TABLE VIII. PRIMARY AND SECONDARY FIXED POINTS OF THE INTERNATIONAL PRACTICAL TEMPERATURE SCALE

Element	Temperature		Point[a]	Transformation[b]	Ref.
	(°K)	(°C)			
80 Hg	234.28	−38.87	S	M	1
49 In[c]	429.76[c]	156.61[c]	S	M	2
50 Sn[c]	505.06[c]	231.91[c]	S	M	1, 2
48 Cd[c]	594.18[c]	321.03[c]	S	M	1, 2
82 Pb[d]	600.4[d]	327.3[d]	S	M	1
80 Hg	629.73	356.58	S	B	1
30 Zn[c]	692.655[c]	419.505[c]	P	M	1, 2
16 S	717.75	444.60	P	B	1
13 Al	933.2	660.1	S	M	1
47 Ag	1234.0	960.8	P	M	1
79 Au	1336.2	1063.0	P	M	1
29 Cu	1356	1083	S	M	1
28 Ni	1726	1453	S	M	1
27 Co	1765	1492	S	M	1
46 Pd	1825	1552	S	M	1
78 Pt	2042	1769	S	M	1
45 Rh	2233	1960	S	M	1
77 Ir	2716	2443	S	M	1
74 W	3653	3380	S	M	1

[a] The letter P signifies a primary fixed point, and S a secondary fixed point.

[b] The letter B signifies a boiling point at 1 atm pressure, and M a melting point at 1 atm.

[c] As a result of the 1960 revision of the text of the 1948 international practical temperature scale the melting point of In has been added as a fixed point, and the melting points of Sn, Cd, and Zn have been revised. In addition, Zn has been changed from a secondary fixed point to a primary one.[2] See text for further discussion.

[d] In view of the recent results of McLaren[3] the melting point of lead will probably be revised. McLaren gives 600.576°K (327.426°C) for the melting point of lead.

REFERENCES TO TABLE VIII

1. H. F. Stimson, *J. Res. Natl. Bur. Std.* **42,** 209 (1949).
2. H. F. Stimson, *in* "Temperature, Its Measurement and Control in Science and Industry" (C. M. Herzfeld, ed.), Vol. 3, Part 1, p. 59. Reinhold, New York, 1962.
3. E. H. McLaren, *in* "Temperature, Its Measurement and Control in Science and Industry (C. M. Herzfeld, ed.), Vol. 3, Part 1, p. 185. Reinhold, New York, 1962.

temperature scale to make it agree with the thermodynamic scale; at the antimony point 0.17° must be added; at the silver point 1.13° must be added; and at the gold point 1.48° must be added.[44–47] If these differences continue to increase with increasing temperature at about the same rate as those mentioned above, then one would expect that the international practical temperature scale lies below the thermodynamic temperature scale by as much as 25° at the melting point of tungsten. The changes cited above, or changes of about this order of magnitude, are expected to be made in 1966, thus revising the practical temperature scale upwards from that given in Table VIII. Other changes, which will probably be made in 1966 as a result of the excellent work of McLaren,[48] are the revision of the value for the melting point of lead (see footnote *d* of Table VIII), and the addition of the melting point of bismuth to the list of standards (this value is given in Table IX). A value of 273.15° was used to convert the temperatures from degrees Kelvin to degrees Centigrade or vice versa.

8. MELTING POINT

The melting points of the elements are listed in Table IX and are shown for the elements of the fourth, fifth, and sixth periods of the Periodic Table in Fig. 12, and for the rare-earth metals in Fig. 13a. The melting point and also the atomic volume are the two properties for which the most experimental data are available. For each of these properties experimental data are avilable for 77 elements of the 80 considered in this review.

The variation of the melting point with the atomic number (Fig. 12) is similar to that shown in several of the previous plots (Figs. 1, 3, and 6). The alkali metals and those elements near the end of the fourth, fifth, and sixth periods have low melting points. A maximum melting point occurs in each period for the metals with a s^2d^4 configuration. The minimum near the end of each period occurs at or near the elements having the $s^2p^1d^{10}$ configuration. The anomalous behavior of germanium is probably due to its diamond structure as compared with the more normal behavior of tin and lead, which have metallic structures.

The melting points of the rare earths increase in a smooth manner with increasing atomic number (Fig. 13a). Small deviations from this curve are found for the experimental value of lanthanum, cerium, and

[44] H. Moser, *in* "Temperature, Its Measurement and Control in Science and Industry" (C. M. Herzfeld, ed.), Vol. 3, Part. 1, p. 167. Reinhold, New York, 1962.

[45] Anonymous, *Chem. Eng. News* **41,** No. 2, 39 (1963).

[46] F. G. Brickwedde, *Phys. Today* **16,** No. 5, 24 (1963).

[47] Anonymous, Nature **197,** 1055 (1963).

[48] E. H. McLaren, *in* "Temperature, Its Measurement and Control in Science and Industry" (C. M. Herzfeld, ed.), Vol. 3, Part 1, p. 185. Reinhold, New York, 1962.