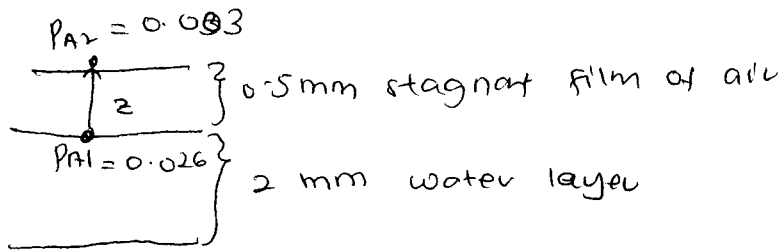


# ANSWER SCHEME TEST 1, CHE311

## Question 1

(a)



(b)

$$N_A = \frac{D_{AB} P}{RT (z_2 - z_1)} \ln \frac{P - P_{A2}}{P - P_{A1}}$$

$$= 0.25 \times 10^{-4} \frac{\text{m}^2}{\text{s}} \Big| \frac{1 \text{ atm}}{82.057 \times 10^{-3} \frac{\text{m}^3 \text{ atm}}{\text{kmol K}}} \Big| 293 \text{ K} \Big| 0.5 \times 10^{-3} \text{ m} \times$$

$$\ln \frac{(1 - 0.003)}{(1 - 0.026)}$$

$$= 4.85 \times 10^{-5} \text{ kmol/m}^2 \cdot \text{s}$$

(c)

$$N_A = 4.85 \times 10^{-5} \frac{\text{kmol}}{\text{m}^2 \cdot \text{s}} \Big| 18 \text{ kg} \Big| \text{area } 2 \text{ m}^2$$

$$= 1.746 \times 10^{-3} \text{ kg/s}$$

$$\text{Time} = \frac{\text{Total mass}}{N_A} = \frac{eV}{N_A} = \frac{1000 \text{ kg}}{\text{m}^3} \Big| \frac{2 \text{ m}^2 \times 2 \times 10^{-3} \text{ m}}{1.746 \times 10^{-3} \frac{\text{kg}}{\text{s}}} \Big| \text{ s}$$

$$= 2290.95 \text{ s}$$

$$= 38.18 \text{ min}$$

$$= 0.636 \text{ h}$$

Question 2

$$\textcircled{a} \quad X_A = \frac{P_T - P_B}{P_A - P_B} \quad Y_A = \frac{X_A P_A}{P_T}$$

$$= \frac{101.32 - 23.1}{136.7 - 23.1} \quad = \frac{0.69 \times 136.7}{101.32}$$

$$= 0.69 \quad = 0.93$$

$$X_A = \frac{101.32 - 37.1}{197.3 - 37.1} \quad Y_A = \frac{0.90 \times 197.3}{101.32}$$

$$= 0.40 \quad = 0.78$$

$\textcircled{b}$  First flash  $F = \frac{V}{F} = \frac{65}{100} = 0.65$

op line

$$y = \frac{f-1}{f} x + \frac{x_F}{f}$$

$$y = \frac{0.65-1}{0.65} x + \frac{0.5}{0.65}$$

$$y = -0.538x + 0.77$$

| x   | y    |
|-----|------|
| 0.2 | 0.66 |
| 0.5 | 0.5  |

$\textcircled{c}$   $f = 0.7$

op line

$$y = \frac{f-1}{f} x + \frac{x_F}{f}$$

$$= \frac{0.7-1}{0.7} x + \frac{0.625}{0.7}$$

$$y = -0.43x + 0.89$$

| x     | y     |
|-------|-------|
| 0.2   | 0.804 |
| 0.625 | 0.62  |

