TABLE XVIII. COMPARISON OF DEBYE TEMPERATURES

| Element | $\theta_{298}^E/\theta_{298}^S$ | $\theta_m^R/\theta_{298}^S$ | $\theta_m^D/\theta_{298}^S$ | $\theta_{298}^I/\theta_{298}^S$ |
|---|---|---|---|---|
| 3 Li | 0.781 | 0.795 | — | 0.683 |
| 4 Be | 1.326 | — | — | — |
| 6 C(d) | 1.073 | — | 0.992 | 0.923 |
| 11 Na | 1.058 | 1.323 | — | 0.736 |
| 12 Mg | 1.100 | 1.082 | — | 0.930 |
| 13 Al | 1.033 | 1.082 | 1.000 | 0.982 |
| 14 Si | 0.832 | — | — | 0.802 |
| 19 K | 0.770 | 1.480 | — | — |
| 20 Ca | 0.904 | — | — | — |
| 21 Sc | — | 0.578 | — | — |
| 22 Ti | 0.982 | 0.900 | 0.711 | — |
| 23 V | 1.010 | — | — | 0.864 |
| 24 Cr | 1.071 | 1.167 | — | 1.355 |
| 25 Mn | 1.270 | — | — | — |
| 26 Fe | 1.249 | 1.324 | 1.121 | 1.083 |
| 27 Co | 1.155 | 1.039 | — | — |
| 28 Ni | 1.284 | 0.794 | 1.174 | 0.988 |
| 29 Cu | 1.071 | 1.084 | 1.032 | 0.994 |
| 31 Ga | 0.371 | — | — | — |
| 32 Ge | 0.802 | — | — | 0.702 |
| 33 As | — | 0.764 | — | — |
| 37 Rb | 0.932 | 1.271 | — | — |
| 38 Sr | 0.899 | 1.155 | — | — |
| 39 Y | 1.168 | 0.939 | — | — |
| 40 Zr | 0.924 | 1.124 | — | — |
| 41 Nb | 1.262 | — | — | — |
| 42 Mo | 1.204 | — | 1.029 | 1.032 |
| 44 Ru | 1.234 | 1.027 | — | 0.822 |
| 45 Rh | 1.366 | 1.126 | — | — |
| 46 Pd | 0.960 | 0.982 | 1.091 | — |
| 47 Ag | 0.964 | 0.991 | 0.946 | 0.955 |
| 48 Cd | 0.724 | 0.715 | — | — |
| 49 In | 0.659 | 1.535 | — | — |
| 50 Sn(w) | 1.082 | 1.235 | — | — |
| 51 Sb | 0.935 | 1.205 | — | — |
| 55 Cs | 0.930 | 1.047 | — | — |
| 56 Ba | 0.836 | 1.147 | — | — |
| 57 La | 1.104 | — | — | — |
| 58 Ce(γ) | 0.978 | — | — | — |
| 59 Pr | 1.043 | — | — | — |
| 60 Nd | 0.993 | — | — | — |
| 62 Sm | 0.912 | — | — | — |
| 64 Gd | 1.116 | — | — | — |
| 65 Tb | 1.095 | — | — | — |



TABLE XVIII. COMPARISON OF DEBYE TEMPERATURES—*Continued*

| Element | $\theta_{298}^E/\theta_{298}^S$ | $\theta_m^R/\theta_{298}^S$ | $\theta_m^D/\theta_{298}^S$ | $\theta_{298}^I/\theta_{298}^S$ |
|---|---|---|---|---|
| 66 Dy | 1.139 | — | — | — |
| 67 Ho | 1.137 | — | — | — |
| 68 Er | 1.172 | — | — | — |
| 72 Hf | 0.850 | — | — | — |
| 73 Ta | 1.142 | 1.013 | 1.200 | — |
| 74 W | 1.186 | 1.151 | 0.994 | — |
| 75 Re | 1.531 | 1.127 | — | — |
| 76 Os | 1.078 | — | — | — |
| 77 Ir | 1.816 | 1.386 | — | — |
| 78 Pt | 1.018 | 1.044 | 1.036 | 0.671 |
| 79 Au | 0.899 | 1.062 | 1.028 | — |
| 80 Hg | 1.815 | 0.402 | — | — |
| 81 Tl | 0.573 | 1.458 | — | — |
| 82 Pb | 0.931 | 1.023 | 1.011 | 0.770 |
| 83 Bi | 0.974 | 0.535 | — | — |
| 90 Th | 1.580 | 1.680 | — | — |
| 94 Pu | 1.011 | — | — | — |

(Section 19). In general, the temperatures range between ~20°K and ~400°K, and thus the $\theta_m^D$ values correspond more closely to $\theta_{298}^S$ than to $\theta_0^S$.

Examination of the data given in Table XVII indicates that the values obtained from several sources are in very good agreement, usually within ±10°K. The $\theta_m^D$ values range from a minimum of 88°K for lead to a maximum of 1860°K for diamond. A comparison of $\theta_m^D$ and $\theta_{298}^S$ values is given in Table XVIII. These data show that two-thirds of the $\theta_m^D$ values lie within ±10% of the corresponding $\theta_{298}^S$ values, and that four-fifths of them lie within ±20%. This represents the best agreement between Debye temperatures measured by different techniques, except for the $\theta_0^S$ and $\theta_0^E$ values. Further examination reveals that $\theta_m^D$ is larger than $\theta_{298}^S$ for two-thirds of the values listed here. From these observations one would conclude that, in general, $\theta_m^D$ is slightly larger than $\theta_{298}^S$.

## 21. DEBYE TEMPERATURE FROM X-RAY INTENSITY DATA

The determination of the Debye temperature from X-ray intensity data is described quite thoroughly by Herbstein[96] and Ibers *et al.*[110] For

[110] J. A. Ibers, D. H. Templeton, B. K. Vainshtein, G. E. Bacon, and K. Lonsdale, *in* "International Tables for X-Ray Crystallography, III, Physical and Chemical Tables," p. 237. Kynoch, Birmingham, England, 1962.