To derive an answer in mg, you'll need to multiply 5.712 g by 1000 mg/g.

$$5.712\ \cancel{\text{g}} \times \frac{1000\ \text{mg}}{\cancel{\text{g}}} = 5712\ \text{mg}$$

This answer makes sense because milligrams is a smaller unit than grams and, therefore, there should be more of them.

The kilogram problem is solved similarly.

$$1\ \text{kg} = 1000\ \text{g}$$

Conversion factors representing this expression are

$$\frac{1\ \text{kg}}{1000\ \text{g}} \text{ and } \frac{1000\ \text{g}}{\text{kg}}$$

To derive an answer in kg, you'll need to multiply 5.712 g by 1 kg/1000 g.

$$5.712\ \cancel{\text{g}} \times \frac{1\ \text{kg}}{1000\ \cancel{\text{g}}} = 0.005712\ \text{kg}$$

The answer makes sense because kilograms is a larger unit than grams and, therefore, there should be fewer of them.

PRACTICE

Answers in Appendix E

1. Express a length of 16.45 m in centimeters and in kilometers.
2. Express a mass of 0.014 mg in grams.

extension

Go to **go.hrw.com** for more practice problems that ask you to perform unit conversions.

Keyword: HC6MEAX

SECTION REVIEW

1. Why are standards needed for measured quantities?
2. Label each of the following measurements by the quantity each represents. For instance, a measurement of 10.6 kg/m^3 represents density.
   - **a.** 5.0 g/mL
   - **b.** 37 s
   - **c.** 47 J
   - **d.** 39.56 g
   - **e.** 25.3 cm^3
   - **f.** 325 ms
   - **g.** 500 m^2
   - **h.** 30.23 mL
   - **i.** 2.7 mg
   - **j.** 0.005 L
3. Complete the following conversions.
   - **a.** 10.5 g = ____ kg
   - **b.** 1.57 km = ____ m
   - **c.** 3.54 µg = ____ g
   - **d.** 3.5 mol = ____ µmol
   - **e.** 1.2 L = ____ mL
   - **f.** 358 cm^3 = ____ m^3
   - **g.** 548.6 mL = ____ cm^3
4. Write conversion factors for each equality.
   - **a.** 1 m^3 = 1 000 000 cm^3
   - **b.** 1 in. = 2.54 cm
   - **c.** 1 µg = 0.000 001 g
   - **d.** 1 Mm = 1 000 000 m
5. **a.** What is the density of an 84.7 g sample of an unknown substance if the sample occupies 49.6 cm^3?
   b. What volume would be occupied by 7.75 g of this same substance?

Critical Thinking

6. **INFERRING CONCLUSIONS** A student converts grams to milligrams by multiplying by the conversion factor $\frac{1\ \text{g}}{1000\ \text{mg}}$. Is the student performing this calculation correctly?