

Problem # 1

What heat is required for producing $m_t = 50$ t/h superheated steam of 70 bar pressure and $t = 480^\circ\text{C}$ temperature if the temperature of feed-water is of 120°C ? The temperature of the water before a boiler is by 40°C lower than boiling point.

Specific heat to supply:

$$h = h_S - h_W = 3365 - 508 = 2857 \text{ kJ/kg}$$

Heat supply for 50 t/h:

$$Q = m_S \cdot h = 50000 \cdot 2857 = 143 \cdot 10^6 \text{ kJ/h}$$

Super-heater:

$$q_S = h_S - h'' = 3365 - 2774 = 591 \text{ kJ/kg}$$

Enthalpy of evaporation:

$$r = h'' - h' = 2774 - 1260 = 1514 \text{ kJ/kg}$$

Boiling:

$$q_b = h'' - h_p = 2774 - 1080 = 1694 \text{ kJ/kg}$$

Preheater:

$$q_p = h_p - h_W = 1080 - 508 = 572 \text{ kJ/kg}$$

