



UNIVERSITÀ  
DEGLI STUDI DI TRIESTE

$$C_p - C_v = R$$

$$f = \frac{5}{2} = \frac{C_p}{R}$$

$$C_v = \frac{3}{2} R$$

$$C_p = \frac{5}{2} R$$

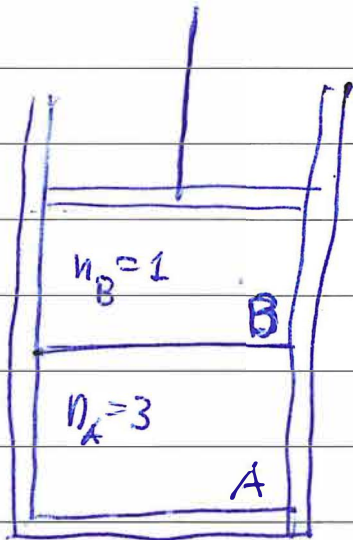
$$n_A = 3 \quad n_B = 1$$

$$T_0 = 300 \text{ K}$$

$$pV = nRT$$

$$V_A = V_B$$

$$V_{B, \text{final}} = 8V_B$$



$$\Delta S_U = \Delta S_A + \Delta S_B = 0$$

$$\Delta S = n C_v \ln \frac{T_f}{T_i} + n R \ln \frac{V_f}{V_i}$$

$$\Delta S_A = n_A C_v \ln \frac{T_f}{T_0}$$

$$\Delta S_B = n_B C_p \ln \frac{T_f}{T_0} + n_B R \ln \frac{V_f}{V_i}$$

$$= n_B C_v \ln \frac{T_f}{T_0} + n_B R \ln 8$$

$$\Delta S_A + \Delta S_B = 0$$

$$= n_A C_v \ln \frac{T_f}{T_0} + n_B C_v \ln \frac{T_f}{T_0} + n_B R \ln 8 = 0$$

$$T_f = T_i \cdot \left( \frac{V_f}{V_i} \right)^{\frac{n_B R}{(n_A + n_B) C_V}}$$

$$\uparrow$$

$$\approx 300 \text{ K} \cdot 8$$

$$\uparrow$$

$$\approx 300 \cdot 8 - \frac{1}{\frac{4 \cdot \frac{3}{2}}{2}} = 212 \text{ K}$$

$$L_A = 0$$

$$L_B = ?$$

(A+B)

$$L_B = L_{A+B} = \textcircled{(A+B)} - \Delta U_{(A+B)}$$

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$$L_B = -\Delta U_{A+B} = -\Delta U_A - \Delta U_B =$$

$$L_B = -n_A C_V (T_f - T_i) - n_B C_V (T_f - T_i)$$

$$= (n_A + n_B) C_V (T_i - T_f)$$

$$= 4 \cdot \frac{3}{2} R \cdot 88 = \underline{\underline{4381 \text{ J}}}$$



$$T dS = dU + p dV$$

$$pV = nRT$$

$$dS = n c_v \frac{dU}{U} + nR \frac{dV}{V}$$

$$\Delta S = \int dS = n c_v \int_{U_0}^{1/2 U_0} \frac{dU}{U} + nR \int_{V_0}^{4V_0} \frac{dV}{V}$$

$$= \frac{5}{2} nR \ln \frac{1}{2} + nR \ln 4$$

$$= nR \left[ \frac{5}{2} \ln \frac{1}{2} + \ln 4 \right] = -\frac{nR}{2} \ln 2$$

$$\Delta S_{\text{AMB}} = ?$$

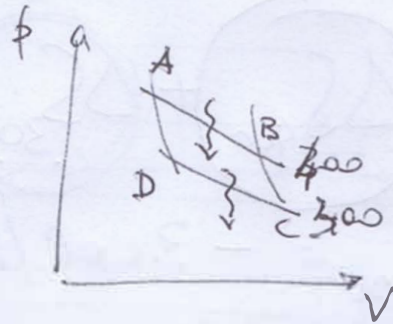
Il rendimento

$$\eta_c = 1 - \frac{300}{400} = 0.25 \quad 25\%$$

Il lavoro lungo il ciclo

$$L = Q = Q_{AB} + Q_{CD}$$

$$= Q_{400} + Q_{300}$$



Per calcolare i calori uso l'entropia.  
Ricontribuisco poi che per il sistema

$$Q_{AB} = Q_{400} > 0$$

$$Q_{CD} = Q_{300} < 0$$

$$\Delta S_{AB} = \frac{Q_{AB}}{T_{400}} > 0$$

$$\Delta S_{CD} = \frac{Q_{CD}}{T_{300}} < 0$$

Per il ciclo, inoltre  $\Delta S = \phi$

$$\Delta S_{AB} + \Delta S_{CD} = \phi$$

da cui

$$\Delta S_{AB} = 3 \text{ cal/K} = 12.55 \text{ J/K}$$

$$1 \text{ cal} = 4.184 \text{ J}$$

$$\Delta S_{CD} = -3 \text{ cal/K} = -12.55 \text{ J/K}$$

$$Q_{AB} = 12.55 \times 400 = 5021 \text{ J}$$

$$Q_{CD} = -12.55 \times 300 = -3766 \text{ J}$$

$$L = 1255 \text{ J}$$