

$$Q - W = \Delta U$$

$$Q = \Delta U + W$$

$$\Rightarrow \Delta U = \{\Delta U\}_{\text{air}} + \{\Delta U\}_{\text{w.v}} + \{\Delta U\}_{\text{w.l}}$$

$$\{\Delta U\}_{\text{air}} = m_{\text{air}} \cdot C_p (T_2 - T_1) = (1.13 \text{ kg}) (0.728 \text{ kJ/kg} \cdot \text{K}) (180 - 25 \text{ K}) = \underline{127.5092 \text{ kJ}}$$

$$\{\Delta U\}_{\text{w.v}} = m_{2, \text{w.v}} \cdot u_{2, \text{w.v}} - m_{1, \text{w.v}} \cdot u_{1, \text{w.v}} = (0.51589 \text{ kg}) \cdot (2583.7 \text{ kJ/kg}) = \underline{1332.904993 \text{ kJ}}$$

$$\begin{aligned} \{\Delta U\}_{\text{w.l}} &= m_{2, \text{w.l}} \cdot u_{2, \text{w.l}} - m_{1, \text{w.l}} \cdot u_{1, \text{w.l}} \\ &= (0.484 \text{ kg}) (762.09 \text{ kJ/kg}) - (1 \text{ kg}) \cdot (104.88 \text{ kJ/kg}) = \underline{263.97156 \text{ kJ}} \end{aligned}$$

$$\therefore \Delta U = 127.5092 + 1332.904993 + 263.97156 = \underline{1724.385753 \text{ kJ}}$$

$$m_{w,v} + m_{w,l} = m, \quad 0 < \chi < 1 \quad \chi = \frac{m_{w,v}}{m} \left(\frac{\text{질량}}{\text{질량}} \right) \quad 1 - \chi = \frac{m_{w,l}}{m} \left(\frac{\text{질량}}{\text{질량}} \right)$$

$$h_{\chi} = h_f + \chi \cdot (h_g - h_f) \\ = (1 - \chi) \cdot h_f + \chi \cdot h_g \quad \Rightarrow \quad \underline{h_{\chi} = \frac{m_{w,l}}{m} \cdot h_f + \frac{m_{w,v}}{m} \cdot h_g}$$

$$H_{\chi} = m \cdot h_{\chi} = m_{w,l} \cdot h_f + m_{w,v} \cdot h_g$$

$$H_{\chi_1} = m_{1,w,l} \cdot h_{1,w,l} + m_{1,w,v} \cdot h_{1,w,v}$$

$$H_{\chi_2} = m_{2,w,l} \cdot h_{2,w,l} + m_{2,w,v} \cdot h_{2,w,v}$$

⇓

$$\Delta H = H_{\chi_2} - H_{\chi_1} \quad (\chi_2 \text{는 상태 2 쪽, 질량이 } 0.51589 \\ \chi_1 \text{은 상태 1 쪽, 질량이 } 0 \quad \text{인 상태})$$

$$= m_{2,w,l} \cdot h_{2,w,l} + m_{2,w,v} \cdot h_{2,w,v} - m_{1,w,l} \cdot h_{1,w,l} - m_{1,w,v} \cdot h_{1,w,v}$$

$$= \underbrace{m_{2,w,v} \cdot h_{2,w,v} - m_{1,w,v} \cdot h_{1,w,v}}_{= \{\Delta H\}_{wv}} + \underbrace{m_{2,w,l} \cdot h_{2,w,l} - m_{1,w,l} \cdot h_{1,w,l}}_{\{\Delta H\}_{wl}}$$

⇒ 문제이 적용해보자!

$$\{\Delta H\}_{wv} = m_{2,w,v} \cdot h_{2,w,v} - \cancel{m_{1,w,v}} \cdot h_{1,w,v} = (0.51589 \text{ kg}) \cdot \overset{\text{교수님과 거의 다른 부분입니다!}}{2777.2} = \underline{1432.729708 \text{ kJ}}$$

$$\{\Delta H\}_{wl} = m_{2,w,l} \cdot h_{2,w,l} - m_{1,w,l} \cdot h_{1,w,l} = (0.484 \text{ kg}) (763.05) - (1 \text{ kg}) (104.83) \\ = \underline{264.4862 \text{ kJ}}$$

$$\therefore \{\Delta H\}_{wv} + \{\Delta H\}_{wl} = 1697.215908 \text{ kJ}$$

(정답)

$$H_{x_2} = m \cdot h_{x_2} = m \left(\frac{m_{2,w}}{m} h_{2,w} + \frac{m_{2,wv}}{m} h_{2,wv} \right)$$

$$= m_{2,w} \cdot h_{2,w} + m_{2,wv} \cdot h_{2,wv} = (0.484 \text{ kg})(763.05) + (0.51589 \text{ kg})(2777.2) \\ = 1802.045908 \text{ kJ}$$

$$H_{x_1} = m \cdot h_{x_1} = m_{1,w} \cdot h_{1,w} + \cancel{m_{1,wv}} \cdot h_{1,wv} = (1 \text{ kg}) \cdot (104.83) = 104.83 \text{ kJ}$$

$$\therefore H_{x_2} - H_{x_1} = \underline{1697.215908 \text{ kJ}}$$

$$\Rightarrow \Delta H = H_{x_2} - H_{x_1} = \{\Delta H\}_{wv} + \{\Delta H\}_{w1} = \underline{1697.215908 \text{ kJ}}$$

Opinion

$\{\Delta H\}_{wv} = m_{2,wv} \cdot h_{2,wv} - \cancel{m_{1,wv}} \cdot h_{1,wv}$ 에서 $h_{2,wv}$ 가 h_{2g} 즉, 2777.2 kJ/kg 가 되어야 한다고 생각합니다!