

26. (a) Eq. 20-24 gives

$$K_{\text{avg}} = \frac{3}{2} \left(1.38 \times 10^{-23} \frac{\text{J}}{\text{K}} \right) (273 \text{ K}) = 5.65 \times 10^{-21} \text{ J} .$$

(b) Similarly, for $T = 373 \text{ K}$, the average translational kinetic energy is $K_{\text{avg}} = 7.72 \times 10^{-21} \text{ J}$.

(c) The unit mole may be thought of as a (large) collection: 6.02×10^{23} molecules of ideal gas, in this case. Each molecule has energy specified in part (a), so the large collection has a total kinetic energy equal to

$$K_{\text{mole}} = N_{\text{A}} K_{\text{avg}} = (6.02 \times 10^{23}) (5.65 \times 10^{-21} \text{ J}) = 3.40 \times 10^3 \text{ J} .$$

(d) Similarly, the result from part (b) leads to

$$K_{\text{mole}} = (6.02 \times 10^{23}) (7.72 \times 10^{-21} \text{ J}) = 4.65 \times 10^3 \text{ J} .$$