$\Lambda^* = h/D(m\epsilon^*)^{\frac{1}{2}}$ which de Boer [11, 12] showed occurs in the general expression for the reduced equation of state in quantum statistics. Eqn. (2) then becomes

$$\Delta p^* = T^* \left[v^{*-1} + \frac{3}{2} \frac{\mathrm{d} \log y^*}{\mathrm{d}\, v^*} \right] [9 \cdot 0710\, y^{*\frac{1}{2}} T^{*\frac{1}{2}} v^{*\frac{1}{3}} \Lambda^{*-1} - 1]^{-1}, \tag{3}$$

where y^* is a function of v^*, the relationship between them being

$$(1 + 12y^* + 25 \cdot 2y^{*2} + 12y^{*3} + y^{*4})(1 + y^*)^{-1}(1 - y^*)^{-6} - 2v^{*2} = 0. \tag{4}$$

Thus, in conformity with the general considerations of de Boer [11, 12] our reduced quantal equation of state is of the type

$$p^* = f(T^*, v^*, \Lambda^*),$$

where f is a universal function.

For the general plot of p^* against v^* in fig. 4, we have selected the reduced temperature $T^* = 2 \cdot 14$ corresponding to our experimental temperature $T = 78 \cdot 9°$ K

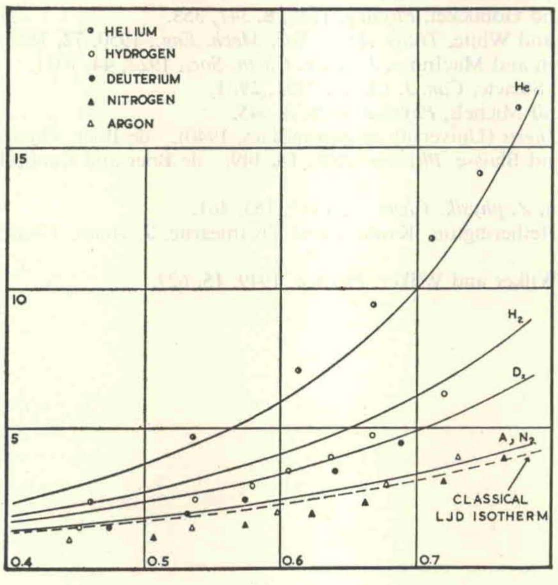

FIG. 4.—Reduced isotherms for $T^* = 2 \cdot 14$. The full curves are the quantal isotherms.

TABLE 3.—MOLECULAR CONSTANTS

	ϵ^*/k (°K)	D (cm × 10^{-8})	Λ^*
He	10·2	2·56	2·64
H_2	37·0	2·92	1·73
D_2	37·0	2·92	1·22
N_2	96·6	3·72	0·225
A	120·3	3·41	0·187

for H_2 and D_2. The intermolecular force parameters and the values of Λ^* have been taken from the tables of de Boer.[11, 12] They are listed in table 3. The experimental data for He, N_2 and A were given by short extrapolations on the temperature scale from the measurements of Buchmann [13] on He; Bartlett, Hetherington, Kvalnes and Tremearne [14] on N_2; Michels, Wijker and Wijker [15] on A.

Fig. 4 shows that the isotherm given by the classical theory is a fairly good representation of the behaviour of the heavy gases N_2 and A, and that the predicted differences between the quantal isotherms are in good agreement with the experimental differences between the light gases.

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