Chem Skills Lab #2: Metal Density

Introduction: The density of a pure substance does not depend upon the amount of that substance. Like temperature or melting point, density is an intensive physical property. That is, a ton of lead has the same density as a milligram of lead. Density is the ratio of an object's mass to its volume.

To determine density, one must find both the mass and volume of the object. Mass can easily be determined using an electronic balance. The Volume of a regularly shaped object can be determined using linear measurements and calculations.

The volume of irregularly shaped objects can be found using Archimedes' principle. This principle states that an object, when placed in a liquid, will displace a volume of liquid equal to its own volume. (This method is also called volume displacement.) To be able to measure the volume of an object by displacement method, the object has to be denser than the liquid used and must be completely immersed in the liquid. The most commonly used liquid for displacement is water.

Purpose: The purpose of this lab is to determine the density of four different metal samples and use that density to determine the identity of each metal sample.

Procedure

1. Describe the appearance of each cube so that you are able to tell the cubes apart from each other by your description.
2. Find the mass of each cube using the electronic balance. Record the value in your data table.
3. Measure the length, width and height of each cube using a metric ruler. Record the value in your data table to the nearest 0.1 cm.

Data

Density Lab Data Table

Sample	Description	Mass (g)	Length (cm)	Width (cm)	Height (cm)
1					
2					
3					
4					

Calculations

1. Calculate the volume of each sample. Volume = length (cm) x width (cm) x height (cm)
2. Calculate the density of each metal sample. Density (g/cm^3) = mass (g) / volume (cm^3)
3. Using the density of the metal samples and the description of each sample, determine the identity of each metal sample.
4. Use the actual density of each sample to calculate the % error of each of your experimental density values.

Application Questions

1. Why were we able to measure the volume with linear measurements rather than by liquid displacement method described in the introduction?
2. What are some advantages of linear measurements over the liquid displacement method?
3. What are some advantages of the liquid displacement method over linear measurements?
4. What properties of water make it ideal for the volume displacement method?
5. Why do most rocks sink in water?
6. Give three examples of solids that are less dense than water.

Conclusion: Write one sentence that refers back to your stated purpose.