

86. (a) The temperature is $10^\circ\text{C} \rightarrow T = 283\text{ K}$. Then, with $n = 3.5\text{ mol}$ and $V_f/V_0 = 3/4$, we use Eq. 20-14:

$$W = nRT \ln \left(\frac{V_f}{V_0} \right) = -2369\text{ J} \approx -2.4\text{ kJ} .$$

- (b) The internal energy change ΔE_{int} vanishes (for an ideal gas) when $\Delta T = 0$ so that the First Law of Thermodynamics leads to $Q = W = -2.4\text{ kJ}$. The negative value implies that the heat transfer is from the sample to its environment.