Exercise 1.62

The concentration of carbon monoxide in an urban apartment is 48 μg/m^3. What mass of carbon monoxide in grams is present in a room measuring 10.6 ft $\times$ 14.8 ft $\times$ 20.5 ft?

Solution

To obtain the mass, multiply the density by the volume of the room.

$$\text{Mass} = \text{Density} \times \text{Volume}$$

$$= \left(48 \ \frac{\mu\text{g}}{\text{m}^3}\right)(10.6 \text{ ft} \times 14.8 \text{ ft} \times 20.5 \text{ ft})$$

$$= \left(48 \ \frac{\cancel{\mu\text{g}}}{\text{m}^3} \times \frac{1 \text{ g}}{10^6 \ \cancel{\mu\text{g}}}\right)\left[10.6 \times 14.8 \times 20.5 \ \cancel{\text{ft}^3} \times \left(\frac{12 \ \cancel{\text{in}}}{1 \ \cancel{\text{ft}}}\right)^3 \times \left(\frac{2.54 \ \cancel{\text{cm}}}{1 \ \cancel{\text{in}}}\right)^3 \times \left(\frac{1 \text{ m}}{100 \ \cancel{\text{cm}}}\right)^3\right]$$

$$= \left(48 \times 10^{-6} \ \frac{\text{g}}{\cancel{\text{m}^3}}\right)\left(10.6 \times 14.8 \times 20.5 \times 12^3 \times 2.54^3 \times \frac{1}{100^3} \ \cancel{\text{m}^3}\right)$$

$$\approx 4.4 \times 10^{-3} \text{ g}$$