

Exercice 1:

$$COP = \frac{Q_L}{W} = \frac{h_1 - h_4}{h_2 - h_1}$$

$$h_1 = 396 \text{ kJ/kg}, h_2 = 425 \text{ kJ/kg}, h_3 = h_4 = 228 \text{ kJ/kg}$$

$$COP = \frac{396 - 228}{425 - 396} = \frac{168}{29} = 5.79$$

Exercice 2

$$h_2 = h_1 = 74.527 = h_f + xh_{fg}; x = 0.353$$

$$m_5 = m_6 = m_1 - xm_1 = 0.647 \text{ kg}$$

$$h_5 = h_6 = 17.8 \text{ kJ/kg}$$

$$Q_L = m_6(h_7 - h_6) = 0.647(155.536 - 17.8)$$

$$Q_L = 89.1 \text{ kJ/kg de } m_1$$

V.C Premier compresseur :

$$s_8 = s_7 = 0.7744 \text{ kJ/kgK}, P_8 = 0.1509 \text{ MPa}$$

$$h_8 = 196.3 \text{ kJ/kg}$$

V.C Mélangeur :

L'application du 1^{er} principe de la thermodynamique donne :

$$m_6h_8 + m_1h_2 = m_1h_3 + m_6h_5$$

$$h_3 = 190.016 \text{ kJ/kg}$$

$$h_3, P_3 = 0.1509 \text{ MPa} \Rightarrow s_3 = 0.7515 \text{ kJ/kgK}$$

V.C Deuxième compresseur :

$$P_4 = 0.9607 \text{ MPa}, s_3 = s_4 \Rightarrow h_4 = 225.8 \text{ kJ/kg},$$

V.C Condenseur :

$$Q_H = m_1(h_1 - h_4) = 74.527 - 225.8 = -151.27 \text{ kJ/g de } m_1$$

$$COP = \frac{Q_L}{W} = \frac{Q_L}{-(Q_L + Q_H)} = 1.4433$$

