

Name: _____

Earth Science

Lab 2: Density

Date: _____

Introduction: Density is the term used to describe the relationship between the mass of an object and its volume. Under given conditions of temperature and pressure, the density of a material is constant. The density of any earth material can be determined by measuring its mass and volume. Then the measured variables can be substituted into the following equation.

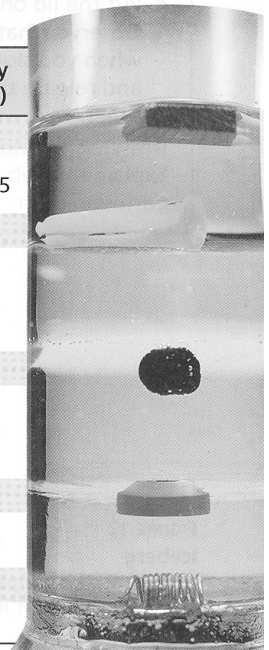
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \qquad \% \text{ Error} = \frac{\text{Difference in Values}}{\text{Accepted Value}} \times 100$$

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.

Materials:

- | | |
|--------------------|--------------|
| Balance | Steel Sphere |
| Metric Ruler | Wooden Block |
| Graduated Cylinder | Marble Rock |
| Calculator | Water |
| Aluminum Bar | Solution A |
| Aluminum Cube | Solution B |
| Glass Sphere | Solution C |

Substance	Density (g/cm ³)
Wood	0.7
Corn oil	0.925
Plastic	0.93
Water	1.00
Tar ball	1.02
Glycerin	1.26
Rubber washer	1.34
Corn syrup	1.38
Copper wire	8.8
Mercury	13.6



Vocabulary:

Mass: _____

Weight: _____

Volume: _____

Displacement: _____

Procedures:

1. Measure the mass of each object using a balance. Your answer will be in grams (g).
2. Find the volume of each object using a metric ruler, and the equation in the Earth Science Reference Tables, or by using the water displacement method. Your answers will be in cm³.
3. Calculate the density of each object by dividing the mass by the volume.
4. Record the data on Report Sheet 1
5. After completing Report Sheet 1 obtain the accepted values from you teacher. Calculate the percent deviation from the accepted values for each of the objects. Use the equation found in the Earth Science Reference Tables.
6. Record your calculations and answers on Report Sheet 2.
7. If your percent deviations are above 20% you need to go back and recheck your measurements. Once you have achieved a percent deviation of below 20% for each object you can go on to answer the questions.

Report Sheet 1

1. Aluminum Bar

Mass: _____

Length: _____

Width: _____

Height: _____

Volume: _____

Density: _____

2. Aluminum Cube

Mass: _____

Length: _____

Width: _____

Height: _____

Volume: _____

Density: _____

3. Wooden Block

Mass: _____

Length: _____

Width: _____

Height: _____

Volume: _____

Density: _____

4. Glass Sphere

Mass: _____

Volume: _____

Density: _____

5. Steel Sphere

Mass: _____

Volume: _____

Density: _____

6. Marble Rock

Mass: _____

Volume: _____

Density: _____

7. Solution A

Mass: _____

Volume: _____

Density: _____

8. Solution B

Mass: _____

Volume: _____

Density: _____

9. Solution C

Mass: _____

Volume: _____

Density: _____

Report Sheet 2

1. Aluminum Bar
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

2. Aluminum Cube
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

3. Wooden Block
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

4. Glass Sphere
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

5. Steel Sphere
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

6. Marble Rock
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

7. Solution A
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

8. Solution B
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

9. Solution C
Density Values:
Your Value: _____
Accepted Value: _____

% Deviation: _____

Show Work:

Discussion Questions:

1. What is the effect of shape on the density of samples of the same material (look at your results)? _____

2. The aluminum bar is cut in half. What is the density of each half compared to the original density of the bar?

3. What are the names of the three solutions? Solution A: _____

Solution B: _____

Solution C: _____

4. Of the three phases of matter, which phase has the greatest density for most substances? _____

5. Water is an unusual earth material because it is densest in which phase? _____

Why? _____

6. There is water on the pan of the balance as you measure the mass of a mineral.

If you ignore the water, what would be its effect on you density calculation? _____

7. Draw and label the following objects in the beaker according to their densities.

- Aluminum Cube
- Wooden Block
- Glass Sphere
- Solution A
- Solution B
- Solution C

