The rubidium data

Figure 5 shows the least squares curve for the combined Br II and Br III data of rubidium. It is immediately evident that the two sets seem to form a single set with the Br II, just slightly lower as expected. Br I data, as shown, again deviates badly from the newer measurements being much lower. In addition the higher points show opposite deviation and thus must be looked at with a high degree of suspicion.

Figure 6 shows the Swenson 4·2°K rubidium data as exhibiting an excellent fit.

The cesium data

It has been established that cesium undergoes a transition from the body-centered cube to the face-centered arrangement[21] at approximately 23,300 kg/cm^2. Another transition has been reported and considered to be due to an electronic transition at about 45,000 kg/cm^2.[22]

It was thus necessary to treat each range between transition points as an independent set of data. The data from 0 to 23,300 kg/cm^2 were treated individually as a low pressure set, the data from 23,300 kg/cm^2 to 40,000 kg/cm^2 were treated as a medium pressure range set, and finally a high pressure set of data extended from 50,000 to 100,000 kg/cm^2.

Figure 7 (changed scale) presents the low and medium rangeset of data. Each set fits its individual least squares line very nicely. Figure 8 is a representation of the high pressure data in an expanded scale and is a rather poor fit. Figure 9 presents the Swenson 4·2°K data of cesium, which again fits well.

From the results of the analysis of the cesium data it can be inferred that a very poor fit of the data points to the least square line indicates, that some sort of transition point may exist in the range being considered.

The Volumes

The real test of the merit of the values of J and L is the fit the volumes derived from them are to the experimentally determined values of the volume. Considering equation (1) it is evident that:

$$v = v_0 - J\ln\left(\frac{P+L}{P_0+L}\right) = v_0 - J\ln\left(\frac{P+L}{\text{const}}\right) \quad (9)$$

It is thus seen that once values of J and L are chosen it is possible to calculate the volume at any pressure, P. P_0 and v_0 are some arbitrary reference pressure and volume with v_0 being the volume at

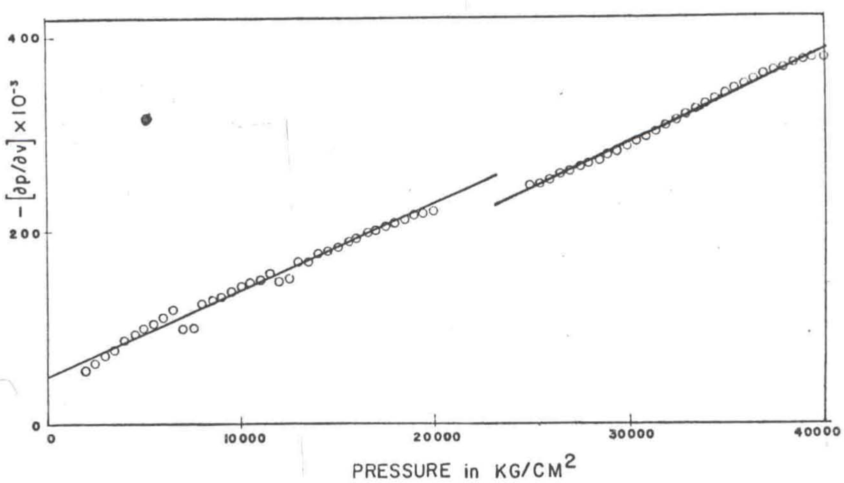

FIG. 7. Plot of $-(\partial p/\partial v)_T$ vs. pressure in kg/cm^2 for the Bridgman low and medium pressure range for cesium. Range from 0 to 23,300 kg/cm^2 represents the low pressure data as points and the least squares line as the solid line. In the medium pressure range the data are represented as points and the least squares line as a solid line on the graph between 23,300 kg/cm^2 and 40,000 kg/cm^2.