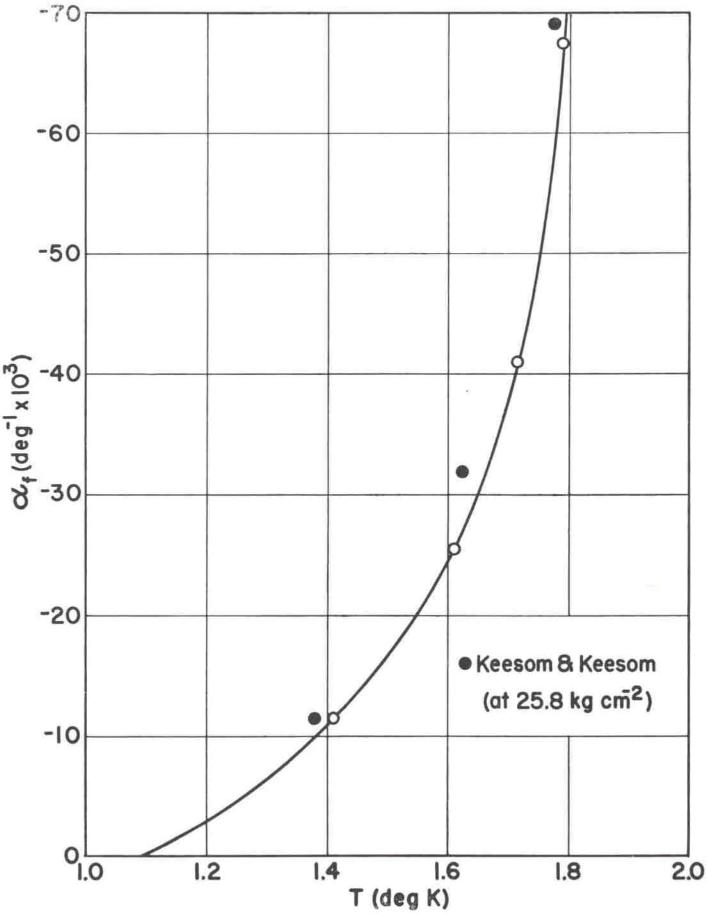

FIG. 8. α_f as a function of T for He^4 at $P = 25.47$ kg/cm^2 and $T < T_\lambda$.

perature. The curve of Fig. 3 exhibits a sharp rise in α_f with decreasing P_m until a maximum is reached at $\sim$50 kg/cm^2. At pressures below this, α_f decreases rapidly, becomes discontinuous at the λ-point by assuming large negative values which decrease in magnitude with further decreases in P_m, as shown in Fig. 8. The α_f values of Keesom and Keesom (*9*), plotted in Fig. 8, were derived from their PVT measurements and show good agreement with the present data.

The V_f measurements of Table I agree with those of Dugdale and Simon (*3*) to within 1 percent. The newly determined melting curve, expressed by Eq. (2) and Table VI, forms a smooth extension of that reported earlier (*1*).

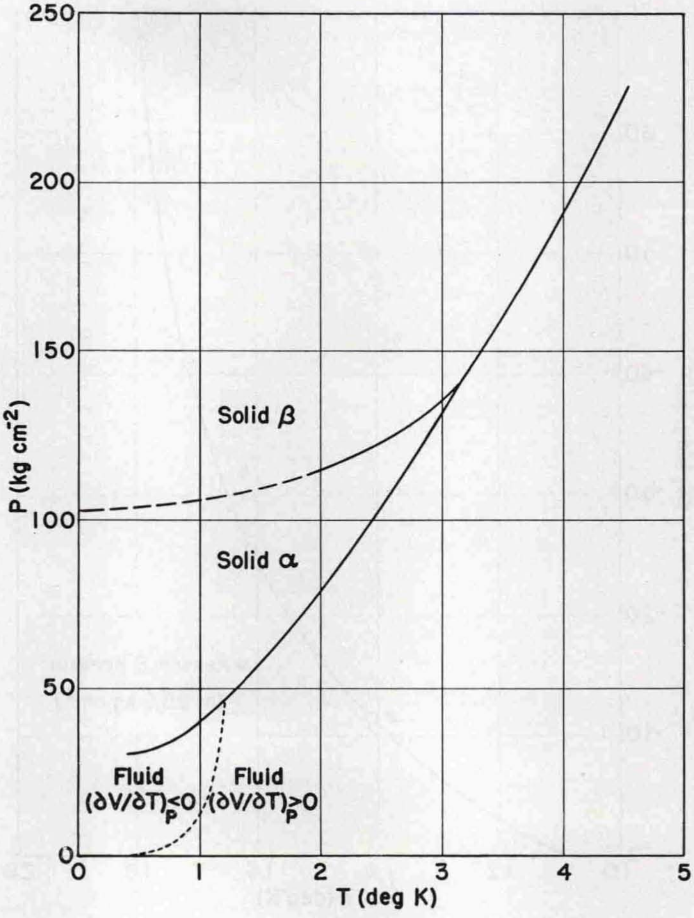

FIG. 9. Condensed phase diagram for He^3.

B. DISCUSSION OF He^3 RESULTS

At high pressures the properties of He^3 along the melting curve roughly parallel those of He^4. At low pressures, although He^3 does not display superfluidity, there are other unique features which merit detailed discussions.

1. The solid-solid transition

With reference to Fig. 2, the discontinuity in the ΔV_m curve for He^3 at $\sim$141 kg/cm^2 is a consequence of a triple point in the melting curve where two types of solid are in equilibrium with the fluid phase. A careful determination of the melting curve showed a slight discontinuity in slope which occurs at 141 kg/cm^2