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

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

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.

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

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

PRACTICE

1. Express a length of 16.45 m in centimeters and in kilometers.

Answer
1645 cm, 0.01645 km

2. Express a mass of 0.014 mg in grams.

Answer
0.000 014 g

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 to represent the following equalities.
   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?