

**CHE 305 – Separation Processes**  
**Spring 2010 – Quiz 6**

A 1 meter column contains a pure, volatile compound (as a liquid) to a level of 25 cm. The gas layer above the liquid is stagnant. If the vapor pressure of the liquid at room temperature (298 K) is 500 torr, and the bulk room concentration is zero, determine the total molar flux of the volatile compound. Justify your choice for mode of molecular diffusion (equimolar counterdiffusion or unimolecular diffusion).

**Given:**

$$\text{Total Pressure} = 760 \text{ torr} = 1 \text{ atm}$$

$$R = 0.08206 \text{ L atm/mol K}$$

$$D_{AB} = 1.5 \text{ cm}^2/\text{s}$$

**Equimolar Counterdiffusion:**

$$N_A = \frac{cD_{AB}}{(z_2 - z_1)}(y_1 - y_2)$$

**Unimolecular Diffusion:**

$$N_A = \frac{cD_{AB}}{(z_2 - z_1)} \ln \left( \frac{1 - y_2}{1 - y_1} \right)$$