

# DENSITY LAB

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

This laboratory exercise will investigate density calculations and the uses of density to calculate other characteristics of samples. It will also use density as a way to identify an unknown sample.

Materials:

electronic balance	graduated cylinder	metric ruler	digital thermometer
solid samples	liquid samples	aluminum foil	scissors      water
unknown samples	textbook		

## Part A. Determining the Density of Solids

- \*Regularly shaped solids can be measured with a ruler to determine the volume.
- \*Irregularly shaped solids need to have the volume determined by water displacement.
- \*The mass of the solid can be determined by weighing on the balance.

For all solid objects provided:

1. Determine the density of the solids (need units!!)
2. Construct a data table that shows the measurements taken, calculations used to determine your answers, and your final answers. (need units!!)

## Part B. Determining the Density of Pure Liquids

- \*Volume of liquids can be determined by graduated cylinder. Use approximately 10 mL.
- \*Mass can be determined by weighing empty graduated cylinder, graduated cylinder plus sample and subtracting the two to achieve a sample mass.
- \* Temperature of sample needs to be recorded.

For all liquid samples provided:

1. Determine the density of the liquid (need units!!)
2. Construct a data table that shows the measurements taken, calculations used to determine your answers, and your final answers. (need units!!)

## Part C. Identify the Unknown Samples

There are three unknown metal samples. Calculate the density of each sample. Using your calculated density values for each and the chart on page 43 of your textbook, identify the samples. You may determine volume by measurement for this portion so you may need the equation for the volume of a cylinder, volume of a cylinder =  $\pi r^2 h$  (pi times radius squared times height) or you may use water displacement to determine volume. Your option!

1. Determine the density of the solids.
2. Construct a data table that shows the measurements taken, calculations used to determine your answers, and your final answers, including the identity of the solids. (need units!!)

# DENSITY LAB

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

## Part D. Using Density

Measuring the thickness of aluminum foil with a ruler would be very difficult. Use your knowledge of density determination to calculate the thickness of the sample of aluminum foil.

The following pieces of information may be helpful:

1. The measured density of aluminum foil is  $2.70 \text{ g/cm}^3$
2. Volume can be determined by measuring length x width x height. Hint: Think of the foil piece as a very flat rectangular box.
3. Be sure you measure the mass and the two dimensions of the foil that you can measure with the ruler before you leave lab. You will need this to be able to answer question #6.

## Part E. Questions Involving Density Knowledge

Using your knowledge of density determinations, answer the questions in your report. *Full sentences and correct grammar and spelling are important. Note: you may have to do some research, if so please tell me where you found your information.*

### Density Lab Questions

1. Would a hollow solid create a density measurement that was too high or too low as determined by the methods used in today's lab experiment?
2. You were told to record the temperature of your liquid samples for density determination. Which density determination factor (mass or volume) is influenced by temperature?
3. When determining the volume of an irregular solid, how would having trapped air (air bubbles) in with the underwater sample influence the density calculation (too high/too low)?
4. Why is it best to determine the mass of an irregular solid before you determine the volume that the sample occupies?
5. What could have caused you to incorrectly identify an unknown from part C (which measurement was most difficult to make and why)?
6. Calculate the thickness of the aluminum foil using the measurements you made in part D. Show or describe what calculations you used to determine your answers and be sure to show proper units.