(vi) *Specific heat of the fluid*

The heat-capacity measurements were extended slightly into the fluid region, and it was found that at the higher densities and temperatures the specific heats of the fluid at all densities were very close to, though slightly less than, the classical value for a gas, i.e. $\frac{3}{2}R$. This rather surprising result is now being investigated in more detail by experiments over a wider temperature region.

(c) *A transition in solid helium*

In the course of the determination of the specific heats of solid helium, a series of anomalously high values was obtained in the region between 15 and 17°K, the actual temperature depending on the volume. In order to fix more exactly the position of the anomalies, a number of specific heat runs were made at different densities in this particular temperature region. The specific heat was measured at every $\frac{1}{10}$°K for a number of different densities and showed that the anomalous region was confined to less than $\frac{1}{10}$°K for each density.

Then a series of heating curves was made in the same temperature region. The calorimeter, filled to a suitable density, was supplied with heat at a constant rate while the temperature was measured as a function of time. The anomaly showed as a well-defined step in the heating curve.

In order to verify that the transition was reversible, cooling curves were also determined. It was concluded that the transition was reversible and, from the shape of the curves, that it was a first-order transition separating two modifications of solid helium. The low-temperature modification was labelled α and the high-temperature modification β.

The equilibrium line of the two modifications has already been shown in figures 3, 4 and 9. It cuts the melting curve at 14·9°K. In addition, the experiments showed that the entropy change associated with the transition was about 5×10^{-3} entropy units, corresponding to a heat of transition of 0·08 cal/mole. The corresponding volume change derived on the basis of the Clausius-Clapeyron equation is 4×10^{-4} ml. Furthermore, when the transition takes place at constant volume, the change in pressure is less than half an atmosphere. Since these qualities are all relatively small, the effect of the transition has been neglected in the derivation of the thermodynamic properties of the solid.

Since substances with short-range forces of the van der Waals type are stable only in close-packed lattices, the most probable conclusion is that the transition is from a close-packed hexagonal structure to a close-packed cubic structure. The very small heat of transition is consistent with this interpretation. The experiments of Keesom & Taconis (1938) indicate that the modification stable at lower temperatures (our α modification) is the hexagonal structure.

(d) *The Lindemann melting formula*

It is now of interest to see if, on the basis of the Lindemann formula (Lindemann 1910), there is any correlation between the Debye θ's, the molar volume, V, and the melting temperature, T_m, since here for the first time there exist the data for