Lab Activity: Density and Percent Error

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 and using the equation in your Earth Science Reference Tables.

OBJECTIVE:

You will be able to calculate the densities of materials and the accuracy in your measurements.

VOCABULARY:

Mass

Volume

Density

Displacement

Percent Deviation

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PROCEDURE A:

1. Find and record the mass of each object using an electric balance to the nearest tenth.

2. Find and record the volume of each object, to the nearest tenth, using one of the following:

    •   The metric ruler and the equation V = L x W x H

    •   The graduated cylinder and the water displacement method

3. Calculate the density using your measurements for mass and volume. Be sure to round your answer to the nearest tenth and include proper units.

REPORT SHEET

Aluminum Bar	Aluminum Cube
Mass = _____ L = _____ W = _____ H = _____ Volume = _____ Density [your value] = _____	Mass = _____ L = _____ W = _____ H = _____ Volume = _____ Density [your value] = _____
Steel Sphere	Glass Sphere
Mass = _____ Initial = _____ Final = _____ Volume = _____ Density [your value] = _____	Mass = _____ Initial = _____ Final = _____ Volume = _____ Density [your value] = _____

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PROCEDURE B:

Use your density calculations from Procedure A and the accepted densities provided to calculate percent deviation on your measurements. Record your answers on the Report Sheet below.

REPORT SHEET

Aluminum Bar	Aluminum Cube
Your Value = _____	Your Value = _____
Accepted Value = 2.7 g/cm^3	Accepted Value = 2.7 g/cm^3
% Deviation = _____	% Deviation = _____
Calculations:	Calculations:
Steel Sphere	**Glass Sphere**
Your Value = _____	Your Value = _____
Accepted Value = 8.0 g/ml	Accepted Value = 2.4 g/ml
% Deviation = _____	% Deviation = _____
Calculations:	Calculations:

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DISCUSSION QUESTIONS:

1. What is the effect of shape on the density of samples of the same material?

2. If the aluminum bar is cut in half, what is the density of each half compared to the original?

3. Of the three phases of matter, what phase has the greatest density for most substances?

4. Water is an unusual earth material because it is denser in which phase?

5. How would additional water on the pan of the balance effect your density calculation?

CONCLUSION: Describe the procedure for determining the density of earth materials.