

$$\begin{aligned}
 3 // \quad W_{rev} &= - \int_{V_2}^{V_1} nRT \frac{dV}{V} = -nRT \ln \frac{V_1}{V_2} \\
 &= -P_1 V_1 \ln \frac{V_1}{V_2} = -5 \times 2 \ln \frac{2}{10} \\
 &= 16,09 \text{ L} \cdot \text{atm} = 1630,3 \text{ J} \\
 4 // \quad W_{irr} &= - \int_{V_2}^{V_1} P_{ext} dV = -P_1 (V_1 - V_2) = 4052 \text{ J}
 \end{aligned}$$

Exercício 5:

$$\begin{aligned}
 1 // \quad dU &= \delta W + \delta Q = \delta Q - PdV \\
 \text{transformation isochore} &\Rightarrow dV = 0 \\
 \Rightarrow \delta Q &= dU \Rightarrow Q_V = \Delta U \\
 &= nC_V \Delta T
 \end{aligned}$$

$$\begin{aligned}
 C_p - C_v &= R \Rightarrow C_v = C_p - R \\
 \Rightarrow Q_V &= 1 \times (C_p - R) (373 - 298) \\
 &= 1 \times (29,2 - 8,31) \times 75 = 1566,75 \text{ J}
 \end{aligned}$$

$$\begin{aligned}
 2 // \quad P = \text{cte} &\Rightarrow Q_p = \Delta H = nC_p \Delta T \\
 \Rightarrow Q_p &= 1 \times 29,2 \times 75 = 2190 \text{ J}
 \end{aligned}$$