THE SPECIMENS

The rubidium specimens were of the form shown in the figure (inset to Fig. 1). The container was of soft glass with platinum electrodes and was filled with rubidium under high vacuum. For most specimens the capillary had an inner diameter of 1 mm. and an approximate length of 5 cm. between the electrodes; for one sample, however, a capillary of 0.1 mm. diameter was used. The use of glass capillaries in pressure experiments is not entirely satisfactory even with materials as plastic as rubidium. Nevertheless because rubidium is such a highly reactive substance this has so far proved the only successful way of mounting a specimen of this element in the apparatus.

We assume that, since the deformation of the glass by the pressure (which acts both internally and externally on the specimen holder) is negligible, we are measuring resistivity directly as a function of pressure. In other words we assume that the dimensions of the specimen, which are determined only by the glass container, do not change appreciably with pressure.

ELECTRICAL MEASUREMENTS

The resistance of the platinum thermometer was measured by means of a potentiometer and the specimen resistance by a galvanometer amplifier (MacDonald 1947).

THE EXPERIMENTAL RESULTS

Measurements were made of electrical resistance over the entire range from helium temperatures to room temperature, in general at three different pressures (approximately 100, 1500, and 2500 atm.). Before the pressure effects are considered, the low pressure behavior of the resistance of rubidium as a function of temperature will be briefly discussed. Fig. 2 shows four examples of this behavior taken from the present measurements.*

Sample 1 is a rubidium specimen contained in a capillary of 0.1 mm. bore. The residual resistivity ratio $R_{0°\mathrm{K.}}/R_{273°\mathrm{K.}}$ was estimated from helium temperature measurements to be 1.3×10^{-2}.

Sample 2 was from the same batch of rubidium measured this time in a capillary of 1 mm. bore; its residual resistance ratio was 1×10^{-2}.

Sample 3 was prepared from rubidium chloride to be especially pure but in fact it was heavily oxidized. Its residual resistance ratio estimated from measurements down to nitrogen temperature only was $R_{0°\mathrm{K.}}/R_{260°\mathrm{K.}} = 3.8\times10^{-2}$. (We use R_{260} for reasons explained below.) It was contained in a 1 mm. bore tube.

Sample 4 was a further specimen in a wide bore tube (1 mm.) with a residual resistance ratio of just less than 1×10^{-2}.

(The material for all these samples except that of number 3 was obtained from Messrs. A. D. Mackay, New York.)

It is at once evident that the resistive behavior, particularly above about 200° K., varies from specimen to specimen.

*These measurements were made, for convenience, at helium cylinder pressure (about 100 atm.). This pressure changes the resistance by rather less than 1% of its value.