17-2

k. oct + but-OH ⟶ but-ac + H_2O

$$A + B \longrightarrow C + D$$

60,05 74,12 116,16 18 kg/kmol

? τ na $\eta = 50\%$ (A)

$$\frac{c_{A0}}{c_{B0}} = \frac{n_{A0}}{n_{B0}} = \frac{1}{4{,}97}$$

$\rho_A = 958\ kg/m^3$

$\rho_B = 742\ kg/m^3$

$\rho = konst \Rightarrow V = konst$

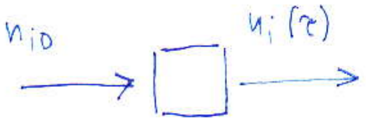
? $V \to \dot m_C = 50\ kg/h$

$\tau_z = 45\ min$

$r = k \cdot c_A^2 \qquad k = 1{,}74 \cdot 10^{-2}\ m^3/kmol \cdot min$

$$c_{A0} = \frac{n_{A0}}{n_{A0} \cdot M_A/\rho_A + n_{B0} \cdot M_B/\rho_B} = \frac{1}{M_A/\rho_A + (n_{B0}/n_{A0}) \cdot M_B/\rho_B}$$

$$c_{A0} = \frac{1}{60{,}05/958 + (4{,}97) \cdot 74{,}12/742} = 1{,}788\ \frac{kmol}{m^3}$$



$$\eta = \frac{n_{i0} - n_i(\tau)}{n_{i0}} = \frac{c_{A0} \cdot V_0 - c_A(\tau) \cdot V(\tau)}{c_{A0} \cdot V_0}$$

[illegible]

$V(\tau) = V_0 = konst$

$$\eta = \frac{c_{A0} - c_A(\tau)}{c_{A0}}$$

$$\boxed{c_A(\tau) = c_{A0} - c_{A0} \cdot \eta = c_{A0} \cdot [1 - \eta(\tau)]}$$

AKUM = VSTUP − VÝSTUP + ZDROJ

$$\frac{dn_A}{d\tau} = -r_A \cdot V = -k \cdot c_A^2 \cdot V$$

$$\frac{dn_A}{d\tau} = -k \cdot c_A(\tau)^2 \cdot V(\tau)$$

$$\frac{dc_A}{d\tau} = -k \cdot c_A^2(\tau)$$

$$dc_A = -c_{A0} \cdot d\eta$$

$$\frac{dc_A}{c_A^2} = -k \cdot d\tau$$

$$\int_0^{\eta(\tau)} \frac{-c_{A0} \cdot d\eta}{c_{A0}^2 \cdot (1-\eta)^2} = \int_0^{\tau} -k \cdot d\tau$$

17-2
str. 2

$$\frac{1}{C_{A0}} \cdot \int_0^{\eta} \frac{d\eta}{(1-\eta)^2} = k\cdot\tau \qquad X \equiv 1-\eta \qquad dX = -d\eta$$

$$\frac{1}{C_{A0}} \cdot \int_{X_1}^{X_2} \frac{-dX}{X^2} = \frac{1}{C_{A0}} \cdot \left[- - \frac{1}{X}\right]_{X_1}^{X_2} = \frac{1}{C_{A0}} \cdot \left[\frac{1}{1-\eta}\right]_0^{\eta} =$$

$$= \frac{1}{C_{A0}} \cdot \left[\frac{1}{1-\eta} - 1\right] = k\cdot\tau$$

$$\tau = \frac{1}{k\cdot C_{A0}} \cdot \left[\frac{1}{1-\eta} - 1\right] = \frac{1}{1{,}74\cdot10^{-2}\cdot 1{,}788}\left(\frac{1}{1-0{,}5} - 1\right) \frac{kmol\cdot min\cdot m^3}{m^3\ kmol} =$$

$$\boxed{\tau = 32{,}14\ min}$$

Kolik vznikne but-ac (C)

$$c_C = C_{A0}\cdot[0 + \eta(\tau)] = \overset{1{,}788}{~~~~}\cdot 0{,}5 = \overset{0{,}894}{~~~~}\ kmol/m^3$$

doba usádky : 32,14 + 45 = 77,14 min

50 kg ...... 60 min
x kg ...... 77,14 min

$x = 64{,}28$ kg v 1né usádce

$$m_C = 0{,}894\ \frac{kmol}{m^3}\cdot 116{,}16\ \frac{kg}{kmol} = 103{,}85\ kg/m^3$$

1 m^3 usádky ...... 103,85 kg
x ...... 64,28 kg

usádka
$\boxed{V = 0{,}619\ m^3}$

$m_{A0} = 1{,}788\cdot 60{,}05 = 107{,}3694\ kg/m^3$ A
$m_{B0} = 1{,}788\cdot 4{,}97\cdot 74{,}12 = 658{,}66\ kg/m^3$ B

usádka A = 66,46 kg – k-oct
B = 407,7 kg but-OH