

(1) حساب في كل حالة P, T, V

$$P_1 V_1 = n R T_1 \Rightarrow T_1 = \frac{P_1 V_1}{n R}$$

$$T_1 = \frac{1 \times 22,4}{1 \times 0,082} \Rightarrow T_1 = 273 \text{ K}$$

T_1

$$T_2 = \frac{P_2 V_2}{n R} = \frac{0,5 \times 98,6}{1 \times 0,082} \Rightarrow T_2 = 546,3 \text{ K}$$

T_2

$$P_1 V_1^\gamma = P_2 V_2^\gamma$$

$P_1 = P_2 = 0,5 \text{ atm}$ ، V_1 .

$$\gamma = \frac{C_p}{C_v} = 1,4$$

$$\Rightarrow V_1 = 22,4 \left(\frac{1}{0,5} \right)^{\frac{1}{1,4}} \Rightarrow V_1 = 34 \text{ l}$$

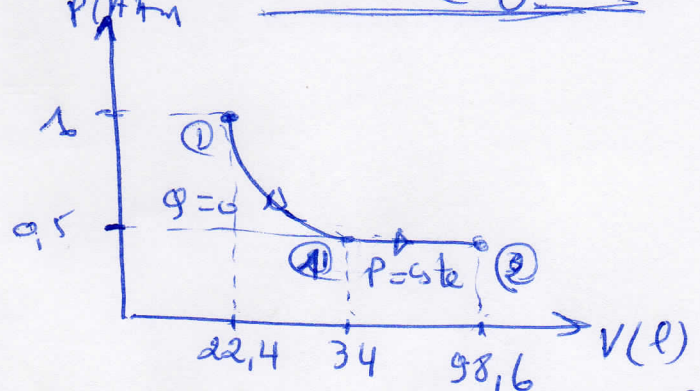
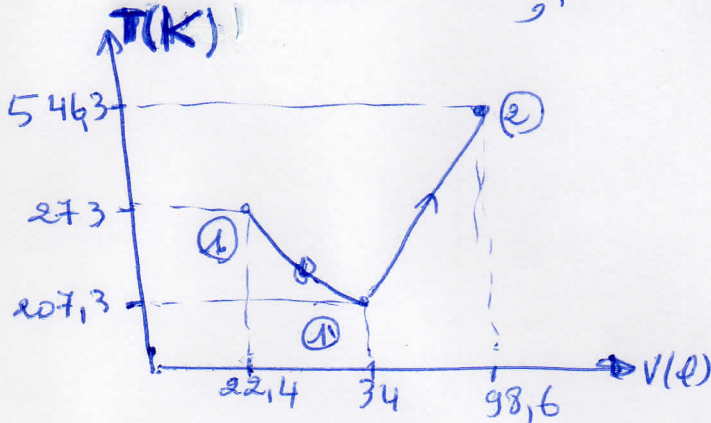
$$V_1 = 34 \text{ l}$$

$$T_1 = \frac{P_1 V_1}{n R} = \frac{34 \times 0,5}{1 \times 0,082} \Rightarrow T_1 = 207,3 \text{ K}$$

$$T_1 = 207,3 \text{ K}$$

T, V

التمثيل على منحنى P, V (الضغط - الحجم)



(3) حساب $w, q, \Delta U, \Delta S$ في كل مرحلة و ΔS الكلية لجميع المراحل

الحول 1 - 1' : تحول أدياباتيكي $q = 0$ و $\Delta S = 0$

$$\Delta U_{11'} = w_{11'} + q_{11'} \Rightarrow \Delta U_{11'} = w_{11'} = n C_v \Delta T = 1 \times 5 (207,3 - 273)$$

$$\Delta U = -198,4 \text{ cal} = -830 \text{ J}$$

$$\Delta H_{11'} = n C_p \Delta T = 1 \times 7 (207,3 - 273)$$

$$\Delta H_{11'} = -328,15 \text{ cal} = -1375 \text{ J}$$

$$C_p - C_v = R$$

$$C_p = 2 + 5 = 7 \text{ cal/K mol}$$

$$\Delta H_{12} = q_p = n C_p \Delta T = 1 \times 7 (546,3 - 207,3)$$

$$\Delta H_{12} = 1695 \text{ cal} = 7094 \text{ J}$$

الحول 1' - 2 : $P = \text{cte}$

$$w_{1'2} = -P \Delta V = 0,5 (98,6 - 34) \text{ l atm} = -32,3 \text{ l atm} = -671,3 \text{ cal} = -2809 \text{ J}$$

$$\Delta U_{1'2} = n C_v \Delta T = 1 \times 5 (546,3 - 207,3) \Rightarrow \Delta U_{1'2} = 1023,7 \text{ cal}$$

$$\Delta S_{1'2} = n C_p \ln \frac{546,3}{207,3} \Rightarrow \Delta S = 2027 \text{ J/K}$$