such a comparison over a substantial region of the melting curve of *one single* substance.

According to the Lindemann melting formula,

$$\theta_D = c\sqrt{\frac{T_m}{MV^{\frac{2}{3}}}},$$

where M is the molecular weight of the substance, and c is a constant. Table 7 gives the values of c for helium at different temperatures, and it is seen that the values are indeed very nearly constant. A comparison of the value of c for helium with those of the other inert gases is made in table 8. It is evident that neon and helium deviate considerably from the behaviour of the heavier elements.

Table 7. Application of the Lindemann melting formula to helium

θ_D (°K)	T_m (°K)	V (ml.)	c
110	23·3	10·6	101
92	17·3	11·6	100
72	11·3	13·1	102
55	7·9	14·4	95
32	3·1	18·3	96

Table 8. Application of the Lindemann melting formula to the inert gases

substance	c	source of data
He	99	present experiments
Ne	140	Clusius (1936)
A	162	Clusius (1936)
Kr	163·5	Clusius (1936)
Xe	164	Clusius (1936)

In a recent paper Domb (1952) has used the results of the present experiments to estimate the mean amplitudes of vibration of the atoms of the lattice at the melting-point. It appears that this amplitude decreases with rising melting temperature, its value at the lowest temperatures being three times its classical value. Hence it is clear that the original semi-empirical argument of Lindemann breaks down for solid helium, even though the melting formula itself remains valid with a somewhat different value for the constant c. Domb interprets this as showing that zero-point energy makes little contribution towards melting, since most of its energy is concentrated in the short-wave region.

Discussion of the entropy diagram

We wish now to discuss the significance of our results in respect of the entropy of the solid and fluid phases in equilibrium, and to compare these results with those of former experiments on substances with much higher melting points. In doing this we have to realize two things: first, these earlier experiments could give only the values of the *change* of entropy and not the entropies of the two phases themselves (for the reasons mentioned in the introduction); and secondly, these experiments refer only to a very much smaller temperature range. Hardly any of them