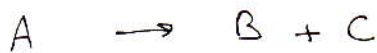
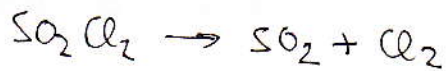


17.9



$$r = k \cdot c_A$$

$$k = 2,2 \cdot 10^{-3} \cdot \text{s}^{-1}$$

$$V = ? \quad \eta = 0,9$$

$$p = 0,101 \cdot 10^6 \text{ Pa}$$

$$\dot{n}_{A0} = 50 \text{ kg/h}$$

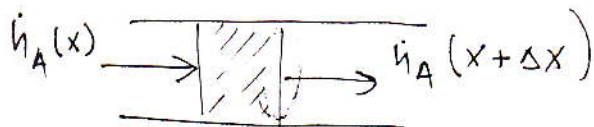
$$T = 320 + 273,15 =$$

$$\dot{n}_A = \dot{n}_{A0} \cdot (1 - \eta) \quad \text{d'Ale}$$

$$\dot{n}_B = \dot{n}_{A0} \cdot (\eta)$$

$$\dot{n}_C = \dot{n}_{A0} \cdot \eta$$

$$\dot{n} = \dot{n}_A + \dot{n}_B + \dot{n}_C = \dot{n}_{A0} \cdot (1 + \eta)$$



$$0 = \dot{n}_A(x) - \dot{n}_A(x + \Delta x) - k \cdot c_A \cdot A \cdot \Delta x \quad / : \Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{\dot{n}_A(x + \Delta x) - \dot{n}_A(x)}{\Delta x} = -k \cdot c_A \cdot A$$

$$\frac{d}{dx} \dot{n}_A = -k \cdot c_A \cdot A$$

$$\frac{d}{dx} [\dot{n}_{A0} \cdot (1 - \eta)] = -\dot{n}_{A0} \frac{d\eta}{dx} = -k \cdot c_A \cdot A$$

$$p \dot{V} = \dot{n} R T$$

$$\left[\frac{\text{mol}}{\text{m}^3} \right] \cdot c = \frac{\dot{n}}{\dot{V}} = \frac{p}{R T}$$

$$c_A = x_A \cdot c = \frac{\dot{n}_A}{\dot{n}_A + \dot{n}_B + \dot{n}_C} \cdot \frac{p}{R T} = \frac{\dot{n}_{A0} \cdot (1 - \eta)}{\dot{n}_{A0} \cdot (1 + \eta)} \cdot \frac{p}{R T}$$

$$A \cdot dx = d \cdot (A \cdot x) = dV$$

$$\eta_{A0} \cdot \frac{dz}{dx} = k \cdot \frac{1-z}{1+z} \cdot \frac{P}{RT} \cdot A$$

$$\int_0^z \frac{1+z}{1-z} dz = \int_0^L \frac{k \cdot P}{RT} \cdot A \cdot \frac{1}{\eta_{A0}} \cdot dx = \int_0^V \frac{k \cdot P}{RT} \cdot \frac{1}{\eta_{A0}} \cdot dV$$

$$x = 1-z \Rightarrow z = 1-x$$

$$dx = -dz \neq$$

$$\int_{x_1}^{x_2} - \frac{1+1-x}{x} dx = \int_{x_1}^{x_2} - \frac{2}{x} dx + \int_{x_1}^{x_2} 1 \cdot dx$$

$$= \left[-2 \cdot \ln(x) \right]_{x_1}^{x_2} + \left[x \right]_{x_1}^{x_2} =$$

$$= \left[-2 \ln(1-z) \right]_0^z + \left[1-z \right]_0^z =$$

$$= 2 \cdot \ln \frac{1}{1-z} + 1-z - 1 = \left(2 \ln \frac{1}{1-z} - z \right) = \frac{k \cdot P \cdot V}{RT \cdot \eta_{A0}}$$

$$M = \frac{m}{n} \quad \dot{\eta}_{A0} = \frac{\dot{V}_{A0}}{M} = \frac{50}{134,97} = 0,3705 \frac{\text{kmol}}{\text{h}} \Rightarrow 0,1029 \frac{\text{mol}}{\text{s}}$$

$$\frac{k \cdot P}{R \cdot T \cdot \eta_{A0}} = \frac{2,2 \cdot 10^{-3} \cdot 0,101 \cdot 10^6}{8,314 \cdot (320+273,15) \cdot 0,3705} = \frac{0,452}{0,4379} = 1,032 \frac{\text{s}^{-1} \cdot \text{Pa} \cdot \text{mol} \cdot \text{K} \cdot \text{h}}{\text{J} \cdot \text{K} \cdot \text{kmol}}$$

$$2 \ln \frac{1}{1-0,9} - 0,9 = 4,42 - 3,705$$

$$V = \frac{4,42}{0,4379} = 8,46 \text{ m}^3$$