(18)

All That Glitters

Name: _____

Period_____ Date:_____

Purpose: It is not always easy to tell one form of matter from another. This activity will show you how to differentiate between different forms of matter by examining density, one of the physical properties of matter.

density = mass ÷ volume

Measure:

1. Obtain one of the three pieces of metal.
2. Measure the mass of the metal piece on a scale.
3. Record the mass to the nearest tenth gram (0.1 g) in your data table.
4. Place about 20 mL of water in a 50 mL graduated cylinder.
5. Record the exact volume of the water to the nearest tenth (0.1 mL) in your data table.
6. Gently place a piece of metal in the graduated cylinder. Be careful not to splash any water.
7. Record the new volume in the table below.
8. Repeat this process beginning at Step 1 for the two other metal samples.

Data Table

	Data and Calculations			
Metal	Mass (g)	Volume of water (mL)	Volume of water with metal (mL)	Volume of metal (mL)
2-inch long gold-colored rod	55.4g	20.0mL	26.6mL	6.6mL
2-inch long silver-colored rod	17.8g	20.0mL	26.6mL	6.6mL
4-inch long silver-colored rod	35.6g	20.0mL	32.2mL	13.2mL

Answer the following questions:

1. The fourth column of the table is for the volume of the metal. How can you determine the volume of the metal from the data you have collected?

2. Determine the volume of the three metal samples and enter the values in the table.

3. How does the volume of the 2-inch long gold-colored rod compare with the 2-inch long silver-colored rod?

4. How does the volume of the 2-inch long silver-colored rod compare with the 4-inch long silver-colored rod?

5. Which of the two metals has a greater mass in the same volume? Explain your thinking.

6. The gold-colored rod has a higher density than the silver-colored rod. What do you think is meant by a higher density?

7. Density is a characteristic of the substance, not of the size and shape. Density (d) in grams per mL is determined by taking the mass (m) in grams and dividing by the volume (v) in mL: $d = m/v$. Both samples of the silver-colored metals have the same density. Use your measurements to prove this.

8. The densities of several metals are given in the table below. Use your measurements to identify the gold-colored and silver-colored metals.

Densities of metals

copper	zinc	gold	aluminum	brass
9.0 g/mL	7.1 g/mL	19.3 g/mL	2.7 g/mL	8.4 g/mL

9. The volume of a penny is 0.36 mL. Determine the mass of the golden penny you made.

Mass = _____

Density = _____

Making Sense:

Could you use density information to determine if the golden penny you made in class is gold? Why or why not?

If you finish early...

When Alexander the Great plundered the empire of Persia his soldiers took a great deal of gold with them. However, it is said that they buried much of it in the sand when it became a hardship to carry. Use the density value of gold to determine how much a block of gold 1 cubic meter in volume would weigh in pounds. Here are some conversions for you:

1 gram = 0.002 pounds

1 mL = 1 cubic centimeter

1 cubic meter = 1,000,000 cubic centimeters