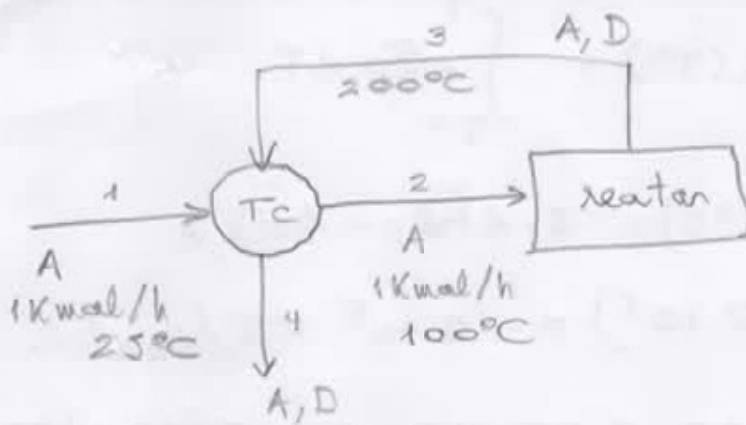




$$X_A = 0,3 \quad (R1)$$



	TC
NVI	$(3) + 4(T_1, T_2, T_3, T_4) + 1(\dot{Q}_{TC})$
NVEI	$(1) + 3(T_1, T_2, T_3) + 1(\dot{Q}_{TC} = 0)$
NBI	$1(BE)$
NRI	0
NGL	2

	reactor
NVI	$(3) + 1(\lambda) + 2(T_2, T_3) + 1(\dot{Q}_R)$
NVEI	$(1) + 2(T_2, T_3)$
NBI	$(2) + 1(BE)$
NRI	(1)
NGL	0

	global
NVI	$(3) + 1(\lambda) + 2(T_1, T_4) + 1(\dot{Q}_{glb})$
NVEI	$(1) + 1(T_1)$
NBI	$(2) + 1(BE)$
NRI	(0)
NGL	2

	processo (5x5)
NVI	$(3) + 1(\lambda) + 4(T_1, T_2, T_3, T_4) + 2(\dot{Q}_{TC}, \dot{Q}_R)$
NVEI	$(1) + 3(T_1, T_2, T_3) + 1(\dot{Q}_{TC} = 0)$
NBI	$(2) + 2(BE)$
NRI	(1)
NGL	0

1) reactor: BM e BE desacopladas

$$A: F_{A,2} - F_{A,3} - \lambda = 0$$

$$D: F_{D,2} - F_{D,3} + 2\lambda = 0$$

$$1 - F_{A,3} - \lambda = 0 \quad (1)$$

$$- F_{D,3} + 2\lambda = 0 \quad (2)$$

$$R1: (F_{A,2} - F_{A,3}) / F_{A,2} = 0,3 \rightarrow (1 - F_{A,3}) / 1 = 0,3 \quad (3)$$

$$De(3): F_{A,3} = 0,7 \text{ kmol/h}; De(1): \lambda = 0,3 \text{ kmol/h}$$

$$De(2): F_{D,3} = 0,6 \text{ kmol/h}$$

$$BE: \sum_{A=1}^S \left[\sum_{j=1}^I F_{A,j} (\hat{H}_{A,j} - \hat{H}_{A,ref}) - \sum_{K=1}^K F_{A,K} (\hat{H}_{A,K} - \hat{H}_{A,ref}) \right] + \sum_{q=1}^Q \lambda_q \Delta \hat{H}_{R,q}(T_{ref}) + \dot{Q}_R - \dot{W}_A = 0; \text{ seja } T_{ref} = T_3 = 200^\circ\text{C}$$

$$F_{A,2} (\hat{H}_{A,2} - \hat{H}_{A,3}) - \lambda \Delta \hat{H}_R(T_3) + \dot{Q}_R = 0$$

$$F_{A,2} \left(\sum_{T_3} \hat{C}_{p,A} dT - \lambda \Delta \hat{H}_R(T_3) \right) + \dot{Q}_R = 0 \quad (4)$$

$$\Delta \tilde{H}_R(T_{ref}) = \Delta \tilde{H}_R(T^\circ) + \int_{T^\circ}^T \Delta \tilde{C}_P dT$$

$$\Delta \tilde{H}_R(T^\circ) = \Delta \tilde{H}_R(25^\circ\text{C}) = 2 \cdot \Delta \tilde{H}_{f,D}^\circ - \Delta \tilde{H}_{f,A}^\circ$$

$$= 2 \cdot (-3 \cdot 10^5) - (-2 \cdot 10^5) = -4 \cdot 10^5 \text{ KJ/kmol}$$

$$\Delta \tilde{C}_P = 2 \cdot \tilde{C}_{P,D} - \tilde{C}_{P,A} = 2 \cdot 50 - 15 = 85 \text{ KJ/(kmol}^\circ\text{C)}$$

$$\therefore \Delta \tilde{H}_R(200^\circ\text{C}) = -4 \cdot 10^5 \frac{\text{KJ}}{\text{kmol}} + 85 \frac{\text{KJ}}{\text{kmol}^\circ\text{C}} \cdot (200 - 25)^\circ\text{C} = -385125 \frac{\text{KJ}}{\text{kmol}}$$

$$\text{De (4): } 1 \cdot 15 \cdot (100 - 200) - 0,3 \cdot (-385125) + \dot{Q}_R = 0$$

$$\dot{Q}_R = -114037,5 \text{ KJ/h}$$

$$\text{água de resfriamento: } \dot{Q} = -\dot{Q}_R = \dot{m}_{\text{H}_2\text{O}} \cdot \hat{C}_{P,\text{H}_2\text{O}} \cdot \Delta T$$

$$\dot{m}_{\text{H}_2\text{O}} = \frac{\dot{Q}}{\hat{C}_{P,\text{H}_2\text{O}} \cdot \Delta T} = \frac{114037,5 \text{ KJ/h}}{4,18 \frac{\text{KJ}}{\text{kg}^\circ\text{C}} \cdot (50 - 5)^\circ\text{C}} = 606,3 \text{ Kg/h}$$

$$2) \text{ TC BE: } \sum_{i=1}^3 \left[\sum_{j=1}^J F_{A,j} \cdot \tilde{H}_{A,j} - \sum_{k=1}^K F_{A,k} \cdot \tilde{H}_{A,k} \right] + \dot{Q}_{TC} - \dot{W}_S = 0$$

$$F_{A,1} \cdot \tilde{H}_{A,1} - F_{A,2} \cdot \tilde{H}_{A,2} + F_{A,3} \cdot \tilde{H}_{A,3} - F_{A,4} \cdot \tilde{H}_{A,4} + F_{D,3} \cdot \tilde{H}_{D,3} - F_{D,4} \cdot \tilde{H}_{D,4} = 0$$

$$\text{mas: } F_{A,1} = F_{A,2}; F_{A,3} = F_{A,4}; F_{D,3} = F_{D,4} \therefore$$

$$F_{A,1} \cdot (\tilde{H}_{A,1} - \tilde{H}_{A,2}) + F_{A,3} \cdot (\tilde{H}_{A,3} - \tilde{H}_{A,4}) + F_{D,3} \cdot (\tilde{H}_{D,3} - \tilde{H}_{D,4}) = 0$$

$$F_{A,1} \cdot (\tilde{H}_A(T_1) - \tilde{H}_A(T_2)) + F_{A,3} \cdot (\tilde{H}_A(T_3) - \tilde{H}_A(T_4)) + F_{D,3} \cdot (\tilde{H}_D(T_3) - \tilde{H}_D(T_4)) = 0$$

$$F_{A,1} \cdot \int_{T_2}^{T_1} \tilde{C}_{P,A} dT + F_{A,3} \cdot \int_{T_4}^{T_3} \tilde{C}_{P,A} dT + F_{D,3} \cdot \int_{T_4}^{T_3} \tilde{C}_{P,D} dT = 0$$

$$F_{A,1} \cdot \hat{C}_{P,A} (T_1 - T_2) + F_{A,3} \cdot \tilde{C}_{P,A} (T_3 - T_4) + F_{D,3} \cdot \tilde{C}_{P,D} (T_3 - T_4) = 0$$

$$F_{A,1} \cdot \tilde{C}_{P,A} (T_1 - T_2) + (F_{A,3} \cdot \tilde{C}_{P,A} + F_{D,3} \cdot \tilde{C}_{P,D}) \cdot (T_3 - T_4) = 0$$

$$1 \cdot 15 \cdot (25 - 100) + (0,7 \cdot 15 + 0,6 \cdot 50) \cdot (200 - T_4) = 0$$

$$-1125 + 40,5(200 - T_4) \rightarrow T_4 = 172,2^\circ\text{C}$$