COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] Mercury-203; ^{203}Hg; [13982-78-0] (2) Cyclohexene; C_6H_{10}; [110-83-8]	H. Lawrence Clever Chemistry Department Emory University Atlanta, Georgia 30322 USA 1985, August

CRITICAL EVALUATION:

An Evaluation of the Solubility of Mercury in Cyclohexene.

Only Spencer and Voigt (ref. 1) report measurements of the solubility of mercury in cyclohexene. They report five measurements in the 273.15 to 303.15 K interval. The data are classed as tentative.

The five solubility values were subjected to a linear regression in concentration, mole fraction and molality. The results are in Tables 1 and 2 below.

Table 1. The solubility of mercury in cyclohexene. Least square parameters of 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}	4.9664 ± 0.2723	-48.2391 ± 0.7914	2.4 x 10^{-7}
x_1	2.8777 ± 0.3261	-48.8341 ± 0.9476	2.9 x 10^{-8}
m_1/mol kg^{-1}	5.5816 ± 0.2461	-49.4324 ± 0.7153	2.8 x 10^{-7}

Table 2. The solubility of mercury in cyclohexene. Tentative values of the concentration, mole fraction and molality as a function of temperature at 0.1 MPa and thermodynamic changes.

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	3.1	3.1	3.7
278.15	4.2	4.2	5.1
283.15	5.7	5.7	7.0
288.15	7.7	7.7	9.4
293.15	10.2	10.4	12.6
298.15	13.5	13.7	16.7
303.15	17.6	17.9	22.0
ΔH_1[a]	40.1 ± 0.7	40.6 ± 0.8	41.1 ± 0.6
ΔS_1[b]	41.3 ± 2.3	23.9 ± 2.7	46.4 ± 2.0

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

The solubility of mercury in cyclohexene is larger than in the other six carbon substances: hexane, cyclohexane and benzene. For example the mole fraction solubility at 298.15 K in cyclohexene is 40 percent larger than in hexane, 7 percent larger than in cyclohexane, and 23 percent larger than in benzene.

REFERENCES:

1. 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]	Spencer, J. N.; Voigt, A. F. *J. Phys. Chem.* 1968, *72*, 464 - 470.
(2) Cyclohexene; C_6H_{10}; [110-83-8]	Spencer, J. N. Dissertation, Iowa State University, 1967.
VARIABLES:	PREPARED BY:
T/K = 273.15 - 303.15	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 ± 0.1	3.1	3.7
15	288.15	7.5 ± 0.1	7.5	9.2
20	293.15	10.4 ± 0.3	10.5	12.8
25	298.15	13.3 ± 0.3	13.5	16.5
30	303.15	17.9 ± 1.0	18.3	22.3

[a]Calculated by compilers.

The authors smoothed their data according to the equation:

$$\log x_1 = (17.148 \pm .230)\log(T/\mathrm{K}) - 48.294$$

for the 273.15 to 303.15 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) Cyclohexene. Phillips Petroleum Co., 99.34 mol %. Matheson Coleman and Bell, 99.9 mol %. Both washed with aqueous NaOH, dried, refluxed over and distilled from sodium stabilized with hydroquinone to prevent peroxide formation.

ESTIMATED ERROR:

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