COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Aromatic Hydrocarbons	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1985, July

CRITICAL EVALUATION:

An Evaluation of the Solubility of Mercury in Aromatic Hydrocabons.

The solubility of mercury in five aromatic hydrocarbons was measured by a radioactive tracer method in the laboratory of A. F. Voigt, Iowa State University. The results are reported in three papers (ref. 1 - 3).

Mercury + Benzene; C_6H_6; [71-43-2]

All three papers report solubility values at 298.15 K. The values are:

$(11.0 \pm 0.6) \times 10^{-6}$ mol dm^{-3}	Moser and Voigt (ref. 1)
$(11.4 \pm 0.3) \times 10^{-6}$ mol dm^{-3}	Klehr and Voigt (ref. 2)
$(11.9 \pm 0.6) \times 10^{-6}$ mol dm^{-3}	Spencer and Voigt (ref. 3)

Spencer and Voigt report five additional values at various temperatures between 288.15 and 308.15 K.

All of the data were treated by a linear regression. The Moser and Voigt value at 298.15 K was dropped because it was just at two standard deviations from the regression line. The data were treated again to obtain two constant equations in concentration, mole fraction and molality. The equation constants are in Table 1. The smoothed data and values of the thermodynamic changes for the transfer of mercury from the liquid metal to the hypothetical unit concentration solution are in Table 2. The enthalpy of solution is similar in magnitude to the value for alkanes of similar carbon number.

Table 1. The solubility of mercury in benzene. Least square parameters for the equation ln(soly) = A(1) + A(2)/(T/100 K).

Solubility	A(1) ± Error	A(2) ± Error	Std. error about the Regression Line
c_1/mol dm^{-3}	5.6307 ± 0.4801	-50.6159 ± 1.4287	3.9×10^{-7}
x_1	3.6560 ± 0.4621	-51.9295 ± 1.3752	3.4×10^{-8}
m_1/mol kg^{-1}	6.0509 ± 0.5041	-51.4670 ± 1.3008	4.6×10^{-7}

Table 2. The solubility of mercury in benzene. Tentative values of the concentration, mole fraction and molality as a function of temperature.

T/K	Mercury Solubility		
	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^6 m_1$/mol kg^{-1}
288.15	6.6	5.8	7.4
293.15	8.8	7.8	10.1
298.15	11.8	10.6	13.5
303.15	15.6	14.1	18.0
308.15	20.5	18.6	23.7
ΔH_1[a]	42.1 ± 1.2	43.2 ± 1.1	42.8 ± 1.1
ΔS_1[b]	46.8 ± 4.0	30.4 ± 3.8	50.3 ± 4.2

[a] units kJ mol^{-1}
[b] units J K^{-1} mol^{-1}

Mercury + Methylbenzene; C_7H_8; [108-88-3]

All three papers report solubility values at 298.15 K. The values are:

$(12.5 \pm 0.2) \times 10^{-8}$ mol dm^{-3}	Moser and Voigt (ref. 1)
$(13.4 \pm 0.1) \times 10^{-8}$ mol dm^{-3}	Klehr and Voigt (ref. 2)
$(12.0 \pm 0.1) \times 10^{-8}$ mol dm^{-3}	Spencer and Voigt (ref. 3)

In addition Klehr and Voigt report seven more values in the 273.15 to 318.15 K interval and Spencer and Voigt report five more values in the 273.15 to 308.15 K interval.

The Klehr and Voigt, the Spencer and Voigt, and the combined data set were treated by linear regressions to obtain two constant equations of the type

$$\ln(\text{soly}) = A(1) + A(2)/(T/100\ \text{K})$$

The Klehr and Voigt data showed more scatter and gave significantly smaller solubility values in the 308.15 to 318.15 K temperature interval than the other data sets. The enthalpy of solution was nearly 5 kJ mol^{-1} less than the benzene enthalpy value for the combined fit. The Klehr and Voigt values at 308.15 and 318.15 K did not quite deviate a full two standard deviations from the combined data regression line. However, they were arbitrarily omitted and the remaining data refit by the linear regression to obtain the values in Tables 3 and 4 for concentration, mole fraction and molality. The enthalpy of solution is the smallest for this system amoung the five aromatic hydrocarbon solvents by several percent.

Table 3. The solubility of mercury in methylbenzene. Least square parameters for the equation $\ln(\text{soly}) = A(1) + A(2)/(T/100\ \text{K})$.

Solubility	A(1) ± Error	A(2) ± Error	Std. error about the Regression Line
c_1/mol dm^{-3}	3.5029 ± 0.5883	-44.2469 ± 1.7135	7.5×10^{-7}
x_1	1.6227 ± 0.5686	-45.3066 ± 1.6563	7.8×10^{-8}
m_1/mol kg^{-1}	3.9894 ± 0.5724	-45.2540 ± 1.6673	8.5×10^{-7}

Table 4. The solubility of mercury in methylbenzene. Tentative values of the concentration, mole fraction and molality as a function of temperature.

T/K	Mercury Solubility		
	Concentration $10^8 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^8 m_1$/mol kg^{-1}
273.15	3.1	3.2	3.4
278.15	4.1	4.3	4.6
283.15	5.4	5.7	6.2
288.15	7.1	7.5	8.2
293.15	9.3	9.8	10.7
298.15	11.9	12.7	13.8
303.15	15.2	16.4	17.8
308.15	19.3	20.9	22.6
313.15	24.3	26.4	28.6
318.15	30.3	33.1	35.9
ΔH_1[a]	36.8 ± 1.4	37.7 ± 1.4	37.6 ± 1.4
ΔS_1[b]	29.1 ± 4.9	13.5 ± 4.7	33.2 ± 4.8

[a] units kJ mol^{-1}
[b] units J K^{-1} mol^{-1}

COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Aromatic Hydrocarbons	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1985, July

CRITICAL EVALUATION:

Mercury + 1,2-Dimethylbenzene; C_8H_{10}; [95-47-6]
+ (1-methylethyl)Benzene; C_9H_{12}; [98-82-8]
+ (2-methylpropyl)Benzene; $C_{10}H_{14}$; [538-93-2]

Only Spencer and Voigt (ref. 3) report solubility data on these systems. The data are classed as tentative. Each system was subject to a linear regression in concentration, mole fraction and molality. The results are in Table 5. The smoothed solubility values as a function of temperature and the enthalpy and entropy changes for the transfer of one mole of mercury from the liquid metal to the hypothetical unit solutions are in Tables 6, 7 and 8.

It is interesting to note that the mole fraction solubilities for the three hydrocarbons above are the same within experimental error at a given temperature. The mole fraction solubilities in benzene and methylbenzene are about 28 and 15 percent smaller, respectively, than the average mole fraction solubility of the C_8, C_9 and C_{10} hydrocarbons above. The enthalpy of solution in mercury in the aromatic hydrocarbons is similar in magnitude to the values in the alkanes.

Table 5. The solubility of mercury in 1,2-dimethylbenzene, (1-methylethyl)benzene and (2-methylpropyl)benzene. Least square parameters for the equation ln(soly) = A(1) + A(2)/(*T*/100 K).

Solubility	A(1) ± Error	A(2) ± Error	Std. error about the Regression Line
	1,2-Dimethylbenzene or *ortho*-Xylene		
c_1/mol dm^{-3}	5.4863 ± 0.2771	-50.1083 ± 0.8157	4.2 x 10^{-7}
x_1	3.5834 ± 0.2744	-50.7252 ± 0.8079	5.3 x 10^{-8}
m_1/mol kg^{-1}	5.8912 ± 0.2858	-50.9159 ± 0.8414	5.0 x 10^{-7}
	(1-methylethyl)Benzene or *Iso*propylbenzene		
c_1/mol dm^{-3}	3.7336 ± 0.2107	-45.2228 ± 0.6203	2.6 x 10^{-7}
x_1	2.0351 ± 0.2155	-46.0108 ± 0.6343	3.7 x 10^{-8}
m_1/mol kg^{-1}	4.0998 ± 0.2056	-45.8465 ± 0.6052	3.0 x 10^{-7}
	(2-methylpropyl)Benzene or *t*-Butylbenzene		
c_1/mol dm^{-3}	4.1354 ± 0.3899	-46.9025 ± 1.1555	5.7 x 10^{-7}
x_1	2.5225 ± 0.3729	-47.6384 ± 1.1052	8.4 x 10^{-8}
m_1/mol kg^{-1}	4.5045 ± 0.3503	-47.5591 ± 1.0383	6.1 x 10^{-7}

Table 6. The solubility of mercury in 1,2-diethylbenzene. Tentative values of concentration, mole fraction and molality as a function of temperature.

T/K	Mercury Solubility		
	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^6 m_1$/mol kg^{-1}
273.15	2.6	3.1	2.9
278.15	3.6	4.3	4.1
283.15	5.0	6.0	5.6
288.15	6.8	8.1	7.7
293.15	9.1	11.0	10.4
298.15	12.1	14.7	13.9
303.15	16.0	19.5	18.4
308.15	20.9	25.5	24.1
ΔH_1[a]	41.7 ± 0.7	42.2 ± 0.7	42.3 ± 0.7
ΔS_1[b]	45.6 ± 2.3	29.8 ± 2.3	49.0 ± 2.4

[a] units kJ mol^{-1}
[b] units J K^{-1} mol^{-1}

Table 7. The solubility of mercury in (1-methylethyl)benzene. Tentative values of concentration, mole fraction and molality as a function of temperature.

T/K	Mercury Solubility		
	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^6 m_1$/mol kg^{-1}
273.15	2.7	3.7	3.1
278.15	3.6	5.0	4.2
283.15	4.8	6.7	5.6
288.15	6.4	8.9	7.4
293.15	8.4	11.7	9.7
298.15	10.8	15.2	12.7
303.15	13.9	19.6	16.3
308.15	17.7	25.1	20.8
ΔH_1[a]	37.6 ± 0.5	38.3 ± 0.5	38.1 ± 0.5
ΔS_1[b]	31.0 ± 1.8	16.9 ± 1.8	34.1 ± 1.7

[a] units kJ mol^{-1}
[b] units J K^{-1} mol^{-1}

COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Aromatic Hydrocarbons	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1985, July

CRITICAL EVALUATION:

Table 8. The solubility of mercury in (2-methylpropyl)benzene. Tentative values of the concentration, mole fraction and molality as a function of temperature.

T/K	Mercury Solubility		
	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^6 m_1$/mol kg^{-1}
273.15	2.2	3.3	2.5
278.15	3.0	4.5	3.4
283.15	4.0	6.1	4.6
288.15	5.3	8.2	6.1
293.15	7.0	10.9	8.1
298.15	9.2	14.3	10.7
303.15	11.9	18.7	13.9
308.15	15.3	24.1	17.9
313.15	19.6	30.8	22.9
ΔH_1[a]	39.0 ± 1.0	39.6 ± 0.9	39.5 ± 0.9
ΔS_1[b]	34.4 ± 3.2	21.0 ± 3.1	37.5 ± 2.9

[a] units kJ mol^{-1}
[b] units J K^{-1} mol^{-1}

REFERENCES:

1. Moser, H. C.; Voigt, A. F. *USAEC Report* 1957, *ISC-892*, 65 pp.; *Chem. Abstr.* 1958, *52*, 10691h.

2. Klehr, E. H.; Voigt, A. F. *Radioisot. Phys. Sci. Ind., Proc. Conf., Copenhagen*, 1960, *1*, 517 - 29 (pub. 1962); *Chem. Abstr.* 1962, *57*, 6681b.

3. Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 70; Spencer, J. N. Dissertation 1967, Iowa State University.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] Mercury-203; ^{203}Hg; [13982-78-0] (2) Benzene; C_6H_6; [71-43-2]	Moser, H. C.; Voigt, A. F. USAEC Report 1957, ISC-892. Chem. Abstr. 1958, 52, 10691h.
VARIABLES: T/K = 298.15	PREPARED BY: H. L. Clever M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
25	298.15	12.0 ± 0.6	10.7	13.7

[a]Calculated by compilers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A globule of Hg metal prepared from radioactive mercury(II) nitrate by reduction with hypophosphorous acid was equilibrated with 5 - 10 ml of liquid by shaking in a thermostat. Aliquotes of the liquid were withdrawn periodically for up to two weeks and the Hg concentration determined radiochemically.

The aliquot was diluted with acetone and equilibrated with $Hg(NO_3)_2$ carrier to exchange the radioactive mercury. The mercury was precipitated as HgS, mounted on a stainless steel planchet and counted with a Geiger-Mueller tube.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. Oak Ridge National Lab; recieved as 0.31 M $Hg(NO_3)_2$ in 1.56 HNO_3 solution. Initial activity 50 millicuries g^{-1}; half-life 48 days. Reduced to Hg by hypophosphorous acid; coagulated to a Hg droplet by addition of concentrated HI.

(2) Benzene. Baker and Adamson; reagent grade, thiophene-free. Used without further purification.

ESTIMATED ERROR:

δT/K = ±0.1

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0] (2) Benzene; C_6H_6; [71-43-2]	Klehr, E. H.; Voigt, A. F. *Radioisotopes Phys. Sci. Ind., Proc. Conf. Use, Copenhagen* 1960, *1*, 517 - 29 (Pub. 1962).
VARIABLES: T/K = 298.15	PREPARED BY: S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^8 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^8 m_1$/mol kg^{-1}
25	298.15	11.4 ± 0.3	10.2	13.0

[a]Calculated by compilers.

The value above is from the direct measurement technique. The indirect measurement result is 11.1 x 10^{-8} mol dm^{-3} at 298.15 K obtained by multiplying the mercury solubility in water, 3.0 x 10^{-7} mol dm^{-3}, times the distribution coefficient.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Direct Method. A globule of mercury containing 203-Hg was placed in 50 ml of solvent in a 100 ml flask and agitated in a thermostated bath. Samples were taken until the solution appeared to be at equilibrium. Analyses were made by GM-counting by one of two techniques:

(i) Solid precipitate counting. The Hg in a 0.5 ml aliquot was exchanged and reprecipitated on a stainless steel panchet as the sulfide was dried and counted. Details in Moser and Voigt (ref. 1).

(ii) Liquid aliquot scintillation-counting. A 0.5 ml aliquot of the saturated solution was diluted and transferred to the counting tube with a known volume of benzene.

The 0.28 MeV gamma radiation was counted. Error due to radiation adsorbed by the benzene and water was shown to be less than one percent.

Indirect Method. The distribution coefficient between solvent and water was measured.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. Reduced from a mercury nitrate sample. Half-life is 47 days.

(2) Benzene. Repurified by stirring with repeated portions of concentrated sulfuric acid and then redistilling.

ESTIMATED ERROR:

See random error reported by authors with concentration values above.

REFERENCES:

1. Moser, H. C.; Voigt, A. F. *USAEC Report* 1957, *ISC-892*, 65 pp.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) Benzene; C_6H_6; [71-43-2]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 288.15 - 308.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
15	288.15	6.6 ± 0.1	5.8	7.5
20	293.15	8.9 ± 0.1	7.9	10.1
22.5	295.65	10.4 ± 0.2	9.27	11.9
25	298.15	11.9 ± 0.6	10.6	13.6
30	303.15	15.2 ± 0.2	13.7	17.5
35	308.15	21.1 ± 1.3	19.1	24.4

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (17.407 \pm .360)\log(T/K) - 49.047$$

for the 288.15 to 308.15 temperature interval.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A radioactive tracer method was used. A high activity sample of mercury-203 nitrate was added to mercury(II) nitrate, reduced to metallic mercury by hypophosphorous acid, coagulated into a drop, washed and dried.

The mercury and solvent were shaken continuously in 25 ml glass stoppered flasks in a thermostat for 24 hours. Aliquots of the equilibrated solution were counted by a conventional single channel scintillation counter. The window width was set to count only the photopeak at 279 kev. The solubility values were the average of at least six determinations over a three day period.

The solubility of mercury in benzene was followed for several days. It was found that the mercury concentration was constant after about 24 hours of shaking and remained constant over a period of several days. Radiation damage sufficient to affect the solubilities would have caused a noticeable increase with time.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. The isotope decays by emission of a beta particle at an energy of 210 kev, accompanied by a gamma ray of 279 kev. The isotope half-life is 47 days.

(2) Benzene. Phillips Petroleum Co. Research Grade, used as received.

ESTIMATED ERROR:

δT/K = ±0.1; See random error reported by authors with concentration values above.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] Mercury-203; ^{203}Hg; [13982-78-0] (2) Methylbenzene or Toluene; C_7H_8; [108-88-3]	Moser, H. C.; Voigt, A. F. USAEC Report 1957, ISC-892. Chem. Abstr. 1958, *52*, 10691h.
VARIABLES: T/K = 298.15	PREPARED BY: H. L. Clever M. Iwamoto

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
25	298.15	12.5 ± 0.5	13.4	14.5

[a]Calculated by compilers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A globule of Hg metal prepared from radioactive mercury(II) nitrate by reduction with hypophosphorous acid was equilibrated with 5 - 10 ml of liquid by shaking in a thermostat. Aliquotes of the liquid were withdrawn periodically for up to two weeks and the Hg concentration determined radiochemically.

The aliquot was diluted with acetone and equilibrated with $Hg(NO_3)_2$ carrier to exchange the radioactive mercury. The mercury was precipitated as HgS, mounted on a stainless steel planchet and counted with a Geiger-Mueller tube.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. Oak Ridge National Lab; recieved as 0.31 M $Hg(NO_3)_2$ in 1.56 HNO_3 solution. Initial activity 50 millicuries g^{-1}; half-life 48 days. Reduced to Hg by hypophosphorous acid; coagulated to a Hg droplet by addition of concentrated HI.

(2) Toluene. Eastman Co.; prepared from toluene sulfonic acid. Shaken with aqueous NaOH, passed through dry silica gel and redistilled.

ESTIMATED ERROR:

δT/K = ±0.1

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Klehr, E. H.; Voigt, A. F.
(2) Methylbenzene or Toluene; C_7H_8; [108-88-3]	*Radioisotopes Phys. Sci. Ind., Proc. Conf. Use, Copenhagen* 1960, *1*, 517 - 29 (Pub. 1962).
VARIABLES:	PREPARED BY:
T/K = 273.15 - 318.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
0	273.15	3.4 ± 0.1	3.5	3.8
10	283.15	5.1 ± 0.1	5.4	5.8
15	288.15	6.6 ± 0.1	7.0	7.6
20	293.15	8.5 ± 0.1	9.0	9.8
25	298.15	13.4 ± 0.1	14.3	15.5
30	303.15	14.4 ± 0.1	15.5	16.8
35	308.15	16.5 ± 0.1	17.8	19.3
45	318.15	26.9 ± 0.2	29.4	31.9

[a]Calculated by compilers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Direct Method. A globule of mercury containing 203-Hg was placed in 50 ml of solvent in a 100 ml flask and agitated in a thermostated bath. Samples were taken until the solution appeared to be at equilibrium. Analyses were made by GM-counting by one of two techniques:

(i) Solid precipitate counting. The Hg in a 0.5 ml aliquot was exchanged and reprecipitated on a stainless steel panchet as the sulfide was dried and counted. Details in Moser and Voigt (ref. 1).

(ii) Liquid aliquot scintillation-counting. A 0.5 ml aliquot of the saturated solution was diluted and transferred to the counting tube with a known volume of benzene.

The 0.28 MeV gamma radiation was counted. Error due to radiation adsorbed by the benzene and water was shown to be less than one percent.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. Reduced from a mercury nitrate sample. Half-life is 47 days.

(2) Toluene. Research grade, used without further purification.

ESTIMATED ERROR:

See random error reported by authors with concentration values above.

REFERENCES:

1. Moser, H. C.; Voigt, A. F. *USAEC Report* 1957, *ISC-892*, 65 pp.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) Methylbenzene or Toluene; C_7H_8; [108-88-3]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 273.15 - 308.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
0	273.15	3.1 ± 0.3	3.2	3.5
15	288.15	6.5 ± 0.1	6.9	7.5
20	293.15	9.7 ± 0.6	10.3	11.2
25	298.15	12.0 ± 0.1	12.8	13.9
30	303.15	16.1 ± 0.3	17.3	18.8
35	308.15	19.8 ± 0.9	21.4	23.2

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (16.034 \pm .538)\log(T/\mathrm{K}) - 45.567$$

for the 273.15 to 308.15 temperature interval.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A radioactive tracer method was used. A high activity sample of mercury-203 nitrate was added to mercury(II) nitrate, reduced to metallic mercury by hypophosphorous acid, coagulated into a drop, washed and dried.

The mercury and solvent were shaken continuously in 25 ml glass stoppered flasks in a thermostat for 24 hours. Aliquots of the equilibrated solution were counted by a conventional single channel scintilation counter. The window width was set to count only the photopeak at 279 kev. The solubility values were the average of at least six determinations over a three day period.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. The isotope decays by emission of a beta particle at an energy of 210 kev, accompanied by a gamma ray of 279 kev. The isotope half-life is 47 days.

(2) Toluene. Phillips Petroleum Co. Research Grade, used as received.

ESTIMATED ERROR:

δT/K = ±0.1; See random error reported by authors with concentration values above.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) 1,2-Dimethylbenzene or *o*-Xylene; C_8H_{10}; [95-47-6]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 273.15 - 308.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
0	273.15	2.6 ± 0.3	3.1	2.9
20	293.15	9.3 ± 0.1	11.2	10.6
25	298.15	12.0 ± 0.3	14.5	13.7
30	303.15	15.5 ± 0.5	18.9	17.8
35	308.15	21.4 ± 1.7	26.2	24.7

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (17.635 \pm .316)\log(T/K) - 49.473$$

for the 273.15 to 308.15 temperature interval.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A radioactive tracer method was used. A high activity sample of mercury-203 nitrate was added to mercury(II) nitrate, reduced to metallic mercury by hypophosphorous acid, coagulated into a drop, washed and dried.

The mercury and solvent were shaken continuously in 25 ml glass stoppered flasks in a thermostat for 24 hours. Aliquots of the equilibrated solution were counted by a conventional single channel scintillation counter. The window width was set to count only the photopeak at 279 kev. The solubility values were the average of at least six determinations over a three day period.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. The isotope decays by emission of a beta particle at an energy of 210 kev, accompanied by a gamma ray of 279 kev. The isotope half-life is 47 days.

(2) 1,2-Dimethylbenzene. Phillips Petroleum Co. Research Grade, used as received.

ESTIMATED ERROR:

δT/K = ±0.1; See random error reported by authors with concentration values above.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) (1-methylethyl)Benzene or *Iso*propylbenzene; C_9H_{12}; [98-82-8]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 273.15 - 308.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
0	273.15	2.7 ± 0.1	3.7	3.1
20	293.15	8.5 ± 0.2	11.9	9.9
25	298.15	10.6 ± 0.3	14.9	12.4
30	303.15	13.7 ± 0.3	19.3	16.1
35	308.15	18.0 ± 1.3	25.5	21.2

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (15.957 \pm .235)\log(T/K) - 45.307$$

for the 273.15 to 308.15 temperature interval.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A radioactive tracer method was used. A high activity sample of mercury-203 nitrate was added to mercury(II) nitrate, reduced to metallic mercury by hypophosphorous acid, coagulated into a drop, washed and dried.

The mercury and solvent were shaken continuously in 25 ml glass stoppered flasks in a thermostat for 24 hours. Aliquots of the equilibrated solution were counted by a conventional single channel scintilation counter. The window width was set to count only the photopeak at 279 kev. The solubility values were the average of at least six determinations over a three day period.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. The isotope decays by emission of a beta particle at an energy of 210 kev, accompanied by a gamma ray of 279 kev. The isotope half-life is 47 days.

(2) *Iso*propylbenzene. Phillips Petroleum Co. Research Grade, used as received.

ESTIMATED ERROR:

δT/K = ±0.1; See random error reported by authors with concentration values above.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]; Mercury-203; ^{203}Hg; [13982-78-0]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) (2-methylpropyl)Benzene or *t*-Butylbenzene; $C_{10}H_{14}$; [538-93-2]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 273.15 - 313.15	S. H. Johnson M. Iwamoto H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility		
t/°C	T/K[a]	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction[a] $10^7 x_1$	Molality[a] $10^6 m_1$/mol kg^{-1}
0	273.15	2.1 ± 0.1	3.2	2.4
15	288.15	5.5 ± 0.2	8.5	6.3
25	298.15	9.6 ± 0.3	14.9	11.1
30	303.15	12.3 ± 0.9	19.2	14.3
35	308.15	15.1 ± 0.5	23.7	17.7
40	313.15	18.6 ± 1.0	29.4	21.9

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (16.689 \pm .388)\log(T/\mathrm{K}) - 47.140$$

for the 273.15 to 313.15 temperature interval.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A radioactive tracer method was used. A high activity sample of mercury-203 nitrate was added to mercury(II) nitrate, reduced to metallic mercury by hypophosphorous acid, coagulated into a drop, washed and dried.

The mercury and solvent were shaken continuously in 25 ml glass stoppered flasks in a thermostat for 24 hours. Aliquots of the equilibrated solution were counted by a conventional single channel scintillation counter. The window width was set to count only the photopeak at 279 kev. The solubility values were the average of at least six determinations over a three day period.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury and Mercury-203. The isotope decays by emission of a beta particle at an energy of 210 kev, accompanied by a gamma ray of 279 kev. The isotope half-life is 47 days.

(2) *t*-Butylbenzene. Phillips Petroleum Co. Research Grade, used as received.

ESTIMATED ERROR:

δT/K = ±0.1; See random error reported by authors with concentration values above.

REFERENCES: