

Name _____ Period: _____

Density & Percent Error

Overview:

Density is a physical property shared by all forms of matter (solids, liquids and gases). In this lab investigation, we are mainly concerned with determining the density of solid objects; both regular shaped and irregular shaped. In general, regular shaped solid objects are those that have straight sides that can be measured using a metric ruler (cm³). Irregular shaped objects are those that do not have straight sides that cannot be measured with a metric ruler; water displacement must be used to determine volume in these circumstances (mL).

Materials:

Electronic Balance Graduated cylinder Beaker Water Ruler (cm)

Pre-Activity Questions:

What is the mathematical formula to determine density?

What will be the unit label for the final density answer? _____ or _____

Procedure:

Find the density of the two unknown substances. Be sure to record every measurement taken with units. Show your work for the calculation of density as well as the final answer with an appropriate unit. Then answer the following questions about your substances.

SUBSTANCE #1

Describe the sample:

Mass: _____

Length: _____

Width: _____

Height: _____

Density: _____

SUBSTANCE #2

Describe the sample:

Mass: _____

Initial Volume: _____

Final Volume: _____

Actual Volume: _____

Density: _____

Follow-Up Questions

The most common way to analyze experimental error is to compare your results with a known (or accepted) value, if available. Use the following data as an example.

Density of water from experiment (measured value)	Density of water (accepted value)
0.993 g/mL	1.00 g/mL

Given these two numerical values, percent error can be calculated as follows:’

Formula found on Reference Table T: Percent Error = $\left| \frac{\text{measured value} - \text{accepted value}}{\text{accepted value}} \right| \times 100 = \% \text{ error}$

So the numerical setup would be: $\% \text{ Error} = \frac{0.993 \text{ g/mL} - 1.00 \text{ g/mL}}{1.0 \text{ g/mL}} \times 100 = 0.7 \% \text{ error}$

1. The identity of Substance #1 is Iron. Using your reference tables, go to Table S and look up the density value for Iron. Using this value as the accepted value, determine your percent error. Show the numerical setup along with the final answer and a unit (%).

2. The identity of Substance #2 is Aluminum. Using your reference tables, go to Table S and look up the density value for Aluminum. Using this value as the accepted value, determine your percent error. Show the numerical setup along with the final answer and a unit (%).

3. What are some causes of error? How could you improve your results?