REFERENCES TO TABLE IV

1. J. J. Gilvarry, *J. Chem. Phys.* **23**, 1925 (1955); calculated from data given by P. W. Bridgman, *Daedalus* **76**, 71 (1948).
2. P. W. Bridgman, *Daedalus* **76**, 71 (1948).
3. P. W. Bridgman, *Daedalus* **64**, 51 (1929).
4. P. W. Bridgman, *Daedalus* **76**, 9 (1945).
5. P. W. Bridgman, *Daedalus* **84**, 111 (1955).
6. R. I. Beecroft and C. A. Swenson, *Phys. Chem. Solids* **18**, 329 (1961).
7. P. W. Bridgman, *Daedalus* **76**, 89 (1948).
8. P. W. Bridgman, *Daedalus* **77**, 187 (1949).
9. T. W. Richards, *J. Am. Chem. Soc.* **37**, 1643 (1915).
10. P. W. Bridgman, *Daedalus* **62**, 207 (1927).
11. P. W. Bridgman, *Daedalus* **76**, 55 (1948).
12. P. W. Bridgman, *Daedalus* **74**, 21 (1940).
13. H. B. Huntington, *Solid State Phys.* **7**, 213 (1958).
14. P. W. Bridgman, *Daedalus* **74**, 425 (1942).
15. P. W. Bridgman, *Rev. Mod. Phys.* **18**, 23 (1946).
16. P. W. Bridgman, *Phys. Rev.* **57**, 235 (1940).
17. P. W. Bridgman, *Daedalus* **58**, 166 (1923).
18. P. W. Bridgman, *Daedalus* **84**, 131 (1957).
19. N. A. Roughton and N. C. Nash, John Carroll Univ. Rept., AD-285, 626 (Jan., 1963); abstracted in *Solid State Abstr.* **4**, 27 (1963).
20. P. W. Bridgman, *Daedalus* **84**, 1 (1955).
21. P. J. Reddy and S. V. Subrahmanyam, *Nature* **185**, 29 (1960).
22. P. W. Bridgman, *Daedalus* **83**, 1 (1954).
23. F. H. Spedding, J. J. Hanak, and A. H. Daane, *Trans. AIME* **212**, 379 (1958).
24. P. W. Bridgman, *Daedalus* **82**, 83 (1953).
25. J. F. Smith, C. E. Carlson, and F. H. Spedding, *Trans. AIME* **209**, 212 (1957).
26. P. W. Bridgman, *Daedalus* **63**, 347 (1928).
27. F. Birch, *in* "Handbook of Physical Constants" (F. Birch, J. F. Schairer, and H. C. Spicer, eds.), p. 39. Geol. Soc. Am., New York, 1942.
28. P. W. Bridgman, *J. Appl. Phys.* **30**, 214 (1959).
29. Only the first two constants were listed in Gilvarry[1]; the remainder were graciously furnished by J. J. Gilvarry. Further details concerning these fits are given in footnote 8, p. 1926 of Gilvarry.[1]
30. P. W. Bridgman, "Physics of High Pressure," pp. 416–417. Bell, London, 1949.

in general, the more compressible ones. The standard deviation of a fit was taken as an indication of its accuracy. That is, if the two-parameter fit had a lower standard deviation than the three-parameter fit, the two-parameter fit was chosen to represent the data. The fits for the alkali metals were kindly furnished by Dr. J. J. Gilvarry of General Dynamics/Astronautics.

The compressibility constants, the standard deviation of the fit, the pressure range, and references are given in Table IV. Slater[17] has pointed out that the ratio of b/a^2 is approximately equal to 2.5 for most substances, and thus it would appear possible to estimate the b term for those substances for which only a is known. This point is discussed later in Section

24. The relationship of the compressibility constants to the Grüneisen constant is discussed in Section 28. Furthermore, Slater[17] suggested that if the ratio of b/a^2 differed considerably from 2.5, then the compressibility data might be erroneous. By applying Slater's criterion to these data, it is found that one should be suspicious of the values given for arsenic, ruthenium, palladium, silver, γ-cerium, tungsten, iridium, platinum, and uranium. (This point is discussed in more detail in Section 24.) Furthermore, from an analysis of the Grüneisen constant, it was noted that the a and b values for beryllium, manganese, cobalt, rubidium, and zirconium may also be incorrect.

All of the values in Table IV are given as isothermal compressibilities (χ_T). A few of these, however, were calculated from the adiabatic values (χ_S) by using the following relationship:

$$\chi_T = \chi_S + \frac{9\alpha^2 TV}{C_P}, \qquad (6.7)$$

where α is the linear coefficient of expansion (see Table VI), T is the temperature in °K, V is the atomic volume (Table VII) and C_P is the heat capacity at constant pressure. In general the second term on the right-hand side of Eq. (6.7) is quite small, usually slightly less than 1% of the value of χ_S.

Sulfur. In Tables IV and V two different values are given for rhombic sulfur. In Table IV, the values for the a parameters differ by a factor of almost 2. (The χ values in Table V are identical with the a values in Table IV.) The smaller value (55.0) was obtained from single-crystal measurements on orthorhombic ("rhombic") sulfur using Voigt's method to obtain the bulk adiabatic compressibility. This bulk value was converted to the isothermal compressibility by using Eq. (6.7). The larger value was obtained by Bridgman on a crystalline form of sulfur which he stated had been crystallized from a carbon disulfide solution. Usually sulfur obtained in this manner is rhombic sulfur, but since Bridgman did not give further details, one cannot be absolutely certain that his compressibility data listed in Tables IV and V are for rhombic sulfur. For this reason the question mark was placed after the identification of the element and its modification. Since the two compressibilities listed in these tables differ by a factor of almost 2, and since one of the values is known to have been measured on rhombic sulfur, it would appear that Bridgman's data for sulfur are for a modification other than rhombic sulfur.

Nickel. Bridgman's latest results[20] for nickel show a cusp at 10,500 kg/cm² in the $\Delta V/V$ versus pressure curve. By using his data points for pressures less than 10,500 kg/cm², a very unrealistic value for the b param-

[20] P. W. Bridgman, *Daedalus* **77**, 187 (1949).