

39.)

$p_1 = 0,1 \text{ MPa}$ 1 atomos $\rightarrow \underline{f}$ (4=1)
 $V_1 = 5 \text{ dm}^3 \rightarrow V_2 = 10 \text{ dm}^3 \rightarrow V_3 = 5 \text{ dm}^3 \rightarrow V_4 = V_3 = 5 \text{ dm}^3$
 $p_3 = p_2$ $p_4 = p_1 = 0,1 \text{ MPa}$

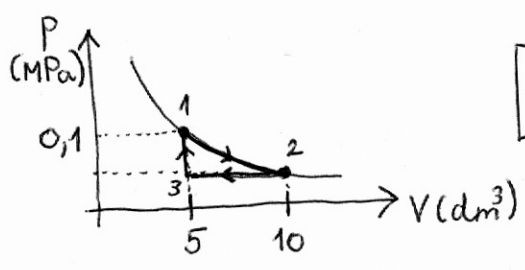
$$\boxed{W_g = -W}$$

$$\boxed{pV = nRT}$$

$$\boxed{E_b = \frac{f}{2} nRT = \frac{f}{2} pV}$$

$$\boxed{\Delta E_b = Q + W}$$

$\Delta E_b = 0$
 $\hookrightarrow T_2 = T_1$



$$\boxed{Q = -Q_{e2}}$$

$$\boxed{\delta W = -pdV}$$

a.) $\sum W_g = ?$
 b.) $Q_{12} + Q_{31} = ?$

a.) $\sum W_g = ?$

$1 \rightarrow 2$ $pV = nRT$ $p_1 V_1 = p_2 V_2 \rightarrow p_2 = p_1 \frac{V_1}{V_2} = \dots$
 $T_1 = T_2$ $p = \frac{nRT}{V} = \frac{p_1 V_1}{V}$ $\delta W_g = p dV = \frac{p_1 V_1}{V} dV$
 $W_{g12} = \int_{V_1}^{V_2} p dV = p_1 V_1 \int_{V_1}^{V_2} \frac{dV}{V} = p_1 V_1 \ln\left(\frac{V_2}{V_1}\right) = \dots$

$2 \rightarrow 3$ $p = \text{all}$

$W_{g23} = p_2 \Delta V = p_2 (V_3 - V_2) = \dots$

$3 \rightarrow 1$ $\Delta V = 0 \rightarrow W_g = 0$ $\underline{\underline{\sum W_g}} = W_{g12} + W_{g23} = \dots$

b.) $\Delta E_b = Q + W \rightarrow Q = \Delta E_b - W = \Delta E_b + W_g$

$1 \rightarrow 2$ $\Delta E_{b12} = 0 \rightarrow Q_{12} = 0 + W_{g12} = W_{g12} = \dots$

$3 \rightarrow 4(1)$ $\Delta E_{b31} = \frac{f}{2} (p_1 V_1 - p_3 V_3) = \dots \rightarrow Q_{31} = \Delta E_{b31} + \underbrace{W_{g31}}_0 = \Delta E_{b31} = \dots$

$Q_{12} + Q_{31} = \dots$