COMPONENTS:	EVALUATOR:
(1) Mercury; Hg; [7439-97-6] (2) Other Elements	H. Lawrence Clever Chemistry Department Emory University Atlanta, Geogia 30322 USA 1986, June

CRITICAL EVALUATION:

The Solubility of Mercury in Other Elements.

The solubility data in this section includes both mercury(l) + element(l) and mercury(l) + element(s) systems. In only one case, mercury + gallium (ref. 8), was phase equilibrium measured and the solubility of the element in mercury determined too. The liquid + liquid systems are mercury + phosphorous and mercury + gallium. The other systems are liquid solute + solid solution systems. The mercury + zinc and the mercury + tin systems were studied by emf methods at room temperature with the solid an electrode in contact with aqueous solution. The mercury + sodium and mercury + potassium systems were studied by an electrical resistance technique. The other systems were studied by an x-ray method. In the x-ray method various amounts of mercury are heated with the element. The element lattice parameter is measured before and after the treatment. If the lattice parameter changes by less than 0.001×10^{-10} m the solubility of mercury in the solid is considered negligible. If the lattice parameter changes, the mercury composition at which the change stops is considered the solubility. There are no confirming papers in these studies except for the mercury + silver and mercury + gold systems. The data are classed tentative.

The papers in this section were found by a *Chem. Abstr.* search under the heading "Mercury, properties, soly of". Papers listed under "Mercury, properties, systems", which may contain additional data, were not covered. Papers from this heading can be found in *Solubility Series Vol. 25 Metals in Mercury* edited by Galus, Guminski and Hirayama.

The table below lists the systems for which data are known from our literature search. Given in the table is the element in order of its atomic number, the temperature and mole fraction solubility of mercury in the element, and the reference number.

Element	Temperature T/K	Mercury Solubility Mole Fraction, x_1	Reference
Liquid + Liquid Systems			
Phosphorus; P	298	0.000176	7
Gallium; Ga	308	0.020	8
	373	0.032	
Liquid + Solid Systems			
Sodium; Na	296	0.00045	13
	333	0.00006	
Silicon; Si + phosphorus; P	1473	-	12
Potassium; K	270	-	13
	318	-	
Manganese; Mn	773	0.004	11
Zinc; Zn	293	0.020	10
Silver; Ag	373	0.364	3
	549	0.372	
Tin; Sn	298	0.075	4
Tellurium; Te	573	0.014	9
	713	0.003	
Platinum; Pt	493	0.01	11
	528	0.153	
	713	0.183	
	903	0.226	
Gold; Au	477	0.168	6
	583	0.182	
	693	0.195	

Jangg and Lugscheider (ref. 11) found negligible mercury solubility in nineteen solid elements by the x-ray method. A small solubility below their limit of detection may exist. The elements are aluminum, titanium, vanadium, chromium, iron, cobalt, nickel, zirconium, niobium, molybdenum, ruthenium, rhodium, tantalum, tungsten, rhenium, osmium, iridium, thorium, and uranium. More information is summarized on a data sheet.

Some further comments about the systems above.

Mercury + Gallium (ref. 8). The mercury rich phase in equilibrium with the gallium rich phase contains 0.036 and 0.039 mole fraction gallium at 308 and 373 K, respectively.

Mercury + Silicon + Phosphorous (ref. 12). Silicon at 1473 K was doped with phosphorus. The mercury solubility is a function of the phosphorus concentration. We estimate from the abstract data that the mole fraction of mercury increases from 1×10^{-8} to 2×10^{-8} as the phosphorous mole fraction increases from 4×10^{-10} to 8×10^{-5}.

Mercury + Potassium (ref. 13). The authors were unable to obtain reproducible data. The solubility is less than in sodium. There were indications the solubility decreased as the temperature increased from 270 to 318 K.

Mercury + Silver. Earlier studies (ref. 1, 14, 15) give appreciably lower results than the results of Day and Mathewson (ref. 3) presented here. It is likely the earlier studies were carried out without proper precautions to prevent loss of the volatile mercury.

Mercury + Platinum (ref. 11). An abrupt increase in the solubility at about 523 K corresponds to a peritechtic reaction in the system.

Mercury + Gold. Mercury + gold solubility data are reported in at least five papers (ref. 1, 2, 3, 5, and 6). Data sheets were prepared from references 3 and 6. The data in the table above are from ref. 6. The papers agree that an alpha + beta = alpha + liquid transformation occurs at 693 K, which is the temperature of the maximum mercury solubility.

REFERENCES:

1. Stenbeck, S. *Z. anorg. Chem.* 1933, *45*, 16.
2. Zakharova, M. I. *Zh. Tekhn. Fiz.* 1937, *7*, 171.
3. Day, H. M.; Mathewson, C. H. *Trans. Am. Inst. Min. Metall. Pet. Eng.* 1938, *128*, 261.
4. Haring, M. M.; White, J. C. *Trans. Electrochem. Soc.* 1938, *73*, 211.
5. Plaksin, I. N. *Izv. Sekt. Fiz. - Khim. Analiza* 1938, *10*, 129.
6. Owen, E. A.; Roberts, E. A. O. *J. Inst. Metals* 1945, *71*, 213.
7. Rotatiu, G. J.; Schramke, E.; Gilman, T. S.; Hildebrand, J. H. *J. Am. Chem. Soc.* 1951, *73*, 2527.
8. Spicer, W. M.; Bartholomay, H. W. *J. Am. Chem. Soc.* 1951, *73*, 868.
9. Abdullaev, G. B.; Movlanov, Sh.; Shakhtakhtinskii, M. G.; Kuliev, A. A. *Izv. Akad. Nauk Tadzh. SSR, Otd. Geol. - Khim., Tekhn. Nauk* 1963, *(2)*, 13; *Chem. Abstr.* 1964, *61*, 1345e.
10. Bianchini, A.; Pozzoli, S. *Metall. Ital.* 1968, *60*, 495.
11. Jangg, G.; Lugscheider, E. *Monatsh. Chem.* 1973, *104*, 1269.
12. Arifov, A. A.; Rakhimbaev, D.; Islamov, D. U. *Legir. Poluprovochu.* 1975, 62; *Chem. Abstr.* 1975, *83*, 121536b.
13. Aleksandrov, B. N.; Dalakova, N. V. *Izv. Akad. Nauk SSSR, Met.* 1982, *(1)*, 133; *Russ. Metall.(Engl. Transl.)*, 1982, *(1)*, 117.
14. Preston, D. G. *J. Inst. Metals* 1931, *46*, 522.
15. Murphy, A. J. *J. Inst. Metals.* 1931, *46*, 507.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Phosphorous; P_4; [7723-14-0]	Rotatiu, G. J.; Schramke, E.; Gilman, T. S.; Hildebrand, J. H. *J. Am. Chem. Soc.* 1951, *73*, 2527 - 8.
VARIABLES: T/K = 298.15	PREPARED BY: H. L. Clever M. Iwamoto

EXPERIMENTAL VALUES:

Temperature t/°C	Temperature T/K	Equilibration Time t/m	Solubility mg Hg in 2 cm^3 P_4
Water saturated phosphorus			
25.0	298.15	12	0.8
		10	1.0
		15	1.0
		20	1.0
		30	1.0
		10	1.11[a]
		10	0.90[a]
Dry phosphorus			
25.0	298.15	17	1.45
		17	1.25
		17	0.74
		17	1.28

[a]These two runs were made using a microbalance. Their average was used along with a phosphorus density of 1.761 g cm^{-3} (ref. 1) to calculate the solubility in the following units:
0.285 mg g^{-1} (1.42 x 10^{-3} mol kg^{-1})
1.76 x 10^{-4} mol mol^{-1} (mole fraction, x_1)
3.7 x 10^{-5} cm^3 cm^{-3}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

About 2 - 4 g of carefully weighed Hg was placed in a J shaped 20 x 1.0 cm tube. Air free water was added and 2 cm^3 of liquid white phosphorus pipetted was in under the water surface at 44°C. The tubes were rocked slowly at 25.0°C.

The water and phosphorus saturated with Hg were poured out. Last amounts were removed by several washings with specially purified CS_2 and CH_3OH. The Hg was dried and reweighed.

For the dry phosphorus experiments, the water was removed by alternately melting the phosphorus and evaporation.

The solubility of water in phosphorus was reported in a later paper (ref. 2).

Experiments to 373 K indicated only a slight increase in solubility with temperature.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. No information.

(2) Phosphorus. Commercial c.p. white phosphorus. Cleaned by melting under a dilute H_2SO_4 - K_2CrO_4 mixture; allowed to stand several days in the dark. The clear colorless liquid phosphorus was used.

ESTIMATED ERROR:

δT/K = ±0.1
$\delta c_1/c_1$ = ±0.25

REFERENCES:

1. Dobinski, S.
Z. Phys. 1933, *83*, 129.

2. Rotariu, G. J.; Haycock, E. W.; Hildebrand, J. H.
J. Am. Chem. Soc. 1952, *74*, 3165.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Gallium; Ga; [7440-55-3]	Spicer, W. M.; Bartholomay, H. W. *J. Am. Chem. Soc.* 1951, *73*, 868 - 9.
VARIABLES:	PREPARED BY:
T/K = 308.15, 373.15	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Rich Layer		Gallium Rich Layer	
t/°C	T/K	Mercury weight %	Gallium weight %	Mercury weight %	Gallium weight %
35	308.15	98.8	1.2	6.0	94.0
		98.6	1.4	6.7	93.3
		98.8	1.2[a]	6.6	93.4[a]
		98.7	1.3[a]	6.7	93.3[a]
		98.7 avg.	(3.6 atom %)	6.5 avg. (2.0 atom %)	
100	373.15	98.6	1.4	8.5	91.5
		98.6	1.4	8.5	91.5
		98.6	1.4	8.8	91.2
		98.6 avg.	(3.9 atom %)	8.6 avg. (3.2 atom %)	

[a]Equilibtated for two months.

ADDED NOTE: See Hirayama, C.; Galus, Z.; Guminski, C. *Metals in Mercury, Solubility Series Volume 25*, Pergamon Press Ltd., Oxford and New York, 1986, pp. 93 - 102 for a complete set of data and evaluation of the Hg + Ga system.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Weighed portions of the metals (*ca.* 3.5 g Ga and 7.0 g Hg) were placed in a glass tube under acidified gallium chloride solution to protect the gallium surface from oxidation.

Samples were equilibrated by frequent shaking in a thermostat. The two phases were sampled, weighed and the gallium was removed by dissolution in HCl. The remaining mercury was dried and weighed.

Two samples were allowed to stand for two months before analysis to show separation was complete.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Purified by washing with nitric acid and water, and then dried and distilled.

(2) Gallium. Aluminum Co. of America. Stated purity of 99.95% and confirmed by spectrographic analysis.

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]	Jangg, G.; Lugscheider, E.
(2) Metals listed below.	*Monatsh. Chem.* 1973, *104*, 1269 - 75.

EXPERIMENTAL VALUES:

Mercury has negligible solubility at the temperature of heat treatment in the metals below.

Atomic Number	Name	Symbol	Registry Number	Heat Treatment Temperature t/°C	T/K
13	Aluminium	Al	[7429-90-5]	260	533.15
22	Titanium	Ti	[7440-32-6]	280, 400 to 500	553.15
23	Vanadium	V	[7440-62-2]	800	1073.15
24	Chromium	Cr	[7440-47-3]	400	673.15
25	Iron	Fe	[7439-89-6]	800	1073.15
27	Cobalt	Co	[7440-48-4]	800	1073.15
28	Nickel	Ni	[7440-02-0]	260	533.15
40	Zirconium	Zr	[7440-67-7]	280, 400 to 500	553.15
41	Niobium	Nb	[7440-03-1]	800	1073.15
42	Molybdenum	Mo	[7439-98-7]	800	1073.15
44	Ruthenium	Ru	[7440-18-8]	800	1073.15
45	Rhodium	Rh	[7440-16-6]	800	1073.15
73	Tantalum	Ta	[7440-25-7]	800	1073.15
74	Tungsten	W	[7440-33-7]	800	1073.15
75	Rhenium	Re	[7440-15-5]	(100 to 500)[a]	373.15
76	Osmium	Os	[7440-04-2]	800	1073.15
77	Iridium	Ir	[7439-88-5]	800	1073.15
90	Thorium	Th	[7440-29-1]	800	1073.15
92	Uranium	U	[7440-61-1]	800	1073.15

[a]No evidence of compound formation with mercury over the temperature interval.

The elements above, which showed a negligible solubility for mercury, are shown below in an abbreviated periodic table.

														13 Al			
22 Ti	23 V	24 Cr									26 Fe	27 Co	28 Ni				
40 Zr	41 Nb	42 Mo									44 Ru	45 Rh					
	73 Ta	74 W	75 Re	76 Os	77 Ir												
90 Th		92 U															

The authors observed measurable solubility of mercruy in manganese, atomic number 25, and platinum, atomic number 78. See following data sheets.

METHOD/APPARATUS/PROCEDURE:

Between 0.2 and 0.3 g of high purity powdered samples of each metal above was heated with 5 to 10 percent of its weight of mercury in a 2 mm inside diameter quartz tube for periods of up to 350 hours. The metal lattice parameter of each metal was measured by an x-ray method before and after the heating with mercury. If the lattice parameter changed less than 0.001 Angstrom the authors assumed negligible solubility of mercury in the metal.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Sodium; Na; [7440-23-5] Potassium; K; [7440-09-7]	Aleksandrov, B. N.; Dalakova, N. V. *Izv. Akad. Nauk SSSR, Met.* 1982, *(1)*, 133 - 40; *Russ. Metall. (Engl. Transl.)* 1982, *(1)*, 117 - 21.
VARIABLES:	PREPARED BY:
T/K = 270 - 333	H. L. Clever

EXPERIMENTAL VALUES:

Element	Temperature		Mercury Solubility
	t/°C	T/K	Atom %
Sodium	23	296	0.045
	60	333	0.006
Potassium	-3	270	Non-reproducible results. Evidence solubility decreased at T increased.
	45	318	

Distribution studies at 700°C (973 K) for sodium and 600°C (873 K) for potassium indicated negligible solubility.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Solubilities were determined by a residual electrical resistance method. Samples of 7 to 8 g of alloy were prepared in steel containers under a helium atmosphere. They were annealed for a number of days.

The alloy was extruded with a press to 150 - 400 mm by 3 mm diameter wire. The resistance was measured at room and liquid helium temperatures. Details of the method are in an earlier paper (ref. 1).

The solubility of about another 12 elements was determined.

SOURCE AND PURITY OF MATERIALS:

ESTIMATED ERROR:

REFERENCES:

1. Aleksandrov, B. N. *et al.* *Fiz. Nizk. Temp. (Kiev)* 1976, *2*, 1432.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Phosphorous; P; [7723-14-0] (3) Silicon; Si; [7440-21-3]	Arifov, A. A.; Rakhimbaev, D.; Islamov, D. U. *Legir. Poluprovodu.* 1975, 62 - 4; *Chem. Abstr.* 1975, *83*, 121536b.
VARIABLES:	PREPARED BY:
T/K = 1473	H. L. Clever

EXPERIMENTAL VALUES:

The paper was not available. The information is from the abstract. Silicon at 1200 °C and 1 x 10^{-4} torr was doped with 2 x 10^{13} to 4 x 10^{18} atom cm^{-3} of phosphorous. The mercury concentration (solubility) is a function of the phosphorus concentration and varies from 5 x 10^{13} to 1 x 10^{15} atom cm^{-3}.

The compiler estimated a silicon density of 2.3 g cm^{-3} at 1473 K from crytallographic data (R. O. A. Hall *Acta Crytl.* 1961, *14*, 1004) to calculate mole fractions. Thus, as the phosphorus mole fraction increases from 4 x 10^{-10} to 8 x 10^{-5} the mercury mole fraction (solubility) increases from 1 x 10^{-9} to 2 x 10^{-8}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Manganese; Mn; [7439-96-5]	Jangg, G.; Lugscheider, E. *Monatsh. Chem.* 1973, *104*, 1269 - 75.
VARIABLES: T/K = 773.15	**PREPARED BY:** H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Solubility[a]
t/°C	T/K	Atom % Hg
500	773.15	0.3 - 0.5

[a]Compiler assumes this is the same as $10^2 x_1$, mole fraction.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Between 0.2 and 0.3 g of highly purified metal powder was placed in a 2 mm inside diameter quartz tube. Mercury was added. The tube was evacuated, sealed and heat treated for up to 350 hours at the stated temperature.

The metal lattice parameter was determined by x-ray before and after heating with mercury. A change in lattice parameter of 0.001 or less was interpreted as a negligible solubility of mercury in the metal. There was a direct relationship between the mercury solubility and the lattice parameter.

SOURCE AND PURITY OF MATERIALS:

Stated to be high purity metals.

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6]	Bianchini, A.; Pozzoli, S.
(2) Zinc; Zn; [7440-66-6]	*Metall. Ital.* 1968, *60*, 495 - 500.
VARIABLES:	PREPARED BY:
T/K = 293	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility	
t/°C	T/K	weight %	atom %
20	293	6.0	2.0

The compiler calculated the atom % solubility and added the Kelvin temperature.

The results were in graphs which could be read to within 0.2 weight %.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The electrolytic behavior of amalgamated zinc was studied in seven aqueous electrolytes. The mercury content was varried up to 10 wt %. The potential became more negative up to 6 wt % mercury. Beyond 6 wt % mercury the potential remained constant. This suggests the limit of mercury solubility in zinc is 6 weight percent which is in agree ment with an (unpublished) x-ray study.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury.

(2) Zinc. Impurities were Cd 15, Pd 0.8, Cu 0.9, and Fe 0.5 parts per million. Some tests were made on 99.9999 % zinc.

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Silver; Ag; [7440-22-4]	Day, H. M.; Mathewson, C. H. *Trans. Am. Inst. Min. Metall. Eng.* 1938, *128*, 261 - 81.
VARIABLES:	PREPARED BY:
T/K = 373.15 - 549.15	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility	
t/°C	T/K	Weight %	Atom %
100	373.15	51.6	36.4
186	459.15	-	-
245	513.15	-	-
276	549.15	52.4	37.2

The measurements at 459.15 and 513.15 K are shown on a graph, but are not tabulated. The four values fall on a smooth curve over the 373.15 to 549.15 K temperature interval.

The compiler calculated the atom % mercury and added the Kelvin temperatures.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The system was studied by a back-reflection method of x-ray analysis.

Particular attention was paid to sample preparation and annealing to avoid loss of the volatile mercury.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Redistilled. Tested to show it contained less than 0.001 % total Ag and Au.

(2) Silver. US Metals Refining Co. Analysed 99.993 % silver. Sample tested for Au, Cu, Fe, Pb, Bi, Se, Te, Sn, Ni, Mn, and Mg. Results in table in paper.

ESTIMATED ERROR:

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Tin; Sn; [7440-31-5]	Haring, M. M.; White, J. C. *Trans. Electrochem. Soc.* 1938, *73*, 211 - 21.
VARIABLES:	PREPARED BY:
T/K = 298.15	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Mole Fraction
t/°C	T/K	x_1
25.00	298.15	0.075

The authors report the Sn + Hg solid to be 0.925 mole fraction tin.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A careful emf study of tin amalgams. The solubility of mercury in tin was calculated assuming the Nernst equation was valid for the 1.0 millivolt difference observed between tin and its saturated amalgam.

SOURCE AND PURITY OF MATERIALS:

ESTIMATED ERROR:

δT/K = $\pm$0.02

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Tellurium; Te; [13494-80-9]	Abdullaev, G. B.; Movlanov, Sh.; Shakhtaktinskii, M. G.; Kuliev, A. A. *Izv. Akad. Nauk Tadzh. SSR, Otd. Geol. - Khim. i Tekhn. Nauk* 1963, *(2)*, 13 - 22. *Chem. Abstr.* 1964, *61*, 1345e.
VARIABLES:	PREPARED BY:
T/K = 543 - 713	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility	
t/°C	T/K	c_1/atom cm^{-3}	Atom Fraction
270	543	-	-
300	573	4×10^{20}	0.014
440	713	1×10^{20}	0.003

The atom fractions were calculated by the compiler using the 293 K Handbook density of tellurium.

The paper was not available. The information is from the abstract. The solubility was measured from 543 to 713 K. Only the maximum value at 573 K and the minimum value at 713 K were given in the abstract. The authors state that HgTe is formed in the system. The solubility of mercury is smaller than the solubility of selenium which is also reported in the paper. There is a statement in the abstract that the saturation at 77 K is 0.1 % mercury. The value would represent an atom fraction of 0.0006.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Platinum; Pt; [7440-06-4]	Jangg, G.; Lugscheider, E. *Monatsh. Chem.* 1973, *104*, 1269 - 75.
VARIABLES:	PREPARED BY:
T/K = 373.15 - 903.15	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Solubility[a]
t/°C	T/K	Atom % Hg
100	373.15	0
200	473.15	0.2
220	493.15	1.0
255	528.15	15.3
307	580.15	16.1
367	640.15	16.5
395	668.15	18.5
440	713.15	18.1
482	755.15	18.7
540	813.15	18.9
630	903.15	22.6

[a]Compiler assumes this is the same as $10^2 x_1$, mole fraction.

The abrupt increase in solubility at about 250°C corresponds to a peritectic reaction in the Pt-Hg system.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Between 0.2 and 0.3 g of highly purified metal powder was placed in a 2 mm inside diameter quartz tube. Mercury was added. The tube was evacuated, sealed and heat treated for up to 350 hours at the stated temperature. The metal lattice parameter was determined by x-ray before and after heating with mercury. A change in lattice parameter of 0.001 or less was interpreted as a negligible solubility of mercury in the metal. There was a direct relationship between the mercury solubility and the lattice parameter.	Stated to be high purity metals. ESTIMATED ERROR: REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Gold; Au; [7440-57-5]	Day, H. M.; Mathewson, C. H. *Trans. Am. Inst. Min. Metall. Eng.* 1938, *128*, 261 - 81.
VARIABLES:	PREPARED BY:
T/K = 373.15 - 689.15	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility	
t/°C	T/K	Weight %	Atom %
100	373.15	17.2	16.9
186	459.15	16.1	15.8
245	518.15	16.0	15.7
300	573.15	16.3	16.0
320	593.15	17.1	16.8
390	663.15	18.5	18.1
416	689.15	18.7	18.4

The authors believe the inflection in the the solubility curve at about 603 K is real.

The compiler calculated the atom % mercury and added the Kelvin temperatures.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The system was studied by a back-reflection method of x-ray analysis. Particular attention was paid to sample preparation and annealing to avoid loss of the volatile mercury.	(1) Mercury. Redistilled. Tested to show it contained less than 0.001 % total Ag and Au. (2) Gold. Source not given. Contained unmeasurable trace of silver. No other impurities detected.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Mercury; Hg; [7439-97-6] (2) Gold; Au; [7440-57-5]	Owen, E. A.; Roberts, E. A. O. *J. Inst. Metals* 1945, *71*, 213 - 53.
VARIABLES:	**PREPARED BY:**
T/K = 477 - 693	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mercury Solubility
t/°C	T/K	Atom %
204	477	16.8
310	583	18.2
420	693	19.5 (max)

The compiler added the Kelvin temperatures.

The transformation

(alpha + beta) = (alpha + liquid)

occurs at 693 K, the temperature of the maximum solubility.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The alpha phase boundry of the Hg + Au system was determined by the x-ray method.

Alloys of 17.45 and 19.5 atom % Hg were prepared by heating weighed samples in evacuated silica tubes. Melts were shaken for up to 15 min, then either slow cooled or rapidly quenched. They were tested for homgeneity. Lump annealed for up to seven weeks, powder annealed for up 12 hours at the temperature of the solubility measurement.

SOURCE AND PURITY OF MATERIALS:

(1) Mercury. Source not given. Stated to be 99.99 %.

(2) Gold. Source not given. Stated to be 99.99 %.

ESTIMATED ERROR:

δT/K = $\pm$ (2 - 5)
$\pm$ 1 atom % (authors).

REFERENCES: