

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 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 (watch your sig. figs.& units)
2. Construct a chart that shows the measurements taken, calculations used to determine your answers, and your final answers. (watch your sig. figs.& units)

Part B. Determining the Density of Pure Liquids

- *Volume of liquids can be determined by graduated cylinder or measuring pipet.
- *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 (watch your sig. figs.& units)
2. Construct a chart that shows the measurements taken, calculations used to determine your answers, and your final answers. (watch your sig. figs.& units)

Part C. Identify the Unknown Samples

There are three unknown metal samples. Using calculated density values for each and the chart on page 43 of your textbook, identify the samples. Once you have identified the three samples, explain at least one source of error (why did you not get the exact density measurement listed in the textbook?) You will be determining volume by measurement for this portion so you will need the equation for the volume of a cylinder. Volume of a cylinder = $\pi r^2 h$ (pi times radius squared times height)

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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 aluminum foil.

The following pieces of information may be helpful:

1. The measured density of aluminum foil is 2.70 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.

Calculate the thickness of the aluminum foil. Include this in your report. Also include an explanation of what measurements were needed and what calculations you used to determine your answers (watch your sig. figs. & units)

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. How would a hollow solid create error in density determination by the methods used in today's lab experiment? Would the calculated density be too high or too low? Explain.
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, why is it important to make sure there are no air bubbles mixed in with the underwater sample? How would having trapped air influence the density calculation (too high/too low)? Explain.
4. Why is it best to determine the mass of an irregular solid before you determine the volume that the sample occupies?