

73. From Table 20-3, $C_V = \frac{3}{2}R = 12.5 \frac{\text{J}}{\text{mol}\cdot\text{K}}$ for a monatomic gas such as helium. To obtain the desired result c_V we need to effectively “convert” $\text{mol} \rightarrow \text{kg}$, which can be done using the molar mass M expressed in kilograms per mole. Although we could look up M for helium in Table 20-1 or Appendix F, the problem gives us m so that we can use Eq. 20-4 to find M . That is,

$$M = mN_A = (6.66 \times 10^{-27} \text{ kg}) (6.02 \times 10^{23} / \text{mol}) = 4.01 \times 10^{-3} \frac{\text{kg}}{\text{mol}} .$$

Therefore, $c_V = C_V/M = 3.11 \times 10^3 \text{ J/kg}\cdot\text{K}$.