

B2-2

$$1) (a) J_A = \frac{D_A}{\delta} (P_{A1} - P_{A2})$$

$$2) (b) J_{He} = \frac{p_{He}}{\delta} \Delta p_{He} = \underline{2.22 \times 10^{-9} \text{ kmol/s}}$$

$$(c) J_{N_2} = \frac{p_{N_2}}{\delta} \Delta p_{N_2} = \underline{6.06 \times 10^{-10} \text{ kmol/s}}$$

$$(d) \Delta V = |V_{He} - V_{N_2}|$$

$$= J_{He} \times \left(\frac{RT}{P}\right)_{He} - J_{N_2} \left(\frac{RT}{P}\right)_{N_2}$$

$$= 2.22 \times 10^{-9} \times \left(\frac{8.314 \times 273}{111}\right) - 6.06 \times 10^{-10} \times \left(\frac{8.314 \times 273}{101}\right)$$

$$= \underline{3.3 \times 10^{-2} \text{ m}^3/\text{s}}$$

$$(e) J'_{N_2} = \frac{p_{N_2}}{\delta} \Delta p_{N_2} = \underline{6 \times 10^{-11} \text{ kmol/s}}$$

$$(f) \Delta V'_{N_2} = J'_{N_2} \times \left(\frac{RT}{P}\right)_{N_2} = \frac{6 \times 10^{-11} \times 8.314 \times 273}{111} = \underline{1.23 \times 10^{-9} \text{ m}^3/\text{s}}$$

$$(g) \underline{2.1 \times 10^{-9}}$$