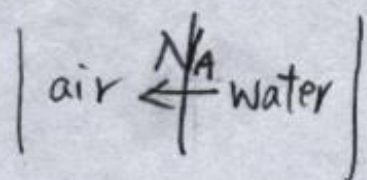


29.16

①



$$290\text{K}, 1.013 \times 10^5 \text{ Pa}$$

$$P_{AG} = 4 \times 10^3 \text{ Pa}, C_{A,L} = 4 \frac{\text{kg mol}}{\text{m}^3}, H = 1400 \frac{\text{Pa}}{\frac{\text{kg mol}}{\text{m}^3}}$$

$$K_G = 2.46 \times 10^{-8} \frac{\text{kg mol}}{\text{m}^2 \cdot \text{s} \cdot \text{Pa}}, \text{ and } \frac{1}{K_G} = \frac{1}{k_G}$$

Find k_G, k_L, p_{Ai}, K_L

(Sd)

$$(a) \frac{1}{K_G} = \frac{1}{k_G} + \frac{H}{k_L}$$

$$0.6 \frac{1}{K_G} = \frac{1}{k_G} \Rightarrow k_G = \frac{K_G}{0.6} = \frac{2.46 \times 10^{-8}}{0.6} = 4.1 \times 10^{-8} \frac{\text{kg mol}}{\text{m}^2 \cdot \text{s} \cdot \text{Pa}}$$

(b)

$$0.4 \frac{1}{K_G} = \frac{H}{k_L} \Rightarrow k_L = \frac{H \cdot K_G}{0.4} = \frac{1400 \frac{\text{Pa}}{\frac{\text{kg mol}}{\text{m}^3}} \cdot 2.46 \times 10^{-8} \frac{\text{kg mol}}{\text{m}^2 \cdot \text{s} \cdot \text{Pa}}}{0.4}$$

$$= 8.61 \times 10^{-5} \text{ m/s}$$

(c)

$$N_A = K_G (P_{AG} - P^*) = k_G (P_{AG} - P_{Ai})$$

$$= 2.46 \times 10^{-8} (4 \times 10^3 - 1400 \times 4) \frac{\text{kg mol}}{\text{m}^2 \cdot \text{s}}$$

$$= 4.1 \times 10^{-8} (4 \times 10^3 - P_{Ai}) \frac{\text{kg mol}}{\text{m}^2 \cdot \text{s}}$$

$$\Rightarrow \frac{3.94 \times 10^{-5}}{-4.1 \times 10^{-8}} = (4000 - P_{A\bar{c}})$$

$$\Rightarrow P_{A\bar{c}} = 4000 + 961 = 4961 \text{ Pa} \#$$

$$(d) \frac{1}{K_L} = \frac{1}{1 \text{ kg}} + \frac{1}{k_L}$$

$$= \frac{1}{1400 \times 4.1 \times 10^{-8}} + \frac{1}{8.61 \times 10^{-5}}$$

$$= \frac{1}{5.75 \times 10^{-5}} + \frac{1}{8.61 \times 10^{-5}}$$

$$= 1.74 \times 10^4 + 1.16 \times 10^4$$

$$= 2.9 \times 10^4 \left(\frac{\text{s}}{\text{m}} \right)$$

$$\Rightarrow K_L = \frac{1}{2.9 \times 10^4} = 3.45 \times 10^{-5} \text{ m/s} \#$$