

NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #4

DENSITY OF SOLIDS

INTRODUCTION

The term density is often confused with the concept of weight. Density is a measure how close together the molecules of a substance are and is derived mathematically by the ratio between mass and volume. While the weight of an object increases as the mass increases, the density of an object will not change as a result of changes in mass or volume.

OBJECTIVES

During this laboratory investigation you will:

1. Measure the mass of an object using a triple beam balance.
2. Measure the length, width, and height of an object using a metric ruler.
3. Calculate the volume of an object from its dimensions.
4. Determine the volume of an irregular substance using the displacement method.
5. Calculate the density of an object after determining its mass and volume.
6. State possible sources of error in measurement.

APPROXIMATE TIME 2 Periods

MATERIALS

1 Graduated Cylinder 100 ml
1 Graduated Cylinder 250 ml
1 Beaker 250 ml with 100 ml of water
1 Electronic balance
Earth Science Reference Tables
Density objects
Pencil
Calculator
Ruler

PART 1

PROCEDURES

1. At your lab station assemble the materials needed for this lab investigation.
2. Answer questions 1 and 2.
3. Determine the mass and the volume of each of the samples of material that have been provided to you. Record these numbers in the data table.
4. In the separate work areas provided, calculate the density for each sample.
SHOW ALL WORK AND THE FORMULA for each sample. Record your density in the space provided on the data table.
5. Your teacher will give you the true density. Record it in the last column of the data table.
6. Using your Earth Science Reference Tables find the formula for Percent Deviation (Error).
7. Calculate the percent error for each of the samples. SHOW ALL WORK AND THE FORMULAS.
8. Finish answering all lab questions.

QUESTION # 1: Describe the procedure for measuring the mass of the samples.

QUESTION # 2: Describe **TWO** procedures for measuring the volume of the samples.

DATA TABLE

SAMPLE	MASS (g)	VOLUME (cc)	YOUR DENSITY	TRUE DENSITY	PERCENT ERROR
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

DENSITY CALCULATIONS

1.	2.	3.
4.	5.	6.
7.	8.	9.

PERCENT ERROR CALCULATIONS

1.	2.	3.
4.	5.	6.
7.	8.	9.

LABORATORY QUESTIONS:

3. List at least **two** possible sources of error in the procedures or conditions of this experiment. Be as specific as possible.

4. What effect does size or shape have on the density of samples made of the **SAME MATERIAL**? **EXPLAIN** your answer.

5. According to your Earth Science Reference Tables what is the density of water?

6. Why does an ice cube or an iceberg float in the water with only a small portion of itself above the surface of the water?

7. Using the true density values, arrange the samples by name in order from the **least dense** to the **most dense**.

8. If you were to take any one of the samples of material used in this lab and cut it in half how would its density compare to that of the original sample? **EXPLAIN** your answer.

MINERAL	DENSITY (g/cm³)	MINERAL	DENSITY (g/cm³)
Gypsum	2.3	Hornblende	3.2
Orthoclase	2.6	Chalcopyrite	4.2
Quartz	2.7	Pyrite	5.0
Calcite	2.7	Magnetite	5.2
Dolomite	2.9	Galena	7.5
Fluorite	3.2	Copper	8.9

1. Your lab group obtained a sample of the mineral quartz. You weigh the sample and found the mass to be 215.7g. Using the data table above look up the density of quartz. Using the density formula, calculate the volume of this mineral sample. (SHOW ALL WORK AND ROUND YOUR ANSWER TO THE NEAREST TENTH OF A GRAM).

DENSITY _____

MASS _____

2. Your lab group obtained a sample of the mineral hornblende. You measured its volume and found it to be 83.2 mL. Using the density equation, calculate the mass of this mineral sample. (SHOW ALL WORK AND ROUND YOUR ANSWER TO THE NEAREST TENTH OF A GRAM).

DENSITY _____

VOLUME _____