

Sec. _____ Name: _____

Experiment: Density & Buoyancy
(E. Science 9-2-3a)

Purpose: To determine the density of insoluble materials and deduce the relationship between density and buoyancy.

Materials: 100 mL graduated cylinder
mass balance 100 mL beaker
wood block metal block
water sea shell
quartz sample

Methods:

1. With a pan balance, measure the mass of the wood block, metal block, sea shell, quartz, & 10 mL of water. Record your values.
2. Fill the graduated cylinder with 50 mL of water.

Submerge the wood block into the cylinder. Be careful not to lose any water. Record the volume to which the water level has risen.

3. Subtract the original volume of the water from the new volume. This change in the volume of water is the volume of the wood block. Record this volume in results.
4. Repeat steps 2 - 3 for metal block, sea shell, quartz, and 10 mL of water.
5. Calculate the density of each sample by using this equation.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Results:

Object	Mass (g)	Volume (cm ³)	Density (g/cm ³)
wood			
metal			
sea shell			
water			
quartz			

Conclusions:

1. If you were to split the wood into two equal pieces. How would this affect density (if it does at all)?
2. What would happen to the density of 30 mL of water if it is lowered 4 °C? (Hint: Remember when objects cool they contract, thus their volume gets smaller).
3. Compare the density of wood and that of water.
wood:
water:
4. Which object, wood or metal, would be buoyant on water?

Discussion:

1. Does size determine the density of an object? Explain.
2. What does determine density?
3. Explain how you would determine the density of a rock sample?
4. State the relationship between density and buoyancy?
5. Explain, in terms of density, why a person is able to float in water.
6. The density of sea water is 1.034 g/cm³. Is it easier for a person to float in seawater or in fresh water? Explain.
7. Explain how a balloon inflated with helium floats in air.
- 8a. If a board has a length of 164 cm, a width of 8.85 cm and a depth of 4.05 cm what is the volume of the board?
- 8b. If the mass of the board is 2580 g, what is the density of the board?
- 9a. There is a record in 2 Kings 6: 1-5 of Elisha and the prophets who were building a place to live. In the process a borrowed axe fell into the Jordan. What was God able to do for the prophet Elisha?
- 9b. The axe was probably made of a metal like iron. If God was to accomplish the miracle by changing the density of the metal axe, would the density need to be changed so that it is lower or higher than the 1.0 g/cm³?
10. Use the words in the box to complete the statements. You will use the words more than once.
 molecule compound chemical properties ionic compounds
 ions mixture
- a. The components of a _____ can be separated by physical means.
- b. The _____ of an element determine how the element will change when it reacts with another element.
- c. A _____ is a substance that has different properties than the elements in it.
- d. The building block of an ionic compound is a _____.
- e. Electrically charged atoms are _____.
- f. Table salt is an example of a _____.
- g. An example of a _____ is salt water.
- h. Table salt is formed when the _____ of sodium and chlorine combine.
- i. The atoms of hydrogen and oxygen combine to form a _____ of the compound water.