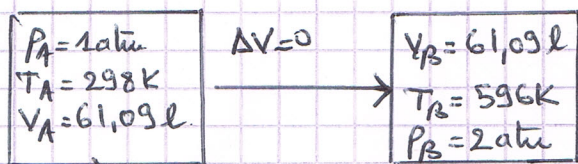


EXON^o 1:

$A \rightarrow B$: $Q_{AB} = \Delta U_{AB} \Rightarrow$ transf isochore $\Delta V = 0$

$B \rightarrow C$: $\Delta U = 0 \Rightarrow$ transf isotherme $\Delta T = 0$

$C \rightarrow A$: $Q_{CA} = 0 \Rightarrow$ transf adiabatique



* calcul n:

$$P_A V_A = n R T_A \Rightarrow n = 2,5 \text{ mol}$$

$$Q_{AB} = n C_V (T_B - T_A)$$

$$\begin{cases} \frac{C_p}{C_V} = \gamma \\ C_p - C_V = R \end{cases} \Rightarrow \begin{cases} C_V = 5 \text{ cal K}^{-1} \text{ mol}^{-1} \\ C_p = 7 \text{ cal K}^{-1} \text{ mol}^{-1} \end{cases}$$

$$\Rightarrow T_B = T_A + \frac{Q_{AB}}{nC_V} \Rightarrow T_B = 596 \text{ K}$$

$$P_B V_B = n R T_B \Rightarrow P_B = 2 \text{ atm}$$

$$* T_A V_A^{\gamma-1} = T_C V_C^{\gamma-1} \Rightarrow V_C = V_A \left(\frac{T_A}{T_C} \right)^{\frac{1}{\gamma-1}} \Rightarrow V_C = 10,79 \text{ L}$$

$$* P_C V_C = n R T_C \Rightarrow P_C = 11,32 \text{ atm}$$

* $A \rightarrow B$ $\Delta V = 0$

$$Q_{AB} = \Delta U_{AB} = 3725 \text{ cal}$$

$$W_{AB} = 0$$

* $B \rightarrow C$ $\Delta T = 0$

$$\Delta U_{BC} = 0 \Rightarrow \Delta U = Q_{BC} + W_{BC}$$

$$W_{BC} = -n R T \ln \frac{V_C}{V_B}$$

$$W_{BC} = -5166,510 \text{ cal}$$

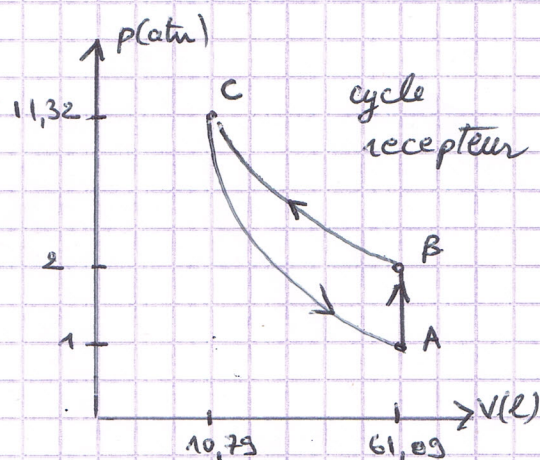
$$Q_{BC} = -W_{BC}$$

$$Q_{BC} = +5166,5 \text{ cal}$$

* $C \rightarrow A$ $Q_{CA} = 0$

$$\Delta U_{CA} = W_{CA} = n C_V (T_A - T_C)$$

$$\Delta U_{CA} = -3725 \text{ cal} \quad W_{CA} = -3725 \text{ cal}$$



$$\Delta W_{\text{cycle}} = \Delta W_{AB} + \Delta W_{BC} + \Delta W_{CA} = 0$$

$$W_{\text{cycle}}: W_{AB} + W_{BC} + W_{CA} = 14 + 1,5 \text{ cal} > 0, \quad \phi_{\text{cycle}} = -W_{\text{cycle}}$$

c) transformation irréversible:

BC : Isotherme:

$$dW = -P_{\text{ext}} \cdot dV = -P_f \cdot dV$$

$$W_{\text{irrev}} = -P_C (V_C - V_B) = -11,32 (10,79 - 61,09) \cdot 101,3 / 4,18$$

$$W_{\text{irrev}} = -13798,99 \text{ cal}$$

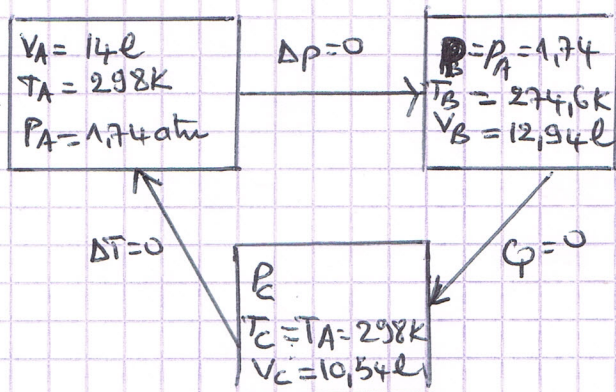
EXON° 2

$$n = 1 \text{ mole (g.p.)}$$

$$A \rightarrow B: \phi_{AB} = \Delta H_{AB} \quad \Delta P = 0 \text{ Isobare.}$$

$$B \rightarrow C: W_{BC} = \Delta W_{BC} \quad \phi_{BC} = 0 \text{ adiabatique.}$$

$$C \rightarrow A: \Delta W_{CA} = 0 \quad \Delta T = 0 \text{ Isotherme}$$



$$P_A V_A = n R T_A$$

$$\Rightarrow P_A = 1,74 \text{ atm}$$

$$\begin{cases} C_p - C_v = R \\ \frac{C_p}{C_v} = \gamma \end{cases}$$

$$\Rightarrow \gamma = 1,4 \quad C_p = 29,08 \text{ J K}^{-1} \text{ mol}^{-1}$$

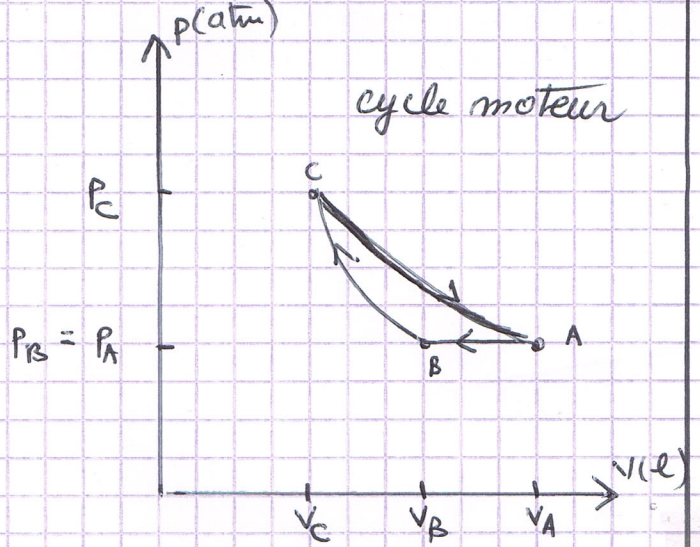
$$\phi_{AB} = n C_p (T_B - T_A) \Rightarrow T_B = T_A + \frac{\phi_{AB}}{n C_p}$$

$$* T_B = 298 + \frac{(-680,5)}{29,08} \Rightarrow T_B = 274,6 \text{ K}$$

$$* P_B V_B = n R T_B \Rightarrow V_B = 12,94 \text{ L}$$

$$* T_C V_C^{\gamma-1} = T_B V_B^{\gamma-1} \Rightarrow V_C = V_B \left(\frac{T_B}{T_C} \right)^{\frac{1}{\gamma-1}} \Rightarrow V_C = 10,54 \text{ L}$$

$$* P_C V_C = n R T_C \Rightarrow P_C = 2,31 \text{ atm}$$



$$A \rightarrow B \quad Q_{AB} = -680,5 \text{ J}$$

$$W_{AB} = -P(V_B - V_A) \cdot 101,3 \Rightarrow W_{AB} = -186,83 \text{ J}$$

$$\Delta H_{AB} = Q_{AB}$$

$$B \rightarrow C \quad Q_{BC} = 0$$

$$\begin{aligned} W_{BC} &= \Delta U_{BC} = nC_V(T_C - T_B) \\ &= 1 \cdot 20,77(298 - 274,6) \end{aligned}$$

$$W_{BC} = 486,01 \text{ J}$$

$$\Delta H_{BC} = nC_P(T_C - T_B) \Rightarrow \Delta H_{BC} = 680,47 \text{ J}$$

$$C \rightarrow A \quad \Delta T = 0$$

$$\Delta H_{CA} = 0 \Rightarrow Q_{CA} = -W_{CA}$$

$$W_{CA} = -nRT \ln \frac{V_A}{V_C}$$

$$W_{CA} = -703,84 \text{ J}$$

$$Q_{CA} = +703,84 \text{ J}$$

$$\Delta H_{\text{cycle}} = 0 \Rightarrow Q_{\text{cycle}} = -W_{\text{cycle}}$$

e) transformation irréversible

$A \rightarrow B$ $p = 0$ Isobare:

$$W_{AB}(\text{irrev}) = -P(V_B - V_A)$$

$$W_{AB}(\text{irrev}) = W_{AB}(\text{rev})$$