# The effect of pressure on electrical resistance

rectly the volume dependence ourpose of these experiments. ime coefficient may, neverthequantity. To compare experisary to be able to measure, or emperature dependence of the herefore, we have made resispressure between 2 and 300 °K ements, we have been able to assium vary with temperature mpressible metal as potassium, dependence at constant presgures 1 and 3).

igan

have already been made on s have been made on rubidium her metals (cf. Lawson 1956). ts have already been published

by which we have made these all therefore give here only a

about 100 cm long and 0.5 mm rmer and measured in either a esistance measurements were f the preparation and mounting

#### iratus

tic calorimeter so that accurate etween about 2 and 300 °K at by Dugdale & Gugan (1960).

#### aratus

assures of up to about 3000 atm ansmitting fluid. Below about that we could generate and in mitting medium. The apparatus men could be varied at fixed 1 to reach thermal equilibrium eriments under almost isothercessary to allow for the change of the bomb temperature during a run. Full details of the apparatus and the technique have been given by Dugdale & Hulbert (1957) and by Dugdale & Gugan (1957).

## 2.4. The absolute resistivities

The absolute resistivities of our different specimens were measured at room temperature. The measurements were made on thick extruded rods of metal in the way described by Dugdale, Gugan & Okumura (1961).

## 3. EXPERIMENTAL RESULTS

The numerical results we give in this paper are smoothed values from our original data. We explain in appendix A how we have obtained the results tabulated. In appendix B we give details of the values we have used for the equations of state of the metals we have studied; we use this information in calculating the resistive properties of our specimens under the conditions of constant density.

We present our results for the different metals in the following sections:  $3\cdot 1$ , potassium;  $3\cdot 2$ , sodium;  $3\cdot 3$ , lithium. In each section we compare our data with those of other observers where these exist.

## 3.1. Potassium

Details of the specimens we have studied are given in table 1.

TABLE 1. DETAILS OF THE POTASSIUM SPECIMENS

$R_{0^{\circ}\mathrm{K}}/R_{273^{\circ}\mathrm{K}}$	comments	source of material
0.124	commercial purity $(\sim 0.5\% \text{ sodium})$	Messrs A. D. Mackay and Co., New York
$7.5 \times 10^{-4}$	— )	
$7.8 \times 10^{-4}$	_ ( '	Mine Safety Appliances
$8 \cdot 2 \times 10^{-4}$	— í (	Ltd., Toronto
$8.5 \times 10^{-4}$	)	
	same stock as K (2) to K (5)	
	$\begin{array}{c} 0.124 \\ \hline 0.124 \\ \hline 7.5 \times 10^{-4} \\ \hline 7.8 \times 10^{-4} \\ 8.2 \times 10^{-4} \\ 8.5 \times 10^{-4} \end{array}$	$\begin{array}{cccc} 0.124 & \text{commercial purity} \\ (\sim 0.5\% \text{ sodium}) \\ 7.5 \times 10^{-4} &\\ 7.8 \times 10^{-4} &\\ 8.2 \times 10^{-4} &\\ 8.5 \times 10^{-4} &\\ & \text{same stock as} \end{array}$

\* The absolute resistivity of a specimen from this stock was  $7 \cdot l_9 \times 10^{-6} \Omega$  cm at 22.0 °C (corrected for residual resistivity). The precision of this result is about 1%. Previous values at this temperature are  $7 \cdot 0_8 \times 10^{-6} \Omega$  cm (Hackspill 1910) and  $7 \cdot 5_7 \times 10^{-6} \Omega$  cm (Guntz & Broniewski 1909). Cf. also MacDonald *et al.* (1956).

#### 3.1.1. The temperature dependence of $\rho_i$

Three specimens were studied in these measurements, namely K (3), K (4) and K (6); K (6) we measured only between about 8 and 20 °K. The results were in satisfactory agreement in the region where they overlapped. The calculated values of  $\rho_i/T$  are given in table 2; the resistivity values have been normalized to our observed value of the absolute resistivity at room temperature (see table 1). The results are illustrated in figure 1.

Several anomalies in the temperature dependence of the resistivity of potassium have been reported: (a) kinks in the resistivity-temperature curve below 20  $^{\circ}$ K

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