.036 - \Phi \times 10^{-3})/2.30$$

where Φ is the apparent molar volume of the salt. For this system $\Phi/\text{cm}^3\ \text{mol}^{-1} = 26.85$.

The solubility of mercury in water is based on Sanemasa's (ref. 3) earlier determination of 63.9×10^{-6} g dm^{-3}.

Note: $k_{scc}/\text{dm}^3\ \text{mol}^{-1} = (1/(c_2/\text{mol dm}^{-3}))\log(c_1^0/c_1)$; $k_{scx} = (1/c_2)\log(x_1^0/x_1)$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solubility apparatus is a closed system which consists of several flasks connected by tubing. A 20 g portion of Hg is placed in one flask immersed in thermostat I, and up to 200 ml of water are placed in a second flask immersed in thermostat II. The Hg vapor pressure is controlled by the temperature of thermostat I. Nitrogen gas at atm pressure is circulated by the pump. The gas passes over the Hg and bubbles through the water (or solution). One hour circulation saturates both the gas space and water.

The Hg is determined by cold-vapor atomic absorption. The method is based on a reduction-aeration method found by Kimura and Miller (ref. 1). The procedure used is similar to that reported by Omang (ref. 2). The sample and working standard are put through the same procedure. Analyses are done in triplicate. Measurements were made at up to six Hg pressures at each temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Purified by distillation under reduced pressure.

(2) Potassium chloride. Analytical reagent grade. Dried and weighed.

(3) Water. Redistilled water. Both aerated and deoxygenated water were used with no difference.

ESTIMATED ERROR:

$\delta T/K = \pm 0.05$
$10^6 \delta c_1/\text{g dm}^{-3} = \pm 0.1$
$\delta(c_1^0/c_1) = \pm 0.005$

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.
2. Omang, S. H. *Anal. Chim. Acta* 1971, *53*, 415.
3. Sanemasa, I. *Bull. Chem. Soc. Jpn.* 1975, *48*, 1795.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Alanine; $C_3H_7NO_2$; [56-41-7]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi <u>1979</u>, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
c_2/mol dm^{-3} = 0 to 5.6 x 10^{-4}
pH = 7.2 ± 0.1

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Alanine		Mercury[a]	
t/days	c_2/mg dm^{-3}	c_2/mol dm^{-3} [c] (compiler)	ppm[b]	$10^7 c_1$/mol dm^{-3} [c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	50	5.6 x 10^{-4}	$0.525 \leq 0.525 \leq 0.525$	26.2

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* <u>1962</u>, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Aspartic acid; $C_4H_7NO_4$; [56-84-8]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi <u>1979</u>, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\mathrm{mol\ dm^{-3}} = 0 \text{ to } 4.5 \times 10^{-4}$
$\mathrm{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Aspartic acid		Mercury[a]	
t/days	$c_2/\mathrm{mg\ dm^{-3}}$	$c_2/\mathrm{mol\ dm^{-3}}$[c] (compiler)	ppm[b]	$10^7 c_1/\mathrm{mol\ dm^{-3}}$[c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	60	4.5×10^{-4}	$0.483 \leq 0.520 \leq 0.552$	25.9

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in $1 \times 10^6\ \mathrm{cm^3}$ of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* <u>1962</u>, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Threonine; $C_4H_9NO_3$; [72-19-5]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.;
Ishizaki, N.; Yamada, T.;
Kawamoto, T.; Hikari, S.;
Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0 \text{ to } 5.0 \times 10^{-4}$
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Threonine		Mercury[a]	
t/days	$c_2/\text{mg dm}^{-3}$	$c_2/\text{mol dm}^{-3}$ [c] (compiler)	ppm[b]	$10^7 c_1/\text{mol dm}^{-3}$ [c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	60	5.0×10^{-4}	$0.659 \leq 0.685 \leq 0.712$	34.1

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Proline; $C_5H_9NO_2$; [147-85-3]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.;
Ishizaki, N.; Yamada, T.;
Kawamoto, T.; Hikari, S.;
Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/\mathrm{K} = 310.15$
$c_2/\mathrm{mol\ dm}^{-3} = 0 \text{ to } 3.5 \times 10^{-4}$
$\mathrm{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Proline		Mercury[a]	
	$c_2/\mathrm{mg\ dm}^{-3}$	$c_2/\mathrm{mol\ dm}^{-3}$ [c] (compiler)	ppm[b]	$10^7 c_1/\mathrm{mol\ dm}^{-3}$ [c] (compiler)
1	0	0	$0.020 \le 0.045 \le 0.070$	2.2
3	0	0	$0.025 \le 0.060 \le 0.096$	3.0
5	0	0	$0.078 \le 0.086 \le 0.090$	4.3
5	0	0	$0.078 \le 0.087 \le 0.095$	4.3
5	0	0	$0.070 \le 0.095 \le 0.120$	4.7
5	40	3.5×10^{-4}	$0.415 \le 0.445 \le 0.493$	22.2

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in $1 \times 10^6\ \mathrm{cm}^3$ of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

$\delta c_1/\mathrm{ppm}$ See ranges in table above.
$\delta T/\mathrm{K}$ Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Glutamine; $C_5H_{10}N_2O_3$; [56-85-9]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
c_2/mol dm^{-3} = 0 to 0.01
pH = 7.2 ± 0.1

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Glutamine		Mercury[a]	
t/days	c_2/mg dm^{-3}	c_2/mol dm^{-3} [c] (compiler)	ppm[b]	$10^7 c_1$/mol dm^{-3} [c] (compiler)
1	0	0	$0.020 \le 0.045 \le 0.070$	2.2
3	0	0	$0.025 \le 0.060 \le 0.096$	3.0
5	0	0	$0.078 \le 0.086 \le 0.090$	4.3
5	0	0	$0.078 \le 0.087 \le 0.095$	4.3
5	0	0	$0.070 \le 0.095 \le 0.120$	4.7
1	-	0.01	$0.588 \le 0.650 \le 0.712$	32.4
3	-	0.01	$0.618 \le 0.680 \le 0.742$	33.9
5	-	0.01	$0.790 \le 0.945 \le 1.101$	47.1
5	100	6.84×10^{-4}	$1.075 \le 1.105 \le 1.132$	55.1

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Methionine; $C_5H_{11}NO_2S$; [63-68-3]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0$ to 0.01
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Methionine		Mercury[a]	
t/days	$c_2/\text{mg dm}^{-3}$	$c_2/\text{mol dm}^{-3}$ [c] (compiler)	ppm[b]	$10^7 c_1/\text{mol dm}^{-3}$ [c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
1	-	0.01	$0.079 \leq 0.086 \leq 0.091$	4.3
3	-	0.01	$0.133 \leq 0.168 \leq 0.204$	8.38
5	-	0.01	$0.237 \leq 0.262 \leq 0.287$	13.1
5	-	0.01	$0.433 \leq 0.433 \leq 0.433$	21.6
5	30	2.0×10^{-4}	$0.097 \leq 0.097 \leq 0.097$	4.8

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Leucine; $C_6H_{13}NO_2$; [61-90-5]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/\mathrm{K} = 310.15$
$c_2/\mathrm{mol\ dm^{-3}} = 0$ to 9.15×10^{-4}
$\mathrm{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Leucine		Mercury[a]	
t/days	$c_2/\mathrm{mg\ dm^{-3}}$	$c_2/\mathrm{mol\ dm^{-3}}$[c] (compiler)	ppm[b]	$10^7 c_1/\mathrm{mol\ dm^{-3}}$[c] (compiler)
1	0	0	$0.020 \le 0.045 \le 0.070$	2.2
3	0	0	$0.025 \le 0.060 \le 0.096$	3.0
5	0	0	$0.078 \le 0.086 \le 0.090$	4.3
5	0	0	$0.078 \le 0.087 \le 0.095$	4.3
5	0	0	$0.070 \le 0.095 \le 0.120$	4.7
5	120	9.15×10^{-4}	$0.330 \le 0.375 \le 0.382$	18.7

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in $1 \times 10^6\ \mathrm{cm^3}$ of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

$\delta c_1/\mathrm{ppm}$ See ranges in table above.
$\delta T/\mathrm{K}$ Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Isoleucine; $C_6H_{13}NO_2$; [73-32-5]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/\mathrm{K} = 310.15$
$c_2/\mathrm{mol\ dm^{-3}} = 0$ to 3.0×10^{-4}
$\mathrm{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Isoleucine		Mercury[a]	
	$c_2/\mathrm{mg\ dm^{-3}}$	$c_2/\mathrm{mol\ dm^{-3}}$[c] (compiler)	ppm[b]	$10^7 c_1/\mathrm{mol\ dm^{-3}}$[c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	40	3.0×10^{-4}	$0.205 \leq 0.227 \leq 0.252$	11.3

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in $1 \times 10^6\ \mathrm{cm^3}$ of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

$\delta c_1/\mathrm{ppm}$	See ranges in table above.
$\delta T/\mathrm{K}$	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Phenylalanine; $C_9H_{11}NO_2$; [63-91-2]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi <u>1979</u>, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0 \text{ to } 3.0 \times 10^{-4}$
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Phenylalanine		Mercury[a]	
t/days	c_2/mg dm^{-3}	c_2/mol dm^{-3} [c] (compiler)	ppm[b]	$10^7 c_1$/mol dm^{-3} [c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	50	3.0×10^{-4}	$0.525 \leq 0.552 \leq 0.578$	27.5

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[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
$\delta T/K$	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta <u>1962</u>, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Tyrosine; $C_9H_{11}NO_3$; [60-18-4]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0 \text{ to } 0.01$
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Tyrosine		Mercury[a]	
t/days	$c_2/\text{mg dm}^{-3}$	$c_2/\text{mol dm}^{-3}$[c] (compiler)	ppm[b]	$10^7 c_1/\text{mol dm}^{-3}$[c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
1	-	0.01	$0.183 \leq 0.251 \leq 0.281$	12.5
3	-	0.01	$0.247 \leq 0.251 \leq 0.255$	12.5
5	-	0.01	$0.257 \leq 0.271 \leq 0.287$	13.5
5	40	2.2×10^{-4}	$0.274 \leq 0.293 \leq 0.303$	14.6

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Cysteine hydrochloride; $C_3H_7NO_2S.HCl$; [52-89-1]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
c_2/mol dm^{-3} = 0 to 0.01
pH = 7.2 ± 0.1

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Cysteine HCl		Mercury[a]	
t/days	c_2/mg dm^{-3}	c_2/mol dm^{-3}[c] (compiler)	ppm[b]	10^7c_1/mol dm^{-3}[c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
1	-	0.01	$34.825 \leq 39.000 \leq 43.184$	1944.3
3	-	0.01	$37.926 \leq 40.000 \leq 42.074$	1994.1
5	-	0.01	$37.852 \leq 42.000 \leq 46.185$	2093.8
5	-	0.01	$79.290 \leq 80.670 \leq 82.050$	4021.6
5	0.1	6.3×10^{-7}	$1.693 \leq 1.723 \leq 1.740$	85.90

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Histidine monochloride; $C_5H_{12}N_2O_3 \cdot HCl$; [645-35-2]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi <u>1979</u>, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0 \text{ to } 0.01$
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Histidine HCl		Mercury[a]	
t/days	$c_2/\text{mg dm}^{-3}$	$c_2/\text{mol dm}^{-3}$ [c] (compiler)	ppm[b]	$10^7 c_1/\text{mol dm}^{-3}$ [c] (compiler)
1	0	0	$0.020 \le 0.045 \le 0.070$	2.2
3	0	0	$0.025 \le 0.060 \le 0.096$	3.0
5	0	0	$0.078 \le 0.086 \le 0.090$	4.3
5	0	0	$0.078 \le 0.087 \le 0.095$	4.3
5	0	0	$0.070 \le 0.095 \le 0.120$	4.7
5	-	0.01	$0.919 \le 0.960 \le 1.001$	47.9

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* <u>1962</u>, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Ornithine monochloride; $C_5H_{12}N_2O_2.HCl$; [3184-13-2]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
c_2/mol $\mathrm{dm^{-3}}$ = 0 to 0.01
pH = 7.2 ± 0.1

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Ornithine HCl c_2/mg $\mathrm{dm^{-3}}$	L-Ornithine HCl c_2/mol $\mathrm{dm^{-3}}$[c] (compiler)	Mercury[a] ppm[b]	Mercury[a] 10^7c_1/mol $\mathrm{dm^{-3}}$[c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	-	0.01	$0.158 \leq 0.158 \leq 0.158$	7.88

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 $\mathrm{cm^3}$ of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Lysine monohydrochloride;
$C_6H_{14}N_2O_2 \cdot HCl$; [657-27-2]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.;
Ishizaki, N.; Yamada, T.;
Kawamoto, T.; Hikari, S.;
Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$c_2/\text{mol dm}^{-3} = 0$ to 0.01
$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Lysine HCl		Mercury[a]	
t/days	c_2/mg dm^{-3}	c_2/mol dm^{-3} [c] (compiler)	ppm[b]	$10^7 c_1$/mol dm^{-3} [c] (compiler)
1	0	0	$0.020 \le 0.045 \le 0.070$	2.2
3	0	0	$0.025 \le 0.060 \le 0.096$	3.0
5	0	0	$0.078 \le 0.086 \le 0.090$	4.3
5	0	0	$0.078 \le 0.087 \le 0.095$	4.3
5	0	0	$0.070 \le 0.095 \le 0.120$	4.7
5	70	3.8×10^{-4}	$0.124 \le 0.162 \le 0.195$	8.08
5	-	0.01	$0.138 \le 0.146 \le 0.154$	7.28

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Arginine monohydrochloride; $C_6H_{14}N_4O_2 \cdot HCl$; [1119-34-2]

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$

$c_2/\text{mol dm}^{-3} = 0 \text{ to } 0.01$

$\text{pH} = 7.2 \pm 0.1$

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Arginine HCl $c_2/\text{mg dm}^{-3}$	 $c_2/\text{mol dm}^{-3}$ [c] (compiler)	Mercury[a] ppm[b]	 $10^7 c_1/\text{mol dm}^{-3}$ [c] (compiler)
1	0	0	$0.020 \leq 0.045 \leq 0.070$	2.2
3	0	0	$0.025 \leq 0.060 \leq 0.096$	3.0
5	0	0	$0.078 \leq 0.086 \leq 0.090$	4.3
5	0	0	$0.078 \leq 0.087 \leq 0.095$	4.3
5	0	0	$0.070 \leq 0.095 \leq 0.120$	4.7
5	70	3.3×10^{-4}	$0.332 \leq 0.425 \leq 0.510$	21.2
5	-	0.01	$0.320 \leq 0.320 \leq 0.320$	16.0

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.

δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) See following seven data sheets. (3) Hanks' balanced salt solution; see formulation below.	Kawahara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S. *Shika Rikogaku Zasshi* 1979, *20*, 137 - 41.

COMMENTS AND/OR ADDITIONAL DATA:

Paul (ref. 1) says that balanced salt solutions are media in which cell growth of tissues from warm-blooded vertebrates is maintained in either an air or special carbon dioxide atmosphere. The function of the balanced salt solution is to maintain the pH and osmotic pressure and to provide an adequate concentration of essential inorganic ions without allowing calcium deposition.

In preparing a balanced salt solution, it is essential that calcium and phosphate ions should not meet until the solution is quite dilute, and that the solution should not be made basic until the last minute. Thus, the calcium chloride is sometimes dissolved separately and slowly added to the solution of other components. Also, the sodium bicarbonate solution is prepared separately and added at the end to adjust pH.

Hanks (ref. 2 and 3) has described the solution. According to Paul (ref. 1), the solution is for use with an air atmosphere, but it has also been used with special carbon dioxide atmospheres. The solution used in the present work had the composition below.

Component	Registry Number	c/mg dm^{-3}	c/mol dm^{-3}
NaCl	[7647-14-5]	8000	0.137
KCl	[7447-40-7]	400	0.00536
$CaCl_2$	[10043-52-4]	140	0.00126
$MgSO_4 \cdot 7H_2O$	[7487-88-9]	200	0.00021
$Na_2HPO_4 \cdot 2H_2O$	[10028-24-7]	48	0.00031
KH_2PO_4	[7778-77-0]	60	0.00044
D-Glucose	[50-99-7]	1000	0.00555
Kanamycin	[8063-07-8]	60	-
(Kanamycin A)	[59-01-8]		
Phenol Red	[143-74-8]	6	-
$NaHCO_3$	[144-55-8]	350	0.0042

The balanced salt solution is prepared in several steps:

(1) Solution 1 is prepared by dissolving the first eight components listed above in a little less than one liter of distilled water.

(2) Solution 2 is prepared by dissolving one gram of phenol red in 100 cm^3 of one molar dm^{-3} NaOH solution.

(3) An 0.6 cm^3 volume of solution 2 is added to solution 1 and the solution is sterilized under high pressure.

(4) Solution 3 is prepared to be 6 wt % $NaHCO_3$. It is sterilized by filtration and then 3 cm^3 is added to the sterilized solution 1. The total solution is brought to one liter.

Note that sterilization by heat when the $NaHCO_3$ is present converts the bicarbonate to carbonate with evolution of CO_2. The reverse reaction occurs at room temperature, $2NaHCO_3(aq) = Na_2CO_3(aq) + CO_2(aq)$.

REFERENCES:

1. Paul, J. *Cell and Tissure Culture*, 4th Ed., Williams and Wilkins, Baltimore, 1970, Chapter VI.

2. Hanks, J. H. *J. Cell Comp. Physiol.* 1948, *31*, 235.

3. Hanks, J. H.; Wallace, R. E. *Proc. Soc. exp. Biol. NY* 1949, *71*, 196.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Hanks' Balanced Salt Solution

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

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$pH = 7.2 \pm 0.1$
Composition: refer to page 87 .

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Shaking Time	Mercury[a]			
	ppm[b]	Concentration	Mole Fraction	Molality
t/days		$10^7 c_1$/mol dm^{-3}	$10^8 x_1$	$10^7 m_1$/mol kg^{-1}
Water				
5	$0.078 \leq 0.086 \leq 0.090$	4.2 ± 0.2		
5	$0.078 \leq 0.087 \leq 0.095$	4.3 ± 0.3		
5	$0.070 \leq 0.095 \leq 0.120$	4.7 ± 1.0		
		4.4 ± 0.7[c]	8.0	4.4
Hanks' Balanced Salt Solution				
5	$0.173 \leq 0.208 \leq 0.243$	10.4 ± 1.7		10.4

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] The average for water is from the the five days of shaking time.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Methionine; $C_5H_{11}NO_2S$; [63-68-3]

(3) Hanks' balanced salt solution

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
pH = 7.2 ± 0.1
composition = See description on page 87 .

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Methionine	Mercury[a]	
t/days	c_2/mg dm^{-3}	ppm[b]	$10^7 c_1$/mol dm^{-3}[c] (compiler)
5	0	$0.173 \leq 0.208 \leq 0.243$	10.4
5	0.01	$0.374 \leq 0.456 \leq 0.556$	22.7

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
δT/K	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) L-Histidine monohydrochloride; $C_6H_9N_3O_2.HCl$; [645-35-2] (3) Hanks' balanced salt solution	Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S. *Shika Rikogaku Zasshi* 1979, *20*, 137 - 41.
VARIABLES: T/K = 310.15 pH = 7.2 ± 0.1 composition = See description on page 87 .	PREPARED BY: Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Histidine HCl c_2/mg dm^{-3}	Mercury[a] ppm[b]	Mercury[a] $10^7 c_1$/mol dm^{-3} [c] (compiler)
5	0	$0.173 \leq 0.208 \leq 0.243$	10.4
5	0.01	$3.244 \leq 3.600 \leq 3.956$	179.5

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Cysteine hydrochloride;
$C_3H_7NOS.HCl$; [52-89-1]

(3) Hanks' balanced salt solution

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.;
Ishizaki, N.; Yamada, T.;
Kawamoto, T.; Hikari, S.;
Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*,
137 - 41.

VARIABLES:

T/K = 310.15
pH = 7.2 ± 0.1
composition = See description on page 87 .

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Cysteine HCl c_2/mg dm^{-3}	Mercury[a] ppm[b]	Mercury[a] $10^7 c_1$/mol dm^{-3} [c] (compiler)
5	0	0.173 $\leq$ 0.208 $\leq$ 0.243	10.4
5	0.01	89.310 $\leq$ 100.000 $\leq$ 110.700	4985

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
$\delta T/K$ Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L.
Anal. Chim. Acta 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Ornithine monohydrochloride; $C_6H_{12}N_2O_2 \cdot HCl$; [3184-13-2]

(3) Hanks' balanced salt solution

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

T/K = 310.15
pH = 7.2 ± 0.1
composition = See description on page 87 .

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Ornithine HCl c_2/mg dm^{-3}	Mercury[a] ppm[b]	Mercury[a] 10^7c_1/mol dm^{-3}[c] (compiler)
5	0	$0.173 \leq 0.208 \leq 0.243$	10.4
5	0.01	$0.952 \leq 0.988 \leq 1.023$	49.3

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
δT/K Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Lysine monohydrochloride; $C_6H_{14}N_2O_2 \cdot HCl$; [657-27-2]

(3) Hanks' balanced salt solution

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
$pH = 7.2 \pm 0.1$
composition = See description on page 87 .

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time	L-Lysine HCl	Mercury[a]	
t/days	c_2/mg dm^{-3}	ppm[b]	$10^7 c_1$/mol dm^{-3}[c] (compiler)
5	0	$0.173 \le 0.208 \le 0.243$	10.4
5	0.01	$1.084 \le 1.218 \le 1.387$	60.72

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1×10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm	See ranges in table above.
$\delta T/K$	Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) L-Arginine monohydrochloride; $C_6H_{14}N_4O_2.HCl$; [1119-34-2]

(3) Hanks' balanced salt solution

ORIGINAL MEASUREMENTS:

Kawakara, H.; Nakamura, M.; Ishizaki, N.; Yamada, T.; Kawamoto, T.; Hikari, S.; Sogawa, K.; Maehara, S.

Shika Rikogaku Zasshi 1979, *20*, 137 - 41.

VARIABLES:

$T/K = 310.15$
pH = 7.2 ± 0.1
composition = See description on page 87 .

PREPARED BY:

Hiroshi Miyamoto

EXPERIMENTAL VALUES:

Shaking Time t/days	L-Arginine HCl c_2/mg dm^{-3}	Mercury[a] ppm[b]	Mercury[a] $10^7 c_1$/mol dm^{-3} [c] (compiler)
5	0	$0.173 \leq 0.208 \leq 0.243$	10.4
5	0.01	$0.315 \leq 0.340 \leq 0.365$	16.9

[a] The compiler assumes that the five day shaking time represents solubility equilibrium.

[b] The compiler calculated the concentration of mercury assuming that ppm means grams of mercury in 1 x 10^6 cm^3 of solution.

[c] This value calculated from the middle value of the three numbers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Metallic mercury (0.3 g) and 25 ml of amino acid solution were placed in an Erlenmeyer flask. The rubber stoppered flask was rotated 1 to 5 days in a thermostat at 37°C.

The aqueous phase was sampled. Acidified (H_2SO_4) potassium permanganate solution was added. The sample was wet ashed and the mercury reduced by air and vaporized as described in ref. 1.

The mercury was determined by flameless atomic absorption spectrophotometry using a mercury analyzer (JEOL AA-HG 01) and an atomic absorption spectrophotometer (JEOL JAA-7000).

Three determinations were performed on each sample.

The solubility was pH dependent. Much larger solubility values were obtained in the pH 2 - 3 and pH 10 - 11 ranges. All reported solubility values are for solutions at pH 7.2 ± 0.1. There was no mention of exclusion of oxygen from the samples.

SOURCE AND PURITY OF MATERIALS:

No information was given on the source and purity of materials.

ESTIMATED ERROR:

δc_1/ppm See ranges in table above.
$\delta T/K$ Not given.

REFERENCES:

1. Kimura, Y.; Miller, V. L. *Anal. Chim. Acta* 1962, *27*, 325.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]

(2) Humus

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

ORIGINAL MEASUREMENTS:

Gjessing, E. T.; Rogne, A. K. G.

Vatten 1982, *38*, 406 - 8.

VARIABLES:

T/K Not given, assumed to be room temperature.

PREPARED BY:

H. L. Clever
M. Iwamoto

EXPERIMENTAL VALUES:

Sample	pH		Color Pt, /mg dm^{-3}		TOC /mg dm^{-3}		Mercury Solubility
	Before	After	Before	After	Before	After	c_1/μgdm^{-3}
Ser. A							
H_2O	-	5.9	-	0	-	<0.5	7
1	4.5	4.6	154	181	-	16.5	14
2	6.7	6.7	26	30	-	4.2	7
3	6.8	6.8	24	28	-	4.9	8
4	6.8	6.8	51	55	-	6.2	10
5	6.6	6.7	24	26	-	4.3	8
Ser. B							
H_2O	-	5.7	-	0	-	0.6	9
6	4.4	4.4	74	80	13.3	11.6	19
7	4.4	4.5	96	104	14.8	16.1	21
8	5.4	5.5	78	82	9.9	10.1	13
Ser. C							
Blank	4.8	5.0	0	0	7.0	3.0	13
9	6.6	6.6	67	71	6.3	4.8	28
10	5.7	5.7	128	138	11.1	10.8	13
11	5.2	5.2	185	195	14.0	14.8	27
12	4.9	5.0	205	215	16.0	17.0	28
13	4.6	4.7	278	271	24.5	26.0	36

The before and after refer to before and after saturation with metallic mercury.

The H_2O samples are distilled water. The water solubility of 7 - 9 micrograms of mercury per liter of water correspond to a mole fraction solubility of (6 - 8) x 10^{-10} or a molality of (3.5 - 4.5) x 10^{-8}.

The blank was prepared to be an artificial "surface water" without organic material. Its composition is 5.62 mg dm^{-3} $NaHCO_3$, 1.18 mg dm^{-3} $MgCO_3$, 7.17 mg dm^{-3} $CaSO_4$, and 10.96 mg dm^{-3} $CaCl_2$.

The samples are described further in the table below.

Sample Number	Location of Sample Taken	Date	Dilution of Mixing
1	Hellerudmyra	1980, Feb. 28	None
2	Byvann	1980, Mar. 4	None
3	Smavann	1980, Mar. 4	None
4	Smavannsbekk	1980, Mar. 4	None
5	Øvre Heffelivann	1980, Mar. 4	None
6	Hellerudmyra	1980, May 1	None
7			#1 and #6 mixed 1:1
8			#1 and #5 mixed 1:1
9			Blank and #13 mixed 3:1
10			Blank and #4 mixed 1:1
11			Blank and #4 mixed 1:2
12			Blank and #4 mixed 1:3
13	Hellerudmyra	1980, June 22	None

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Humus (3) Water; H_2O; [7732-18-5]	Gjessing, E. T.; Rogne, A. K. G. *Vatten* 1982, *38*, 406 - 8.
VARIABLES:	PREPARED BY:
T/K Not given, assumed to be room temperature.	H. L. Clever M. Iwamoto

EXPERIMENTAL VALUES:

The color and the total organic carbon, TOC, are measures of the humus in the samples. The authors show that "dissolvable" mercury increases linearly with both color and TOC.

The problem with the results of this study is that the reported mercury concentration in water is about one-tenth the value reported by most other workers at 298.15 K.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The experiment was performed by adding an aliquot amount of pure mercury (5 drops per 500 cm^3 from a polarographic analyzer) to natural humus water samples from several different locations. Some of the samples were diluted with artificial "surface water" without organic material [see description of 'blank' on other data sheet]. Thus the experiment covered a wide range of humus concentrations. All samples were filtered through glass-fiber-filters (Whatman GF/C) before adding the mercury. The samples were left on a shaking table for 19 hours and the supernatant analyzed for mercury by atomic absorption spectrophotometry (Perkin Elmer 460).

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Stated to be pure mercury.

(2) Humus. Natural humus water. See information on other sheet.

(3) Water. Distilled.

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]
Mercury-203; ^{203}Hg; [13982-78-0]

(2) Whole blood

ORIGINAL MEASUREMENTS:

Hursh, J. B.

JAT, J. Appl. Toxicol. 1985, *5*, 327 - 32.

VARIABLES:

T/K = 283 - 310

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Temperature t/°C	 T/K	Sample	Carrier Gas	Ostwald Coefficient[a] Av. ± SE (no.)	Concentration[b] $10^7 c_1$/mol dm^{-3}
10	283.15	Whole blood	Air	10.50 ± 0.25(5)	3.06
		Whole blood (heparin no ethanol)	Air	10.36 ± 0.22(3)	3.02
		Whole blood (heparin no ethanol)	N_2	11.12 ± 0.30(4)	3.24
22	295.15	Whole blood	Air	6.62 ± 0.06(5)	5.37
37	310.15	Whole blood	Air	4.20 ± 0.08(5)	10.9

[a] The Ostwald coefficient is ((ng Hg/mL fluid)/(ng Hg/mL air)). Given above is the average ± standard error (number of determinations).

[b] The concentrations were calculated by the compiler for mercury vapor in equilibrium with pure liquid mercury from the vapor pressure evaluation of Ambrose and Sprake (ref. 1). The mercury vapor pressure and vapor concentration used at each temperature are:

T/K	283	295	310
p_1°/Pa	6.869	19.90	66.89
c_1°/(ng Hg/mL air)	5.85	16.27	52.03

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The equilibrium cell is a 50 mL syringe thermostated in a Dewar flask. A 10 mL liquid sample and a 40 mL carrier gas with Hg vapor sample are drawn into the cell. The cell is turned and rolled on the cylinder axis for 120 to 300 sec. Equilibrium is rapidly attained through the large contact area between liquid and vapor phases. Both the liquid and vapor phases are sampled. The liquid phase is aerated and the Hg adsorbed on Hopcalite. The Hg radioactivity is measured on a liquid scintillation counter. Corrections are applied for the counter efficiency, and for radioactive decay of the Hg. The whole blood results were adjusted to a hematocrit of 42 %. Blood specific gravity was taken as 1.057. An empirical correction was made for Hg oxidized during the experiment. The added ethanol inhibits the oxidation.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by reduction of $^{203}HgCl_2$. The Hg vapor is swept into a leak-proof Saran bag.

(2) Whole blood. Red Cross fresh blood was used within 72 hours of withdrawal. As received, each 450 mL of blood was mixed with 63 mL CPDA-1 anticoagulant containing 2.0 g dextrose, 1.66 g Na citrate, 206 mg citric acid, 149 mg Na_2HPO_4, and 17.3 mg adenine. At time of use 30 μL 95 % ethanol was added to 10 mL blood samples to inhibit Hg oxidation. Samples labelled (heparin no ethanol) were fresh drawn blood to check effect of additives. The effect was considered negligible.

REFERENCES:

1. Ambrose, D.; Sprake, C. H. S. *J. Chem. Thermodynam.* 1972, *4*, 603.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]
Mercury-203; ^{203}Hg; [13982-78-0]

(2) Plasma

ORIGINAL MEASUREMENTS:

Hursh, J. B.

JAT, J. Appl. Toxicol. 1985, *5*, 327 - 32.

VARIABLES:

T/K = 283 - 310

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Temperature *t*/°C	Temperature *T*/K	Carrier Gas	Ostwald Coefficient[a] Av. ± SE (no.)	Concentration[b] $10^7 c_1$/mol dm^{-3}
10	283.15	Air	5.76 ± 0.15(5)	1.68
22	295.15	Air	3.36 ± 0.04(5)	2.94
37	310.15	Air	2.40 ± 0.03(5)	6.23

[a] The Ostwald coefficient is ((ng Hg/mL fluid)/(ng Hg/mL air)). Given above is the average ± standard error (number of determinations).

[b] The concentrations were calculated by the compiler for mercury vapor in equilibrium with pure liquid mercury from the vapor pressure evaluation of Ambrose and Sprake (ref. 1). The mercury vapor pressure and vapor concentration used at each temperature are:

T/K	283	295	310
p_1°/Pa	6.869	19.90	66.89
c_1°/(ng Hg/mL air)	5.85	16.27	52.03

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The equilibrium cell is a 50 mL syringe thermostated in a Dewar flask. A 10 mL liquid sample and a 40 mL carrier gas with Hg vapor sample are drawn into the cell. The cell is turned and rolled on the cylinder axis for 120 to 300 sec. Equilibrium is rapidly attained through the large contact area between liquid and vapor phases. Both the liquid and vapor phases are sampled. The liquid phase is aerated and the Hg adsorbed on Hopcalite. The Hg radioactivity is measured on a liquid scintillation counter. Corrections are applied for the counter efficiency, and for radioactive decay of the Hg.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by reduction of ^{203}HgCl$_2$. The Hg vapor is swept into a leak-proof Saran bag.

(2) Plasma. Prepared from the Red Cross fresh whole blood described on the previous data sheet.

ESTIMATED ERROR:

REFERENCES:

1. Ambrose, D.; Sprake, C. H. S. *J. Chem. Thermodynam.* 1972, *4*, 603.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]
Mercury-203; ^{203}Hg; [13982-78-0]

(2) Hemoglobin

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

ORIGINAL MEASUREMENTS:

Hursh, J. B.

JAT, J. Appl. Toxicol. 1985, *5*, 327 - 32.

VARIABLES:

T/K = 295

PREPARED BY:

H. L. Clever

EXPERIMENTAL VALUES:

Temperature t/°C	Temperature T/K	Hemoglobin wt. %	Carrier Gas	Ostwald Coefficient^a	Concentration^b $10^7 c_1$/mol dm^{-3}
22	295.15	0^c	-	(3.05)	(2.47)
		2.32	Air	3.44, 3.51	2.79, 2.85
		6.50	Air	4.49, 4.65	3.64, 3.77
		(14.0)	-	(6.05)	(4.91)

[a] The Ostwald coefficient is ((ng Hg/mL fluid)/(ng Hg/mL air)).

[b] The concentrations were calculated by the compiler for mercury vapor in equilibrium with pure liquid mercury from the vapor pressure evaluation of Ambrose and Sprake (ref. 1). The calculated values at 295.15 K are mercury vapor pressure 19.90 Pa and vapor concentration 16.27 ng Hg/mL air.

[c] The value for water, 0 wt. % hemoglobin, is from a graphical extrapolation of the other three values (Fig. 3 in the paper). The value is about 5 % smaller than the value of 3.22 at 295.15 K calculated by the compiler from the results in the mercury + water evaluation. The value at 14.0 wt. % hemoglobin is a value calculated from the whole blood Ostwald coefficient assuming a contribution of 0.57 from the lipid and the remaining solubility due to the hemoglobin and water (see Fig. 3).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The equilibrium cell is a 50 mL syringe thermostated in a Dewar flask. A 10 mL liquid sample and a 40 mL carrier gas with Hg vapor sample are drawn into the cell. The cell is turned and rolled on the cylinder axis for 120 to 300 sec. Equilibrium is rapidly attained through the large contact area between liquid and vapor phases. Both the liquid and vapor phases are sampled. The liquid phase is aerated and the Hg adsorbed on Hopcalite. The Hg radioactivity is measured on a liquid scintillation counter. Corrections are applied for the counter efficiency, and for radioactive decay of the Hg.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Prepared by reduction of $^{203}HgCl_2$. The Hg vapor is swept into a leak-proof Saran bag.

(2) Hemoglobin. Fisher Hemoglobin powder. Content determined in subsequent analysis.

(3) Water. Distilled.

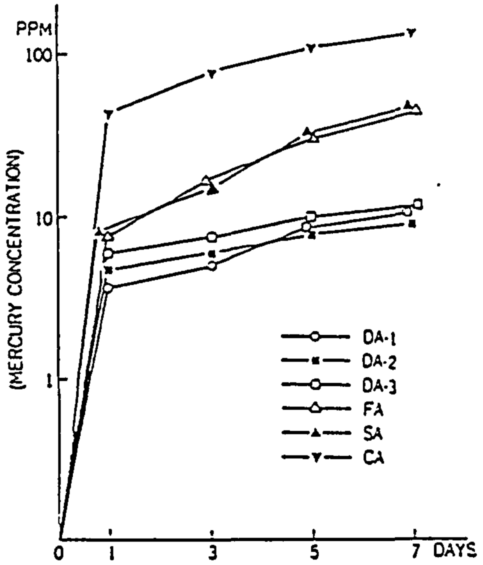
ESTIMATED ERROR:

REFERENCES:

1. Ambrose, D.; Sprake, C. H. S. *J. Chem. Thermodynam.* 1972, *4*, 603.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (From various dental amalgams) (2) Tissue culture medium; YLH	Kawahara, H.; Yamada, T.; Nakamura, M.; Tomoda, T.; Kobayashi, H.; Saijo, A.; Kawata, Y.; Hikari, S. *Shika Rikogaku Zassi* 1981, *22*, 295 - 9. *Chem. Abstr.* 1982, *96*, 91615a.

EXPERIMENTAL VALUES:



Mercury solubility from amalgams in YLH.

Solubility of mercury (ppm = parts per million) in YLH tissue culture medium as a function of time.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Six dental alloys were used. Their properties are listed below.

Dental Alloy	Manufacturer	Abbreviation	Composition / weight %				
			Hg	Ag	Sn	Cu	Other
Alloy for high copper amalgams							
Spherical D	Shofu	DA - 1	46	33	12	7	2
Dispersalloy	J and J	DA - 2	50	35	8	7	-
Dialloy	G - C	DA - 2	45	33	14	5	3
Alloy for conventional and copper amalgams							
Spherical amalgam alloy	Shofu	SA	46	38	15	2	-
Non zinc Luna alloy	G - C	FA	62	27	10	1	-
Copper amalgam	Nimi	CA	63-74	-	-	37-26	-

The figure reproduced from *Shika Rikogaku Zassi* by permission of the publisher and the authors.

COMPONENTS:

(1) Mercury; Hg; [7439-97-6]
(From various dental amalgams)

(2) Tissue culture medium; YLH

ORIGINAL MEASUREMENTS:

Kawahara, H.; Yamada, T.; Nakamura, M.; Tomoda, T.; Kobayashi, H.; Saijo, A.; Kawata, Y.; Hikari, S.

Shika Rikogaku Zassi 1981, *22*, 295 - 9.
Chem. Abstr. 1982, *96*, 91615a.

VARIABLES:

$T/\mathrm{K} = 310$

PREPARED BY:

H. Miyamoto

SOURCE AND PURITY OF MATERIALS (continued):

(2) Tissue culture medium (YLH).

The following components are dissolved in water.

Component	c/mg dm^{-3}
NaCl	8000.0
KCl	400.0
$Na_2HPO_4 \cdot 2H_2O$	60.0
KH_2PO_4	60.0
$MgSO_4 \cdot 7H_2O$	200.0
$CaCl_2$ (anhyd.)	140.0
Glucose	1000.0
Lactalbumin Hydrolysate	5000.0
Yeast extract	1000.0
$NaHCO_3$	700.0
Phenol red	5.0
Penicillin	100.000 unit
Streptomycin	100 mg

The figure is reproduced in a review paper.

Kawahara, H.; Tomoda, T.; Kukizaki, H.; Ogitani, Y.; Mitsutani, M.; Nomura, Y.; Ikeda, H.; Kooda, Y.; Yokota, S.; Sakaguchi, K.; Iseki, T.; Yamanaka, M. *Bosei Kanri* 1982, *26(3)*, 84 - 92;
Chem. Abstr. 1983, *98*, 90150z.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solutes were six dental amalgams. The alloy powder and pure mercury were mechanically triturated. The triturated dental amalgam was placed in the tissue culture medium (YLH) at 37°C and rotated at 200 rpm for seven days. The amalgam surface area/YLH solution volume ratio is 1 cm^2/50 ml.

Solution samples were taken on days 1, 3, 5, and 7. The mercury concentration in the YLH solution was determined by atomic absorption spectroscopy.

The results are presented graphically. A copy of the figure is shown on the previous page. The solubility is still increasing after seven days. The effect is greatest for the copper amalgam.

It is not clear that air (oxygen) was excluded.

REFERENCES:

Two additional studies on the solubility of metal from dental amalgams in saliva and in tissue culture media are:

Kawahara, H.; Tomoda, T.; Tomoda, S.; Sakae, H.; Yokoyama, A.; Suganami, S. *J. Jpn. Soc. Biomater.* 1983, *1(1)*, 69 - 76.

Kawahara, H.; Tomoda, T.; Tomoda, S.; Nomura, Y.; Matsumoto, A.; Kohda, H. *J. Jpn. Soc. Biomater.* 1983, *1(1)*, 77 - 84.