the conductivities of the binary mixtures of $CO_2$-$N_2$-$C_2H_6$ by assuming that the contribution of the internal degrees of freedom were additive to the hard sphere conductivity:

$$k = k_{hs} + k_{ie} \tag{6}$$

where, for pure compounds,

$$k_{ie} = F\rho D\left(C_v - \frac{3}{2}\frac{k_B}{m}\right) \tag{7}$$

The factor F is an arbitrary weighting factor to be determined by regression analysis on the data for the pure compounds along with the effective molecular diameter, $\sigma$. In the curve fit for pure gases, the product $\rho D$ was assumed constant, and the one atmosphere values were used. The values obtained for molecular diameter, F, and the standard errors of estimate are:

| Gas | $\sigma$, Å | F | S, % | Max. Dev., % |
|---|---|---|---|---|
| Carbon Dioxide | 4.56 | 1.045 | 4.6 | -8.3 |
| Nitrogen | 3.97 | 1.113 | 4.4 | +7.0 |
| Ethane | 5.04 | .68 | 3.9 | -7.5 |

The calculated monatomic thermal conductivities were first approximations since the mixture equation is a first approximation.

These values of $\sigma$ were used to calculate mixture hard sphere conductivities using Thorne's equations. The contri-