COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1985, August

CRITICAL EVALUATION:

An Evaluation of the Solubility of Mercury in Nitrobenzene at 298.15 K and 0.1 MPa.

In 1908 Christoff (ref. 1) showed that dissolved mercury could be detected in nitrobenzene. There are two modern reports of the solubility of mercury in nitrobenzene at 298.15 K. Both (ref. 2 and 3) are from the laboratory of A. F. Voigt. One value (ref. 2) was determined directly by a radioactive tracer method, the other (ref. 3) was by a distribution method. The two results are within experimental error of each other. Arguments can be made that the distribution method is more uncertain than the direct radioactive tracer method, but here we treat the two equal and average the results to obtain a tentative value of solubility.

T/K	Mercury Solubility			Method/ Reference
	Concentration $10^6 c_1$/mol dm^{-3}	Mole Fraction $10^7 x_1$	Molality $10^6 m_1$/mol kg^{-1}	
298.15	9.3 ± 0.7	9.6	7.8	Tracer/ref. 2
	8.8	9.0	7.3	Distribution/ ref. 3
	9.1	9.3	7.6	Average (tentative value)

REFERENCES:

1. Christoff, A. *Z. Phys. Chem.* 1908, *63*, 346.

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

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

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] Mercury-203; ^{203}Hg; [13982-78-0] (2) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]	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	9.3 ± 0.7	9.6	7.8

[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 Aliquotes of the liquid were withdrawn periodically for up to two weeks and the Hg concentration determined radiochemically.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) Nitrobenzene. Baker Chemical Co. Purified Grade; 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) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]	Klehr, E. H.; Voigt, A. F. *Radioisot. Phys. Sci. Ind., Proc. Conf., Copenhagen* 1960, *1*, 517 - 29 (Pub. 1962).
VARIABLES:	PREPARED BY:
T/K = 298.15	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}
25	298.15	8.8	9.0	7.3

[a]Calculated by compilers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Indirect Method. The distribution coefficient between nitrobenzene and water was measured by a radioactive tracer method. The solubility in nitrobenzene was obtained by multiplying the mercury solubility in water, 3.0 x 10^{-7} mol dm^{-3}, times the distribution coefficient.

Solutions were analyzed by one of two counting techniques. Either the Hg in an aliquot was exchanged, precipitated as HgS on a stainless steel panchet, and counted, or a liquid aliquot was diluted and placed in a scintillation tube for counting.

SOURCE AND PURITY OF MATERIALS:

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

(2) Nitrobenzene. Steam-distilled from dilute sulfuric-nitic acid solution and redistilled.

ESTIMATED ERROR:

REFERENCES:

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