TABLE I. Values of the factor $pv/NkT$.

| $v/v_0$ \ $kT/\epsilon_m$ | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.30 | 26749 | 13378 | 8921 | 6693 | 5356 | 4464 | 3827 | 3350 | 2978 | 2681 |
| 0.35 | 13816 | 6911 | 4610 | 3459 | 2769 | 2309 | 1980 | 1733 | 1541 | 1388 |
| 0.40 | 7678 | 3843 | 2564 | 1925 | 1541.4 | 1285.7 | 1103.1 | 966.1 | 859.6 | 774.3 |
| 0.45 | 4497 | 2252 | 1503.8 | 1129.6 | 905.2 | 755.5 | 648.6 | 568.5 | 506.1 | 456.2 |
| 0.5657 | 1473.5 | 740.4 | 496.2 | 373.9 | 300.7 | 251.8 | 216.9 | | | |
| 0.6364 | 773.1 | 390.4 | 262.7 | 198.9 | 160.6 | 135.2 | 116.9 | | | |
| 0.7071 | 399.8 | 203.9 | 138.5 | 105.9 | 86.09 | 72.96 | 63.67 | | | |
| 0.8485 | 75.02 | 41.63 | 30.47 | 24.80 | 21.45 | 19.19 | 17.52 | | | |
| 0.9899 | −32.95 | −12.01 | −5.159 | −1.801 | 0.1466 | 1.449 | 2.372 | | | |
| 1.0607 | −55.23 | −23.03 | −12.44 | −7.246 | −4.174 | −2.200 | −0.8034 | | | |
| 1.1314 | −66.97 | −28.77 | −16.17 | −10.03 | −6.450 | −4.105 | −2.467 | | | |
| 1.5556 | −57.61 | −25.01 | −14.47 | −9.343 | −6.345 | −4.393 | −3.029 | | | |
| 1.9799 | −34.89 | −15.58 | −9.104 | −5.870 | −3.940 | −2.664 | −1.761 | | | |
| 2.1213 | −30.70 | −13.72 | −8.012 | −5.149 | −3.433 | −2.295 | −1.487 | | | |
| 2.4749 | −24.09 | −10.71 | −6.211 | −3.945 | −2.582 | −1.671 | −1.022 | | | |
| 2.8284 | −20.33 | −8.965 | −5.148 | −3.226 | −2.066 | −1.291 | −0.7379 | | | |
| 3.5355 | −16.14 | −7.004 | −3.938 | −2.395 | −1.465 | −0.8433 | −0.3990 | | | |
| 4.2426 | −13.69 | −5.851 | −3.218 | −1.893 | −1.096 | −0.5637 | −0.1844 | | | |
| 5.0 | −11.89 | −4.994 | −2.678 | −1.524 | −0.8435 | −0.4037 | −0.1019 | 0.1145 | 0.2747 | 0.3966 |

our data overlap those of Wentorf *et al.*[3] at $kT/\epsilon_m = 0.7$, and that the agreement is satisfactory.

We have used these data to calculate theoretical volume–temperature and volume–pressure relationships for solid argon, converting the reduced volumes and temperatures of the LJD theory to absolute units by the factors $v_0 = 23.78\ \text{cm}^3/\text{mole}$, $\epsilon_m/k = 119.8°\text{K}$, derived from the second virial coefficient of gaseous argon.[6] Our results are compared with experimental data in Figs. 1[7] and 2.[8] It will be seen that the LJD theory gives a good description of the actual volumetric behavior of solid argon over a wide range of conditions.[9] The failure of the theory at the lowest temperatures (Fig. 1) is probably the result of its being based on a classical and not a quantal model.

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1 J. E. Lennard-Jones and A. F. Devonshire, Proc. Roy. Soc. (London) **A163**, 53 (1937).

2 See, particularly, J. A. Barker *Lattice Theories of the Liquid State* (Pergamon Press, Ltd., London, 1962).

3 R. H. Wentorf, Jr., R. J. Buehler, J. O. Hirschfelder, and C. F. Curtiss, J. Chem. Phys. **18**, 1484 (1950).

4 W. Fickett and W. W. Wood, J. Chem. Phys. **20**, 1624 (1952).

5 To save space we have not included tables of the integrals $G$, $g_L$, $g_M$, although they are useful for deriving the energy and entropy of imperfection. They are available on request.

6 J. O. Hirschfelder, C. F. Curtiss, and R. B. Bird, *Molecular Theory of Gases and Liquids* (John Wiley & Sons, Inc., New York, 1954), p. 1110.

7 E. R. Dobbs and G. O. Jones, Rept. Progr. Phys. **20**, 516 (1957).

8 J. W. Stewart, J. Phys. Chem. Solids **1**, 146 (1956).

9 It should be emphasized that the *only* experimental property of argon introduced into the calculations is its second virial coefficient.