

Exercise 80

The gas tank of a certain luxury automobile holds 22.3 gallons according to the owner's manual. If the density of gasoline is 0.8206 g/mL, determine the mass in kilograms and pounds of the fuel in a full tank.

Solution

Start with the given volume and use conversion factors to calculate the mass of gasoline in kilograms.

$$22.3 \cancel{\text{ gallons}} \times \frac{4 \cancel{\text{ quarts}}}{1 \cancel{\text{ gallons}}} \times \frac{1 \cancel{\text{ L}}}{1.0567 \cancel{\text{ quarts}}} \times \frac{1000 \cancel{\text{ mL}}}{1 \cancel{\text{ L}}} \times \frac{0.8206 \text{ g}}{1 \text{ mL}} \times \frac{1 \text{ kg}}{1000 \text{ g}} \approx 69.3 \text{ kg}$$

Start with the given volume and use conversion factors to calculate the mass of gasoline in pounds.

$$22.3 \cancel{\text{ gallons}} \times \frac{4 \cancel{\text{ quarts}}}{1 \cancel{\text{ gallons}}} \times \frac{1 \cancel{\text{ L}}}{1.0567 \cancel{\text{ quarts}}} \times \frac{1000 \cancel{\text{ mL}}}{1 \cancel{\text{ L}}} \times \frac{0.8206 \text{ g}}{1 \text{ mL}} \times \frac{1 \cancel{\text{ kg}}}{1000 \text{ g}} \times \frac{2.2046 \text{ lb}}{1 \cancel{\text{ kg}}} \approx 153 \text{ lb}$$