

Density Lab

Research Question

How are density units determined?

What is the real-world application of density?

Introduction

Density is defined mathematically as the ratio of a substances mass and volume:

$$\rho = \text{mass} / \text{volume}$$

It uses derived units; in chemistry, the derived units are usually g/mL or g/cm³. The latter is equivalent to the former because 1 mL = 1 cm³.

Procedures

First, we measured the mass of the gray plastic PVC sample using an electronic scale. We filled our graduated cylinder with 50.0mL of water and then slid the sample into the cylinder. We then measured the new volume of the water, being careful each time to measure at the meniscus. Next, we subtracted these two volumes to obtain the sample's volume. The sample's mass was divided by its volume to obtain density. Each lab group then announced their findings and a comparison of these was made.

Data/ Observations

The mass was 19.09g PVC.

The volume of the water in the cylinder was 50.0mL.

The new volume in the cylinder was 64.

The difference was 14.

$$64.0\text{mL} - 50.0\text{mL} = 14.0 \text{ mL}$$

$$19.09\text{g} \div 14\text{mL} = 1.36\text{g/ mL}$$

$$D = 1.36\text{g per mL}$$

Conclusion

The units of density are determined by the units used for mass and volume and then dividing those units with their respective quantities. These are derived units, renowned by computation. Density is a physical trait that determines if an object will sink or float in a liquid. If the objects density is greater than the liquids density, it sinks. If the objects density is less than the liquids density it floats. The marble had a greater density than the water and therefore it sank.

Mass: A large body of matter with no definite shape

Density: The measurement of how tightly a material is packed together

Buoyancy: The ability or tendency to float in water or air or some other fluid

Physical property: Any property that is measurable