

(1)

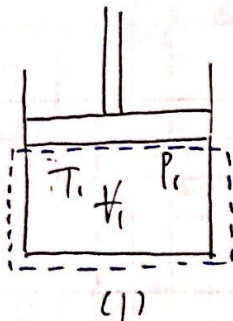
GIVEN

Piston-cylinder with refrigerant R-134a

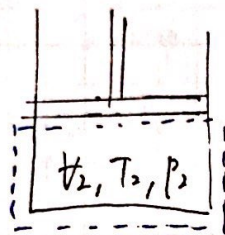
>> constant p process

* $P_1 = 4 \text{ bar} \rightarrow P_2, T_1 \rightarrow T_2 = 30^\circ\text{C}$

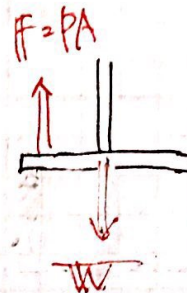
>> pF & kF negligible

FIND Show p-v diagram and find work, \dot{W} and \dot{Q} FFD

(1)



(2)

FFDASSUMP

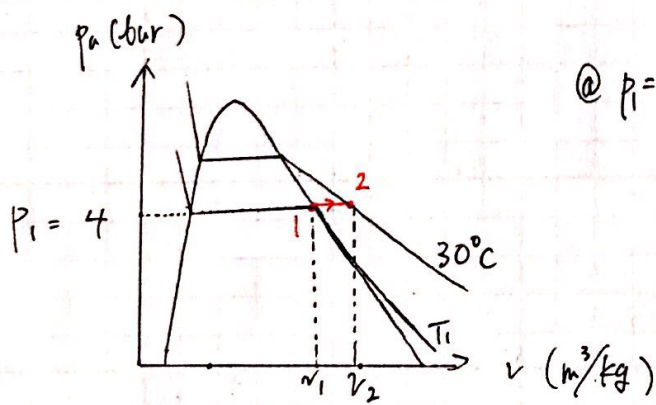
- closed sys.
- Quasi-equilibrium
- pF = kF = 0
- isobar

EQN

$$\frac{dm}{dt}\bigg|_{\text{sys}} = \dot{m}_{\text{in}} - \dot{m}_{\text{out}}$$

$$\cancel{\Delta pF} + \cancel{\Delta kF} + \Delta U = Q - W$$

$$W = \int p dV$$

SOLN

$$@ P_1 = 4.0 \text{ bar } T_{\text{sat}} = 8.9306^\circ\text{C}$$

the is all gas, and from SHV @ $P_1 = 4 \text{ bar}$ and state 1 is ($T_1 = T_{\text{sat}}$)

$$v_{g1} = 0.051207 \frac{\text{m}^3}{\text{kg}}$$

and at state 2 using same table $v_{g2} = 0.05680$

thus,

$$W_{12} = \int_{v_1}^{v_2} P dv = P_1 v_{g2} - P_1 v_{g1} = (4 \times 10^5 \text{ Pa})(0.05680 - 0.051207) \frac{\text{m}^3}{\text{kg}} \approx 2.237 \frac{\text{kJ}}{\text{kg}}$$