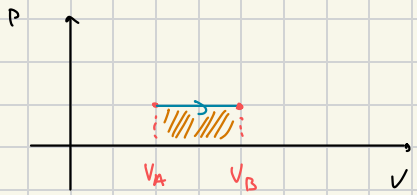
Pag 448 n 116

$n = 5\,mol$
$\ell = 3$
$P_A = 1\,atm = 1 \cdot 10^5\,Pa$
$T_A = 300\,K$



$V_B = 2V_A$ $\quad W = ?$ $\quad \Delta U = ?$ $\quad Q = ?$

- $W = P_A \cdot \Delta V = P_A (V_B - V_A) = P_A (2V_A - V_A) = P_A V_A \approx 12{,}5\,kJ$

Devo calcolare $V_A \rightsquigarrow P_A V_A = nRT_A \Rightarrow V_A = \frac{nRT_A}{P_A}$ ($P_A V_A = nRT_A$)

- $\Delta U = \frac{\ell}{2} nR\Delta T = \frac{\ell}{2} nR(T_B - T_A) = \frac{\ell}{2} nR(2T_A - T_A) = \frac{\ell}{2} nRT_A \approx 18{,}7\,kJ$

$\frac{V_A}{T_A} = \frac{V_B}{T_B} \rightsquigarrow T_B = \frac{V_B}{V_A} \cdot T_A = \frac{2V_A}{V_A} T_A = 2T_A$

- $\Delta U = Q - W \rightsquigarrow Q = \Delta U + W = 31{,}2\,kJ$

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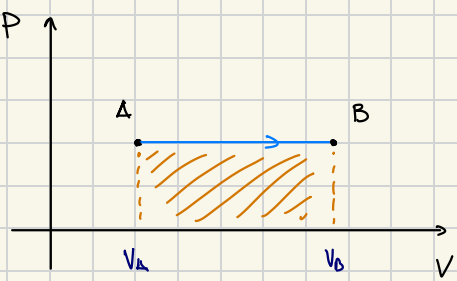
n 150 :

$n = 3\,mol$ $\quad \ell = 5$
$T_A = 300\,K$
$V_B = \frac{5}{2} V_A$



$T_B = ?$
$Q = ?$
$\Delta U = ?$

- $\frac{V_A}{T_A} = \frac{V_B}{T_B} \rightsquigarrow T_B = \frac{V_B}{V_A} \cdot T_A = \frac{\frac{5}{2} V_A}{V_A} T_A = \frac{5}{2} 300\,K = 750\,K$

▷ $Q = \frac{\ell+2}{2} nR\Delta T = \frac{\ell+2}{2} nR(T_B - T_A) \approx 3{,}93 \cdot 10^4\ J$

▷ $\Delta U = \frac{\ell}{2} nR\Delta T = \frac{\ell}{2} nR(T_B - T_A) \approx 2{,}81 \cdot 10^4\ J$

▷ W? Uso il I principio $\Delta U = Q - W \rightsquigarrow W = Q - \Delta U = 1{,}12 \cdot 10^4\ J$

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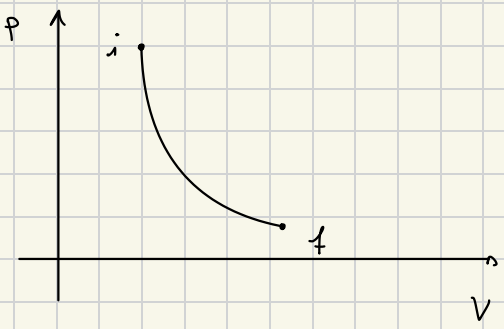
n ideale:

$\ell = 3 \rightsquigarrow \gamma = \frac{\ell+2}{\ell} = \frac{5}{3}$



$P_i = 1{,}2 \cdot 10^5\ Pa$
$V_i = 3\ L = 3 \cdot 10^{-3}\ m^3$
Adiabatica $\rightsquigarrow Q = 0$

$P_f = \frac{40}{100} P_i = \frac{4}{10} P_i$

$T_f = 310K \qquad V_f = ? \qquad n = ?$

Uso formule adiabatica (con le pressioni)

$P_f = \left(\frac{V_i}{V_f}\right)^\gamma P_i \rightsquigarrow \frac{P_f}{P_i} = \left(\frac{V_i}{V_f}\right)^\gamma \xrightarrow{\text{elevo a } \frac{1}{\gamma}} \left(\frac{P_f}{P_i}\right)^{\frac{1}{\gamma}} = \frac{V_i}{V_f}$

$\rightsquigarrow V_f = V_i \left(\frac{P_i}{P_f}\right)^{\frac{1}{\gamma}} = V_i \left(\frac{P_i}{\frac{4}{10} P_i}\right)^{\frac{1}{\gamma}} = V_i \left(\frac{10}{4}\right)^{\frac{1}{\gamma}} \approx 3{,}7 \cdot 10^{-3}\ m^3$

Per il numero di moli $P_f V_f = nRT_f \rightsquigarrow n = \frac{P_f V_f}{RT_f} \approx 0{,}12\ mol$