ficantly from the values of θ_∞, which strictly are needed for calculating the zero point energy [10]. For completeness, the Debye temperature, the Grüneisen parameter γ ($\gamma = -\,\mathrm{d}\log\theta/\mathrm{d}\log V$), and the melting temperature as calculated for various values of the volume are listed in Table I.

TABLE I. – *The Debye temperature, the Grüneisen γ and melting temperature of solid helium calculated for various values of volume.*

V (cm^3)	θ_D (°K)	γ	T_m (°K)
16	44	2.71	4.9
15	52	2.49	6.6
14	62	2.31	8.8
13	73	2.17	11.7
12	86	2.06	15.5
11	102	1.96	20.8
10	123	1.87	28.0
9	149	1.8	38.5
8	184	1.74	53.9
7	230	1.68	77.7
6.5	261	1.65	94.5

4. – Conclusions.

From the remarkably close agreement between the extrapolated experimental melting curve and that calculated by the methods outlined in this paper, one may draw the following conclusions:

a) that the calculated melting curve and isochores of the solid can be accepted with considerable confidence;

b) that in spite of the large zero point motion of the atoms composing it, a relatively simple model of solid helium is sufficient to account quite well for its properties provided that the effect of the zero point energy is taken into account at the very outset of the calculations (*); and

c) that the Lindemann melting formula appears to be valid over an enormous region of the melting curve, a fact which deserves close theoretical attention.

(*) To carry out the calculation from first principles, the U_0-V relationship should be derived from the interatomic potential. This has already been attempted with some success [11] but the difficulty is that a really satisfactory theoretical interatomic potential for helium does not yet exist.