a) $C_V = 1.5R = \frac{3}{2}R \Rightarrow$ 3 grados de libertad $\Rightarrow$ Monoatómico

A//

b) $pV = mRT \Rightarrow p = \frac{mRT}{V} = \frac{1 \cdot 8.314 \cdot 300}{2 \times 10^{-3}} = 1\,247\,100\ Pa \Rightarrow 12.3\ atm$

B//

c) $v_q = \sqrt{\frac{3 \cdot K_B \cdot T}{m_o}} = \sqrt{\frac{3 \cdot 1.38 \times 10^{-23} \cdot 300}{40 \cdot 1.66 \times 10^{-27}}} = 432\ m/s$

C//

P1) $\Delta U = mc_V \Delta T = 1 \times 1.5R \times (500 - 300) = 300R$

B//

P2) $\Delta S = \int ds = \int \frac{dq}{T} = \int \frac{dU}{T} - \int \frac{dW}{T} =$

$dq = dU - dW \qquad = \int \frac{mc_V}{T} dT + \int \frac{p}{T} dV =$

$dU = mc_V\, dT$

$dW = -p\, dV \qquad = \int \frac{mc_V}{T} dT + \int \frac{mR}{V} dV =$

$pV = mRT \qquad = mc_V \ln\left(\frac{T_f}{T_i}\right) + mR \ln\left(\frac{V_f}{V_i}\right) =$

$= m(c_V + R) \ln\left(\frac{T_f}{T_i}\right) = 1.28R$ B//