TABLE XIV. HEAT CAPACITY AT CONSTANT PRESSURE AND AT CONSTANT VOLUME, AND THE DILATION TERM[a]—*Continued*

Element	C_p (cal/g-at/deg)	Ref.	$A \times 10^5$ (g-at/cal)	C_v^l (cal/g-at/deg)	$C_v = C_v^l + C_v^e$ (cal/g-at/deg)
55 Cs	7.65	1	4.855	6.55	6.80
56 Ba	6.30	2	0.7510	6.02	6.21
57 La	6.25	7	0.3261	5.49	6.21
58 Ce(γ)	6.48	8	0.1833	5.94	6.46
59 Pr	6.45	7	0.1522	4.87	6.43
60 Nd	6.56	8	0.3340	5.88	6.52
61 Pm	(6.50)[c]	—	(0.2959)[b]	(5.75)[b]	(6.46)[b]
62 Sm	6.95	8, 9	0.2825	6.16	6.91
63 Eu	6.48	7	2.395	(5.98)[b]	6.18
64 Gd	8.72	2	0.1482	(7.97)[b]	8.69
65 Tb	6.92	1	0.3663	6.22	6.87
66 Dy	6.72	1	0.3475	6.01	6.67
67 Ho	6.49	1	0.4349	4.59	6.44
68 Er	6.72	1	0.5464	5.72	6.65
69 Tm	6.45	1, 2	0.6582	4.97	6.37
70 Yb	6.16	7	1.166	5.82	6.03
71 Lu	6.46	6	0.2492	5.70	6.43
72 Hf	6.10	1, 2	0.3047	5.90	6.07
73 Ta	6.07	1, 2	0.5440	5.59	6.01
74 W	5.84	1	0.4120	5.71	5.80
75 Re	6.14	1, 2	0.8267	5.88	6.05
76 Os	5.95	2	(0.4733)[b]	(5.89)[b]	(5.90)[b]
77 Ir	6.10	1	0.7697	5.79	6.02
78 Pt	6.185	1, 2	1.144	5.58	6.05
79 Au	6.065	1, 2	2.058	5.79	5.84
80 Hg	6.68[d]	1	7.138	5.81[d]	5.94
81 Tl	6.29	1, 2	2.907	5.75	5.95
82 Pb	6.39	1	3.478	5.74	5.97
83 Bi	6.20	1	0.6744	6.12	6.12
84 Po	(6.30)[c]	—	(1.710)[b]	(6.09)[b]	(6.10)[b]
87 Fr	(7.60)[c]	—	(5.538)[b]	(6.35)[b]	(6.65)[b]
88 Ra	(6.49)[c]	—	(1.071)[b]	(6.14)[b]	(6.36)[b]
89 Ac	(6.50)[c]	—	(0.6252)[b]	(5.74)[b]	(6.42)[b]
90 Th	6.53	1, 2	0.6797	6.11	6.44
91 Pa	(6.79)[c]	—	(0.2858)[b]	(6.25)[b]	(6.75)[b]
92 U	6.58	1	1.025	5.67	6.45
93 Np	7.02[e]	10	(2.946)[b]	(5.87)[b]	(6.59)[b]
94 Pu	8.50	11	5.816	3.77	7.25

[a] The dilation term, C^d, is given here in terms of a constant A, which is essentially independent of temperature. $C^d = AC_pT$. See text for further discussion.

[b] Estimated value; see text for further discussion.

[c] These data were estimated by Stull and Sinke.[2]

[d] This value corresponds to that of solid mercury at its melting point, 234°K.

[e] This value was obtained by the reviewer from the data given by Evans and Mardon[10] by extrapolation of the high-temperature specific heat from ~325° to 298°K.

REFERENCES TO TABLE XIV

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and since these values appear to be reasonable, the reviewer has included these in Table XIV instead of attempting to make his own estimates.

15. HEAT CAPACITY AT CONSTANT VOLUME AND THE DILATION TERM

The heat capacity at constant volume, C_v, is related to the heat capacity at constant pressure, C_p, by the following expression

$$C_p = C_v + C^d = C_v^l + C_v^e + C^d, \tag{15.1}$$

where $C_v = C_v^l + C_v^e$; C_v^l is the lattice contribution to the heat capacity at constant volume; C_v^e is the electronic contribution to the heat capacity at constant volume; and C^d is the dilation term. C_v^e is given by

$$C_v^e = \gamma T, \tag{15.2}$$

where γ is the electronic specific heat constant listed in Table XIII, and T is the absolute temperature. The dilation term is given by

$$C^d = 9\alpha^2 TV/\chi, \tag{15.3}$$

where α is the linear coefficient of thermal expansion listed in Table VI, V is the atomic volume listed in Table VII, and χ is the isothermal compressibility listed in Table V. The difficulty in using Eq. (15.3) to determine the dilation term is that the coefficient of expansion, the atomic volume, and the compressibility must be known for each temperature at which one wishes to calculate C_v, and these quantities, especially the compressibility, are usually known over a small range of temperature. Fortunately this limitation can be overcome. If Eq. (15.3) is rewritten as

$$C^d = 9\alpha^2 TVC_p^2/\chi C_p^2 \tag{15.4}$$

and letting

$$A = 9\alpha^2 V/\chi C_p^2, \tag{15.5}$$