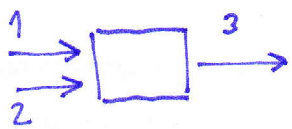


7-8 | 100 kg voda - 25°C + sstá pára 100°C (1 kg/min)



$$m_1 = 100 \text{ kg} \quad h_1 = h(\text{voda}, 25^\circ\text{C})$$

$$m_2 = (1 \cdot \tau) \text{ kg} \quad h_2 = h(\text{pára}, 100^\circ\text{C})$$

\uparrow min

výstup

$$h_3 = h(\text{voda}, t) \quad t \leq 100^\circ\text{C}$$

$$h_3 = \underbrace{\alpha \cdot h(\text{voda}, 100^\circ\text{C})}_{\text{zůstane v nádrži}} + \underbrace{(1-\alpha) h(\text{pára}, 100^\circ\text{C})}_{\text{projde jako pára}} \quad t = 100^\circ\text{C}$$

$$\Delta_{LV} h(100^\circ\text{C}) = 2257 \text{ kJ/kg}$$

$$c_p = 4,2 \text{ kJ/kg}\cdot\text{K} \quad (\text{voda})$$

volba ref. stavu: $h_{\text{ref}} = h(\text{voda}, 100^\circ\text{C}) = 0 \quad (\text{např.})$

$$h_1 = h(\text{voda}, 25^\circ\text{C}) = c_p \cdot (25 - 100) = -315 \text{ kJ/kg}$$

$$h_2 = h(\text{pára}, 100^\circ\text{C}) = \Delta_{LV} h = +2257 \text{ kJ/kg}$$

b) za jak dlouho dosáhne teplota v nádrži 100°C?

$$h_3 = h(\text{voda}, 100^\circ\text{C}) = 0 \quad (\text{dle volby ref. stavu})$$

$$m_1 \cdot h_1 + m_2 h_2 = (m_1 + m_2) \cdot h_3$$

$$100 \cdot (-315) + (1 \cdot \tau) \cdot 2257 = (100 + 1 \cdot \tau) \cdot 0$$

$$\tau = \frac{100 \cdot 315}{2257} = \underline{\underline{13,96 \text{ min}}}$$

a) $\tau = 10 \text{ min}$

$$m_1 h_1 + m_2 h_2 = (m_1 + m_2) \cdot h_3$$

$$100 \cdot (-315) + (1 \cdot 10) \cdot 2257 = (100 + 1 \cdot 10) \cdot h_3$$

$$h_3 = -81,18 \text{ kJ/kg}$$

$$h_3 = h(\text{voda}, t_x) = c_p \cdot (t_x - 100) = -81,18 \text{ kJ/kg}$$

$$t_x - 100 = -19,33 \text{ K}$$

$$\underline{\underline{t_x = 80,67^\circ\text{C}}}$$

a) $\tau = 20 \text{ min}$

$$100 \cdot (-315) + (1 \cdot 20) \cdot 2257 = \dots$$

$$\dots = 120 \cdot h_3$$

$$h_3 = 113,7 \text{ kJ/kg}$$

$$h_3 = \alpha \cdot h(l, 100^\circ\text{C}) + (1-\alpha) h(s, 100^\circ\text{C})$$

$$h_3 = \alpha \cdot 0 + (1-\alpha) \cdot 2257$$

$$113,7 = 2257 - 2257 \alpha$$

$$\alpha = 0,9996$$

Zůstane v nádrži: $m_3 \cdot \alpha = 120 \cdot \alpha = \underline{\underline{114 \text{ kg}}}$