**49.** An object has a mass of 57.6 g. Find the object's density, given that its volume is 40.25 $cm^3$.

**50.** A lab worker measures the mass of some sucrose as 0.947 mg. Convert that quantity to grams and to kilograms.

**51.** A student calculates the density of iron as 6.80 $g/cm^3$ by using lab data for mass and volume. A handbook reveals that the correct value is 7.86 $g/cm^3$. What is the percentage error?

## USING THE HANDBOOK

**52.** Find the table of properties for Group 1 elements in the *Elements Handbook.* Calculate the volume of a single atom of each element listed in the table by using the equation for the volume of a sphere.

$$\frac{4}{3}\pi \cdot r^3$$

**53.** Use the radius of a sodium atom from the *Elements Handbook* to calculate the number of sodium atoms in a row 5.00 cm long. Assume that each sodium atom touches the ones next to it.

**54.** a. A block of sodium that has the measurements 3.00 cm × 5.00 cm × 5.00 cm has a mass of 75.5 g. Calculate the density of sodium.

b. Compare your calculated density with the value in the properties table for Group 1 elements. Calculate the percentage error for your density determination.

## RESEARCH & WRITING

**55.** How does the metric system, which was once a standard for measurement, differ from SI? Why was it necessary for the United States to change to SI?

**56.** What are ISO 9000 standards? How do they affect industry on an international level?

## ALTERNATIVE ASSESSMENT

**57.** **Performance** Obtain three metal samples from your teacher. Determine the mass and volume of each sample. Calculate the density of each metal from your measurement data. (Hint: Consider using the water displacement technique to measure the volume of your samples.)

**58.** Use the data from the Nutrition Facts label below to answer the following questions:

a. Use the data given on the label for grams of fat and Calories from fat to construct a conversion factor that has the units Calories per gram.

b. Calculate the mass in kilograms for 20 servings of the food.

c. Calculate the mass of protein in micrograms for one serving of the food.

d. What is the correct number of significant figures for the answer in item a? Why?

**Nutrition Facts**

Serving Size ¾ cup (30g)
Servings Per Container About 14

| Amount Per Serving | Corn Crunch | with ½ cup skim milk |
|---|---|---|
| **Calories** | 120 | 160 |
| Calories from Fat | 15 | 20 |
| | | % **Daily Value**** |
| **Total Fat** 2g* | **3**% | **3**% |
| Saturated Fat 0g | **0**% | **0**% |
| **Cholesterol** 0mg | **0**% | **1**% |
| **Sodium** 160mg | **7**% | **9**% |
| **Potassium** 65mg | **2**% | **8**% |
| **Total Carbohydrate** 25g | **8**% | **10**% |
| Dietary Fiber 3g | | |
| Sugars 3g | | |
| Other Carbohydrate 11g | | |
| **Protein** 2g | | |

*Amount in Cereal. A serving of cereal plus skim milk provides 2g fat, less 5mg cholesterol, 220mg sodium, 270mg potassium, 31g carbohydrate (19g sugars) and 6g protein.

**Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

| | Calories | 2,000 | 2,500 |
|---|---|---|---|
| Total Fat | Less than | 65g | 80g |
| Sat Fat | Less than | 20g | 25g |
| Cholesterol | Less than | 300mg | 300mg |
| Sodium | Less than | 2,400mg | 2,400mg |
| Potassium | | 3,500mg | 3,500mg |
| Total Carbohydrate | | 300g | 375g |
| Dietary Fiber | | 25g | 30g |