Binary diffusion coefficient in the gas phase

- As we've seen, $J_A^* = cx_A(v_A - v^*) = -cD\left(\frac{\partial x_A}{\partial y}\right)$ and $J_A = \rho\omega_A(v_A - v) = -\rho D_{AB}\left(\frac{\partial \omega_A}{\partial y}\right)$, D_{AB} – binary diffusion coefficient of *A* through *B*.
- From the kinetic theory of gases one may derive $D_{AB} = \frac{1.858*10^7 T^{3/2}\left(\frac{1}{M_A}+\frac{1}{M_A}\right)^{1/2}}{(\frac{p}{101325})\sigma_{AB}^2\Omega(T_D^*)}$ [m^2s^{-1}], where σ_{AB}=(σ_A+σ_B)/2, and $T_D^* = kT/\varepsilon_{AB}$ with $k/\varepsilon_{AB}\sqrt{(k/\varepsilon_A)(k/\varepsilon_B)}$. ε_A - characteristic energy of A, k Boltzmann's constant, and $\Omega(T_D^*)$ – collision integral.