

Kelly 1954; Bradshaw & Pearson 1956), but up till now the information needed to apply the corrections fully has not existed.

We have made a first attempt on this problem by calculating the resistive properties of sodium and potassium under the condition of constant density. We have chosen the density to be that of 0 °K under zero pressure, because all the high-pressure data needed to make such corrections to constant density lie in the range of our high-pressure experiments. It would be most interesting to be able to calculate what the resistive behaviour is for other densities too, but the accuracy of the basic data does not as yet warrant doing this.

The method we have adopted is to calculate from the data on the equation of state of our specimens the pressure required to compress them to the volume that they would occupy at the absolute zero under zero pressure; we call this new pressure  $p'$ . From the same data we also calculate the instantaneous compressibility at  $p'$ . From this information, and from our measured resistance-pressure curves, we are then able to calculate the resistivity and the pressure coefficient of resistivity at pressure  $p'$ ; these we call  $\rho'_i$  and  $(\partial \ln \rho'_i / \partial p)$ . We are of course interested in the temperature dependence of these quantities; in particular, from  $\rho'_i$  we calculate the quantities  $(\partial \ln \rho'_i / \partial \ln T)$  and  $\theta'_G$  as functions of temperature. We convert the values of  $(\partial \ln \rho'_i / \partial p)$  to volume derivatives (using the values calculated for the instantaneous compressibility at  $p'$ ) and plot  $(\partial \ln \rho'_i / \partial \ln V)$  against  $(1 + \partial \ln \rho'_i / \partial \ln T)$  which gives us, according to equation (2), the quantities  $(d \ln K / d \ln V)$  and  $\gamma_R$  appropriate to the density at 0 °K. That the difference between the coefficient evaluated at constant density and at constant pressure can be large is illustrated in figure 3 by the curves showing  $\theta_G$  and  $\theta'_G$  for potassium.

#### APPENDIX B. DATA FOR THE EQUATION OF STATE

We have tabulated in table A 1 the values *we have used* for the equations of state of lithium, sodium and potassium. The data are based on values of specific volume given by: Richards & Brink 1907 (K); Simon & Vohsen 1928 (K); Siegel & Quimby 1938 (Na); Pearson 1954 (Li); Barrett 1956 (Li, Na, K); Basinski & Verdini 1959 (Li, Na); and on values of volume compression given by: Bridgman, 1923 (Na), 1935 (Li, Na, K); Kleppa 1950 (K); Swenson 1955 (Li, Na, K); Nash & Smith 1959 (Li); Beecroft & Swenson 1961 (Na).

We have assumed that the shape of the  $P$ - $V$  curves may be represented by the quadratic expression

$$V_p = V_0[1 + ap + bp^2] \equiv V_0[1 + ap(1 + cp)]. \quad (1A)$$

We have tabulated ' $a$ ' ( $\equiv \beta$ , compressibility) as a function of temperature, and ' $c$ ' ( $\equiv b/a$ ) we have assumed to be independent of temperature. The quantity ' $a$ ' is the value of ' $a$ ' corresponding to the specific volume at 0 °K.

The units of pressure used in this paper are those of the normal atmosphere

$$1 \text{ atm} = 1.033_2 \text{ Kg wt./cm}^2 = 1.013_3 \text{ bar.}$$