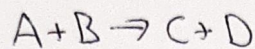


15-4



vsádkovj t

$$T_0 = 313 \text{ K}$$

$$C_{A0} = 2,4 \text{ kmol/m}^3$$

$$\Delta_R h = -167,6 \text{ kJ/kmol}$$

$$\rho = 960 \text{ kg/m}^3$$

$$\langle C_p \rangle = 2,09 \text{ kJ/kg}\cdot\text{K}$$

$$z_A = 40\%$$

$$t = 4,7 \text{ h}$$

$$T = ? \quad T < 373 \text{ K} ??$$

$$\frac{dH}{dt} = -\Delta_R h \cdot t \cdot V$$

$$\frac{dm_A}{dt} = -t \cdot V$$

$$\frac{dH}{dt} = 0$$

~~NEODVOŽOVAT / PLAUHĚ!~~

$$C_p V \rho \frac{dT}{dt} = -\Delta_R h \cdot t \cdot V$$

$$\boxed{\frac{dc_A}{dt} = -t}$$

$$\boxed{C_p \rho \frac{dT}{dt} = -\Delta_R h \cdot t}$$

$$\frac{dT}{dc_A} = + \frac{\Delta_R h}{\rho C_p}$$

$$\frac{\text{J/mol}}{\frac{\text{kg}}{\text{m}^3} \frac{\text{J}}{\text{kg}\cdot\text{K}}}$$

$$\int_{T_0}^T dT = \int_{C_{A0}}^{C_A} dc_A \cdot \frac{\Delta_R h}{\rho C_p}$$

$$T - T_0 = \frac{\Delta_R h}{\rho C_p} \cdot (C_A - C_{A0})$$

$$= \frac{-167,6 \text{ kJ/kmol}}{10^3}$$

NEODVOŽOVAT / PLAUHĚ!

$$H = \sum n_i h_i$$

$$h_i = \Delta_F h_i + \langle C_{p,i} \rangle (T - 25^\circ\text{C})$$

$$n_i = (n_{i0} + \nu_i \xi)$$

$$H = \sum n_{i0} \Delta_F h_i + \sum n_{i0} \langle C_{p,i} \rangle (T - 25^\circ\text{C}) + \sum \nu_i \xi \Delta_F h_i + \sum \nu_i \xi \langle C_{p,i} \rangle (T - 25^\circ\text{C})$$

$$H = \xi \cdot \left\{ \sum \nu_i \Delta_F h_i + \sum \nu_i \langle C_{p,i} \rangle (T - 25^\circ\text{C}) \right\} + \Delta_R h(T) + \sum n_{i0} \left\{ \Delta_F h_i + \langle C_{p,i} \rangle (T - 25^\circ\text{C}) \right\}$$

$$\frac{dH}{dt} = \frac{d\xi}{dt} \cdot \Delta_R h(T) + 0 + \underbrace{\left[\sum n_{i0} C_{p,i} \right]}_{m \cdot C_p^{net}} \frac{dT}{dt}$$

restart:

U15-04 vsadkovy reaktor s ent. bilanci (integralne, bez derivaci)

$$\begin{aligned} T_0 &:= 313 : \# K \\ c_{A0} &:= 2.4 : \# \frac{\text{kmol}}{\text{m}^3} \\ dRh &:= -167.6e3 : \# \frac{\text{kJ}}{\text{kmol}} \\ \rho &:= 960 : \# \frac{\text{kg}}{\text{m}^3} \\ C_p &:= 2.09 : \# \frac{\text{kJ}}{\text{kg} \cdot \text{K}} \\ dzeta_A &:= 0.40 : \# 40\% \text{ konverze} \end{aligned}$$

Vysledna koncentrace

$$\left[\begin{array}{l} > c_A := c_{A0} \cdot (1 - dzeta_A); \# \frac{\text{kmol}}{\text{m}^3} \\ & c_A := 1.440 \end{array} \right. \quad (1)$$

Vysledna teplota adiabatickeho reaktoru

$$\left[\begin{array}{l} > \Delta T := \frac{dRh}{\rho \cdot C_p} \cdot (c_A - c_{A0}); \# C \text{ nebo } K \\ & \Delta T := 80.19138755 \end{array} \right. \quad (2)$$

$$T := T_0 + \Delta T; \# K$$

$$T := 393.1913876 \quad (3)$$