

## 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 substance mass and volume:

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

It uses derived units; in chemistry, the derived units are usually g/mL or g/cm<sup>3</sup>. The latter is equivalent to the former because 1 mL = 1 cm<sup>3</sup>.

## PROCEDURES

First, we measure the mass of the gray plastic PVC sample using an electronic scale. We filled our graduated cylinder with 50 mL of water and then slid the sample in the cylinder. We then measured the new volume of water, being careful each time to measure at the meniscus. Next, we subtract 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

1. The mass of the PVC was 15.25g
2. The volume of H<sub>2</sub>O in the cylinder was 50 mL
3. The new volume of the H<sub>2</sub>O in the cylinder after we placed the PVC in was 61.0 mL

$$61.0 \text{ mL} - 50.0 = 11.0 \text{ mL}$$

$$15.25 \text{ g divided by } 11.0 \text{ mL} = 1.386 \text{ g/mL}$$

## CONCLUSION

The units of density are determined by units used for mass and volume and then dividing those units with their respective quantities. These are derived units renamed by computation. If the density is greater than the liquid's density it sinks. If the density is less than the liquid's density it will float.

## DEFINITIONS

**MASS:** The definition of mass is a quantitative measure of inertia, a fundamental property of all matter.

**DENSITY:** The definition of density is the measurement of how tightly a material is packed together.

**BUOYANCY:** The definition of buoyancy is the tendency of an object to float in a fluid.

**PHYSICAL PROPERTY:** The definition of physical property is any property that is measurable.

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