

PTK 314 ASSIGNMENT

$$\text{Diameter} = 3\text{mm} = 0.003\text{m}$$

$$\text{Length} = 20\text{m}$$

$$\Delta = 0.28 \times 10^{-4}$$

$$M = 17 \text{ kg/kg mole}$$

$$\frac{N_a}{A} = \frac{\Delta \cdot P_{a1} - P_{a2}}{RT \cdot L}$$

$$N_a = \frac{\Delta A \cdot P_{a1} - P_{a2}}{RT \cdot L}$$

$$\frac{M_a}{M} = \frac{\Delta A \cdot P_{a1} - P_{a2}}{RT \cdot L}$$

$$M_a = \frac{\Delta A \cdot P_{a1} - P_{a2}}{RT \cdot L} \times M \quad A = \frac{\pi d^2}{4}, A = 7.0695 \times 10^{-6}$$

$$= \frac{0.28 \times 10^{-4} \times 7.0695 \times 10^{-6} \times (1.013 \times 10^5 - 0) \times 3600 \times 17}{8315 \times 20}$$

$$M_a = 7.3793 \times 10^{-6} \text{ kg/hr}$$

Mass of air diffusing in

$$N_a = -N_b$$

$$N_b = -N_a$$

$$N_b = \frac{-7.3793 \times 10^{-6}}{17} \left\{ \frac{M_{air}}{M} \right\}$$

$$= -4.34 \times 10^{-7}$$

Mass of air = no. of moles \times molar mass of air

$$= -4.34 \times 10^{-7} \times 28.97$$

$$= -1.257 \times 10^{-5} \text{ kg/hr}$$