

## 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 substance's mass and volume:

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

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 measured 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 into the cylinder. We then measured the new volume of 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

1. The mass of the PVC was 15.25g
2. The volume of H<sub>2</sub>O in the cylinder was 50mL
3. The new volume of H<sub>2</sub>O in the cylinder was 61mL

$$61\text{mL} - 50\text{mL} = 11\text{mL}$$

$$15.25\text{g}/11\text{mL} = 1.386\text{g/mL}$$

1.39g/mL is the density of the PVC

### 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 object's density is greater than the liquid's density, it sinks. If the object's density is less than the liquid's density, it floats. The PVC had a greater density than the H<sub>2</sub>O, and therefore it sank.

Mass- A measure of the amount of matter in an object.

Density- An object's mass divided by the volume that the object occupies.

Buoyancy- Tendency of an object to float or rise in a fluid when submerged.

Physical property- A characteristic of matter that is not associated with a change in its chemical composition.