

2019

[AS]

$$r_A = -kC_A^2$$

1)

$$\tau = \frac{V}{q_0} = C_{A0} \frac{\gamma_A}{-r_A(\gamma_A)} = C_{A0} \frac{\gamma_A}{kC_{A0}^2(1-\gamma_A)^2} = \frac{\gamma_A}{kC_{A0}(1-\gamma_A)^2}$$

$$\tau = \frac{V}{q_0} = \frac{3 \text{ m}^3}{10 \text{ m}^3/\text{h}} = 0.3 \text{ h}, \quad k = 2.0 \text{ m}^3/\text{mol} \cdot \text{h}, \quad C_{A0} = 1 \text{ mol}/\text{m}^3 \text{ (J'1)}$$

$$0.3 = \frac{\gamma_A}{2(1-\gamma_A)^2}$$

整理得

$$0.6\gamma_A^2 - 2.2\gamma_A + 0.6 = 0$$

$$\underline{\gamma_A = 0.297}$$

$$2) \quad C_{A1} = C_{A0}(1-\gamma_A) = \underline{0.703 \text{ mol}/\text{m}^3}$$

1) 同樣

$$\tau = \frac{\gamma_A'}{kC_{A1}(1-\gamma_A')^2}$$

$$0.4218(\gamma_A')^2 - 1.8436\gamma_A' + 0.4218 = 0$$

$$\gamma_A' = 0.242$$

$$2) \quad C_{A2} = C_{A1}(1-\gamma_A') = \underline{0.533 \text{ mol}/\text{m}^3}$$

$$\text{系統轉化率 } X_A \text{ 为 } X_A = \frac{C_{A0} - C_{A2}}{C_{A0}} = \underline{0.467}$$

$$3) \quad V = q_0 \times \frac{X_A}{kC_{A0}(1-X_A)^2}$$

$$= 10 \times \frac{0.467}{2(1-0.467)^2} = \underline{8.22 \text{ m}^3}$$