In Eq. (6) $-E^*$ is the minimum potential energy between two molecules and r_0 is their separation when $V(\rho)=0$. Putting (6) into the limiting expression for low densities:

$$\gamma = \frac{3P_0}{b_0} \int_0^\infty \rho^{-4} e^{-\beta V(\rho)} d\rho \qquad (7)$$

(where $\beta = 1/kT$, $b_0 = 2\pi N r_0^3/3$) and using the parameters $b_0 = 115.5$ cc/mole, $E^*/k = 199.2°$K calculated by Bird, Spotz, and Hirschfelder[24] from the second virial coefficient data for C_2H_4, we find: $\gamma = +0.143$ at 50°C. This figure is somewhat lower than the value $\gamma = +0.22 \pm 0.06$ given by the least squares quadratic fit of our low density experimental data. In this respect our results are qualitatively similar to those of Keyes and Oncley[2] for CO_2 and C_3H_8. For these gases γ_{obs} is about twice γ_{calc}.

It is hardly profitable to speculate on these differences since the C-M/d curves are apparently of quite complex form even at the lowest densities,* and the extrapolated values of γ may be subject to very large errors. There is

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[24] Bird, Spotz, and Hirschfelder, J. Chem. Phys. **18**, 1395 (1950).

* The steps in these curves which are found in nearly all the recorded data suggest that there may be relatively sharp changes in the molecular distribution functions with density.

TABLE III.

Temp.	CO_2		C_2H_4		
	50°C	100°C	25°C	50°C	
d (for max. C-M)	0.0123[a]	0.0135[a]	0.0070	0.0083	mole/cc
d (critical)		0.0104[b]		0.0079[b]	mole/cc

[a] The data for CO_2 are taken from A. Michels and L. Kleerekoper, Physica **6**, 586 (1939).
[b] Values from International Critical Tables **3**, 248 (1928).

an obvious need for more accurate C-M measurements in the density range 0–0.002 moles/cc. These were not possible with our apparatus.

A point of interest is that the densities at which the slopes of the C-M/d plots abruptly change sign correspond quite closely with the critical densities of the gases. This is shown in Table III.

It may also be significant that above this density the C-M function decreases with increasing density, an effect which is generally found in liquid systems.

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