

Density: A Physical Property

All matter takes up space and has mass. The ratio of a substance's mass to its volume is an important physical property called **density**. This important property is commonly measured in g/mL. The relationship between the density, mass, and volume is expressed in the formula:

$$\text{Density} = \frac{\text{mass (g)}}{\text{volume (mL)}}$$

Part I: Making Observations

Procedure

1. First, you will make some general observations about the density of different metal pure substances. Copy the following data table:

Table I: The Density of Metal Samples

Metal	Mass(g)	Volume(ml)	Density (g/ml)
2 X _____			

2. Weigh the first sample using an electronic balance. Record in data table.
3. Find the volume of your sample by using water displacement in a graduated cylinder.
4. Calculate the density of the metal by dividing the mass by the volume.
5. Repeat with the second and third metal.
6. Find the mass and volume of two pieces of **the same** metal at the same time.

Thought Questions:

1. Is density dependent on the amount of a substance? (i.e. 1 or 2 pieces?)
2. Gold (Au) has a density of 19.32 g/mL. Explain what this means in your own words.
3. Population density is determined by an estimate of the human population divided by total surface area. ($\#/km^2$) What is the population density of the United States versus Nigeria? Nigeria population = 131,529,700; surface area = 923,768 km^2 , United States population = 295,734,134; surface area = 9,631,418 km^2

Part II: The Rainbow Tube

Background:

Explain what you know about density. What is it?

Problem:

Determine the order of density between 5 different salt water solutions (A, B, C, D, & E).

Hypothesis: Can you make a prediction by massing the liquids in each beaker?

Materials

test tube rack

test tubes

A plastic pipette

water

Procedure:

1. ? You will design your own procedure.

Data:

Record your final order by drawing a picture with colored pencils.

Conclusion:

1. What is the relationship of the solutions from top to bottom?
2. Which solution was the densest, the least?
3. Define the term density in your own words.
4. Would your final, rainbow layered test tube be an example of a heterogeneous or a homogeneous mixture? Explain.
5. Give one example of how density can be observed in every day life.