Name_____ Date _____
Lab #_____

DENSITY LAB

Introduction: Density is the term used to describe the relationship between the mass of an object and its volume. When temperature and pressure remain at a constant value, the density of a material is also constant. The density of any Earth material can be determined by measuring its mass and volume using the equation:

$$\text{DENSITY} = \frac{\text{MASS}}{\text{VOLUME}}$$

Objective: You will be able to calculate the densities of different materials and recognize that density is one of the most important properties of matter.

VOCABULARY:

mass:

weight:

volume:

displacement:

PROCEDURE:

1. Measure the mass of each object using a balance. Your answer will be in grams (g).
2. Find the volume of each object, measuring with a metric ruler and using the formula V= length x width x height, or by using the water displacement method. Your answer will be in cubic centimeters (cm^3).
3. Calculate the density of each object using the equation shown above.
4. Record your data for each object on Report Sheet 1
5. Using your density values and the accepted values, calculate the percent deviation from the accepted value for each material. Use the equation provided in the ESRT.

ALUMINUM BAR

mass _____

volume _____

density _____

percent error:

ALUMINUM CUBE

mass _____

volume _____

density _____

percent error:

STEEL SPHERE

mass _____

volume _____

density _____

percent error:

ROCK

mass _____

volume _____

density _____

percent error:

WATER

mass _____

volume _____

density _____

percent error:

ICE

mass _____

volume _____

density _____

percent error:

WOODEN BLOCK

mass _____ **volume** _____

density _____ **pecent error:**

Density of Ice

Mass of graduated cylinder, alcohol and ice _____

Mass of graduated cylinder and alcohol _____

Mass of ice _____

Volume of alcohol + ice _____

Volume of alcohol _____

Volume of ice _____

Density calculations:

Discussion Questions

1. A wooden block with a mass of 80.0 g is 8 cm long, 3 cm wide, and 4 cm high. Calculate the density of this block. **Show all work.**

2. What happens to the molecules of a substance when it is heated?

3. What do you think will happen to the mass of an object that is heated?

4. What do you think will happen to the volume of an object that is heated?

5. Use the information in questions 3 and 4 to predict what will happen to the density of an object when it is heated.

6. Does changing the size of a pure substance change its density? Why?

7. What happens to the density of an object when you break it into pieces?

8. How do you determine if an object will sink or float?

9. An object with a density of 0.7 b/mL is placed into a cup of pure water. What percentage of the object will be found below the surface?

Challenge Discussion Questions

1. What happens to the molecules of a substance when it is heated?

2. What do you think will happen to the mass of an object that is heated?

3. What do you think will happen to the volume of an object that is heated?

4. Use the information in questions 3 and 4 to predict what will happen to the density of an object when it is heated.

5. What is the effect of changing the shape or size of an object have on its density? Draw a graph to show this relationship, labeling the axes correctly.

6. What happens to the density of an object when you break it into pieces?

7. An object with a density of 0.7 b/mL is placed into a cup of pure water. What percentage of the object will be found below the surface?

8. Where will an object float in a column of water if its density is the same as water?

9. There is water on the pan of the balance as you measure the mass of the rock. If you ignore the water, what effect will this have on the density you calculate?