

## Density for Identification

Name: \_\_\_\_\_

Density is a physical property that can assist in the classification of matter. In this lab you will calculate the density of different spheres to determine their densities and compare them to the theoretical density. From there you will evaluate whether or not the density is a good indicator for classification of matter.

### Procedure

1. Collect a sphere from the sample set to measure. Choose only one sphere at a time so they are shared between groups.
2. Measure the height of the sphere to get the diameter using the measuring device most appropriate to the task.
3. For one trial with a metal sphere, measure via displacement to compare the calculated and the measured volume differences.
4. Measure the mass of the sphere on the balance and record the value.
5. Return the sphere and collect a new sphere until data has been collected for all 6.
6. Calculate the volume for each sphere using the formula for a sphere provided below.
7. Calculate the density for each sphere using the formula for density.

### Data Table

Substance	Sphere Height (diameter)	Mass	Volume	Density
Aluminum				
Brass				
Copper				
Cork				
Steel				
Wood				

Sphere formula =  $(4/3)\pi r^3$

Density = mass/volume

## Displacement Data

Metal Selection: \_\_\_\_\_

Initial Volume: \_\_\_\_\_ Final Volume: \_\_\_\_\_

Volume of Sphere: \_\_\_\_\_

## Analysis

1. How close was the volume by displacement to the calculated volume for the sphere that you selected? Which factors contributed to this difference?
2. Which method do you think is better, displacement or calculated, for determining the volume of these spheres?
3. Look up the accepted densities for each of the substances that made up the balls. Record them next to the calculated densities. If there is one that is not obvious or clear, choose the closest you can find.

Substance	Theoretical	Calculated (Lab)
Aluminum		
Brass		
Copper		
Cork		
Steel		
Wood		

4. Which one was closest to the expected value and which one was furthest away. Calculate the percent error for each.

$$\text{percent error} = \frac{(\text{theoretical} - \text{experimental})}{\text{theoretical}} \times 100\%$$

5. Look at other materials listed on the table where you found the densities of the other substances. Do you think density alone is a good way to identify a potentially unknown material? Why or why not?