46. (a) According to the first law of thermodynamics $Q = \Delta E_{\text{int}} + W$. When the pressure is a constant $W = p\,\Delta V$. So

$$\begin{aligned}
\Delta E_{\text{int}} &= Q - p\Delta V \\
&= 20.9\,\text{J} - \left(1.01 \times 10^5\,\text{Pa}\right)\left(100\,\text{cm}^3 - 50\,\text{cm}^3\right)\left(\frac{1 \times 10^{-6}\,\text{m}^3}{1\,\text{cm}^3}\right) \\
&= 15.9\ \text{J}\ .
\end{aligned}$$

(b) The molar specific heat at constant pressure is

$$\begin{aligned}
C_p &= \frac{Q}{n\Delta T} \\
&= \frac{Q}{n\left(\frac{p\Delta V}{nR}\right)} = \frac{R}{p}\,\frac{Q}{\Delta V} \\
&= \frac{\left(8.31\,\frac{\text{J}}{\text{mol}\cdot\text{K}}\right)(20.9\,\text{J})}{(1.01 \times 10^5\,\text{Pa})(50 \times 10^{-6}\,\text{m}^3)} = 34.4\ \text{J/mol}\cdot\text{K}\ .
\end{aligned}$$

(c) Using Eq. 20-49, $C_V = C_p - R = 26.1\,\text{J/mol}\cdot\text{K}$.