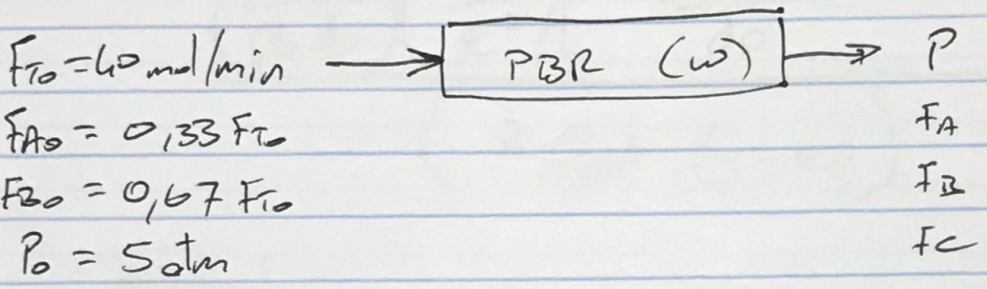
CRO 410 2019

TUT 1.3



$$A + 2B \Rightarrow C$$

Given: $T = 170°C$ (isothermal assumed)

$k' = 0,05 \quad \frac{mol\ A}{kg.min.atm_B}$

$MM_{AV} = 0,03\ kg/mol$

$\varepsilon = 0,4$

$D_{reactor} = 0,085m$

$A = \pi (D_{reactor})^2 / 4 \quad m^2$

$d_{cat} = 0,003m$

$\mu = 2 \times 10^{-5}\ kg/m.s$

$\rho_{packed\ bed} = 1000\ kg/m^3$

$$\Rightarrow \rho_{cat.} = \frac{\rho_{packed\ bed}}{(1-\varepsilon)}$$

$$\Rightarrow \rho_0 = \frac{MM_{AV} \cdot P_0}{RT}$$

$$\Rightarrow G = \frac{MM_{AV} \cdot F_{T0}}{A}$$

7. 1.3

$$k = \frac{\left(\frac{G}{\rho_0 d_p}\right)\left(\frac{1-\epsilon}{\epsilon^3}\right)\left[\frac{150\mu(1-\epsilon)}{d_p} + 1{,}75G\right]}{\left(A \cdot \rho_{cat} \cdot (1-\epsilon)\right)}$$

Algebraic

1.) $r_A' = -k' p_B = -k' C_B P = -k'\left(\frac{F_B}{F_T}\right) P$

2.) $r_B' = 2 r_A'$

3.) $r_C' = -r_A'$

4.) $\Phi = \frac{F_T R T}{P}$

5.) $C_A = \frac{F_A P}{F_T R T}$

6.) $C_B = \frac{F_B P}{F_T R T}$

7.) $C_C = \frac{F_C P}{F_T R T}$ $\qquad X_i = \frac{f_{i0} - f_i}{f_{i0}}$

D.E.s: 8.) $\frac{dF_A}{dw} = r_A'$

9.) $\frac{dF_B}{dw} = r_B'$

10.) $\frac{dF_C}{dw} = r_C'$

11.) $\frac{dP}{dw} = -K\left(\frac{P_0}{P}\right)\left(\frac{F_T}{F_{T0}}\right)$