

(P) Steam

$$a) T_1 = 40^\circ\text{C}, x_1 = 100\%, p_2 = 150 \text{ kPa}.$$

$$s_1 = 8.2555 \text{ kJ/kgK}, h_1 = 2573.5 \text{ kJ/kg}$$

(SHV)

$$@ p_2 \quad s_1 \approx s_2 = 8.231 \rightarrow T_2 = 360^\circ\text{C} \quad h_2 = 3195.3 \text{ kJ/kg}$$

$$h_2 - h_1 = 621.8 \text{ kJ/kg}$$

$$b) T_1 = 10^\circ\text{C} \quad x_1 = 75\%$$

$$s_1 = s_f|_{T=10} + (s_g|_{T=10} - s_f|_{T=10})x_1$$

$$= 0.151090 \text{ kJ/kgK} + (8.8998 - 0.151090) \left(\frac{\text{kJ}}{\text{kg} \cdot \text{K}} \right) (0.75)$$

$$\approx 6.71262 \text{ kJ/kgK}$$

$$u_1 = u_f|_{T=10} + (u_g|_{T=10} - u_f|_{T=10})x_1$$

$$= 42.020 \frac{\text{kJ}}{\text{kg}} + (2385.6 - 42.020) \left(\frac{\text{kJ}}{\text{kg}} \right) (0.75)$$

$$\approx 1802.0 \text{ kJ/kg}$$

$$p_2 = 1 \text{ MPa} = 10 \text{ bar if } s_1 = s_2 \text{ since } s_2 > s_g|_{p=10}$$

it is a SHV

using interpolation

$$T_2 = (s_2 - s|_{T=200}) \frac{\Delta T}{\Delta s} + T$$

$$= (6.71262 \frac{\text{kJ}}{\text{kgK}} - 6.696 \frac{\text{kJ}}{\text{kgK}}) \frac{240 - 200}{(6.884 \frac{\text{kJ}}{\text{kgK}} - 6.616 \frac{\text{kJ}}{\text{kgK}})} + 200$$

$$\approx 203.5^\circ\text{C}$$

same way,

$$u_2 = (s_2 - s|_{T=200}) \frac{\Delta u}{\Delta s} + u$$

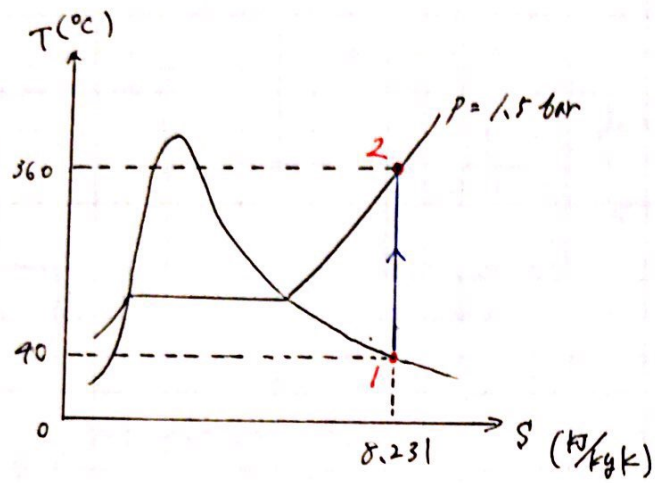
$$\approx 2628.5 \frac{\text{kJ}}{\text{kg}}$$

$$u_2 - u_1 = 826.5 \text{ kJ/kg}$$

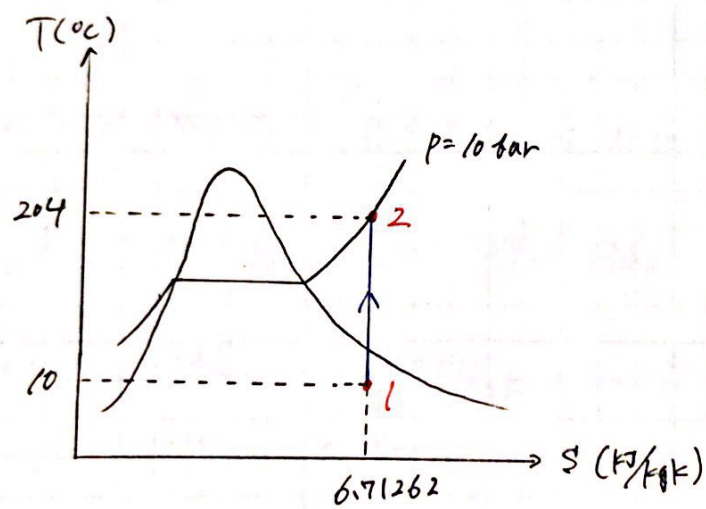
$$T_2 = 204^\circ\text{C}$$

$$u_2 - u_1 = 827 \frac{\text{kJ}}{\text{kg}}$$

(a)



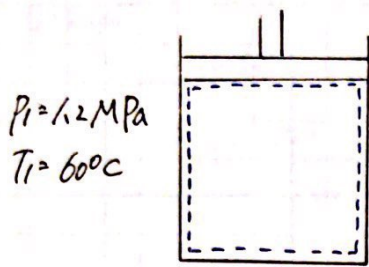
(b)



(1)

GIVEN

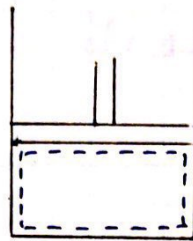
<FPD>



$$P_1 = 1.2 \text{ MPa}$$

$$T_1 = 600^\circ\text{C}$$

(1)



$$P_2 = 1.0 \text{ MPa}$$

$$s_2 - s_1 = -0.077 \text{ kJ/kgK}$$

(2)

ASSUMPclosed sys, $\Delta KE = \Delta PE = 0$ EQN

$$Q = \Delta U + W$$

$$\text{FIND } T_2 (^\circ\text{C}), h_2 (\text{kJ/kg})$$

SOLN

from table @ state ①

$$P_1 = 12 \text{ bar} < 21.18 \text{ bar} = P_{\text{sat}}|_{T=60}$$

so it's a SHV

$$s_1 = 1.888 \text{ kJ/kgK}, h_1 = 559.1 \text{ kJ/kg}$$

now

$$s_2 = 1.888 \text{ kJ/kgK} - 0.077 \text{ kJ/kgK} = 1.811 \text{ kJ/kgK}$$

then for $P_2 = 1.0 \text{ MPa} = 10 \text{ bar}$

$$\text{comparing } s_g|_{P=10} = 1.9245 \text{ kJ/kgK} < s_2$$

the state is SHV

thnc from table @ s_2, P_2

$$T_2 = 40^\circ\text{C}$$

$$h_2 = 524.7 \text{ kJ/kg}$$