COMPONENTS:	EVALUATOR:
Mercury; Hg; [7439-97-6]	Appendix V Second Virial Coefficient of Mercury Vapor

CRITICAL EVALUATION:

Douglas, Ball, and Ginnings evaluated graphically the second virial coefficient of mercury vapor at temperatures of 430, 530, 630, and 730 K. They took into account the molar dissociation energy of Hg_2.

The empirical equation

$$B_{11}/cm^3\ mol^{-1} = 56.4 - 43.82\ exp(655/(T/K))$$

represents the second virial coefficient, B_{11}, in the 373 to 773 K temperature range. Differentiation with respect to temperature gives

$$B'/cm^3\ K^{-1} = dB/dT = (655/(T/K)^2)(56.4 - B).$$

Values of B and B' as a function of temperature are given below.

Temperature t/°C	Temperature T/K	2nd Virial Coefficient $B_{11}/cm^3\ mol^{-1}$	Temperature Coefficient $(dB/dT)/cm^3\ K^{-1}\ mol^{-1}$
100	373.15	-197	1.19
120	393.15	-175	0.98
140	413.15	-158	0.82
160	433.15	-142	0.69
180	453.15	-130	0.59
200	473.15	-118	0.51
220	493.15	-109	0.45
240	513.15	-101	0.39
260	533.15	-93	0.34
280	553.15	-87	0.31
300	573.15	-81	0.27
320	593.15	-76	0.25
340	613.15	-71	0.22
356.58	629.73 (bp)	-68	0.20
360	633.15	-67	0.20
380	653.15	-63	0.18
400	673.15	-60	0.17
420	693.15	-56	0.15
440	713.15	-53	0.14
460	733.15	-51	0.13
480	753.15	-48	0.12
500	773.15	-46	0.11

Mixed second virial coefficients, B_{12}, have been obtained from the solubility of mercury in compressed gases for mercury + argon, + propane, + butane, + methanol, and + acetone. The values are given in the evaluation of the solubility of mercury in compressed gases.

REFERENCES:

Douglas, T. B.; Ball, A. F.; Ginnings, D. C. *J. Res. Nat. Bur. Stand.* 1951, *46*, 334 - 48.