

Floating Eggs:

Analyzing Mass, Volume, & Density

Intro - All matter has a specific physical property called density. The density of a substance is defined as the amount of matter (mass) contained in a given space (volume). The equation for density is below:

$$\text{Density (g/mL or g/cm}^3\text{)} = \frac{\text{Mass (g)}}{\text{Volume (mL or cm}^3\text{)}}$$

For example, if a substance's mass is 10g and its volume is 2mL, then you would divide 10g by 2mL to get a density of 5g/mL.

$$\text{Density} = \frac{10\text{g}}{2\text{mL}} = 5\text{g/mL}$$

The density of a specific substance does NOT change. For instance, water will always have a density of 1g/mL, no matter if you have 0.5 grams of it or 5,000 grams of it. Other substances will float in water if their density is less than 1g/mL, and will sink if their density is greater than 1g/mL. Using the density of water, determine which substances would float or sink in water.

Liquid Substance	Density (g/mL)	Float or Sink?
A	1.42	
B	0.30	
C	10.4	
D	1.01	

In this lab, you will manipulate the density of water great enough to make an egg.

Purpose: Manipulate factors, like mass, that affect a substance's density.

Procedure:

- Use the scale to record the mass (g) of the egg in the Physical Properties table.
*Handle the egg carefully, as it could break & mess everything up!
- Place the egg carefully to the side.
- Halfway fill the clear container with tap water & record the water's volume (mL) in the Physical Properties table.
- GENTLY place the egg in the container. (It may break if dropped hard!)
- Record the water + egg's new volume (mL) in the Physical Properties table.
- Use the volumes from steps 3 & 5 (mL) to calculate the egg's volume (mL). Record it in the Physical Properties table.
- Use the egg's mass (g) & volume (mL) to calculate its density (g/mL). Record it in the Physical Properties table.
- Observe the egg in the plain tap water. Record observations in the Observations of Raw Egg table.
- Take the egg out & carefully place it to the side.
- Dissolve 2 spoons of salt into the tap water.
- GENTLY place the egg back in the container.
- Observe the egg in the water. Record observations in the Observations of Raw Egg table.
- Repeat steps 7-10 four more times, adding 2 more spoons of salt each time.



Data:

Physical Properties of the Raw Egg	
Mass (g)	
Volume (mL)	Water = Water + Egg = Egg = _____ - _____ =
Density (g/mL)	Show your work! →

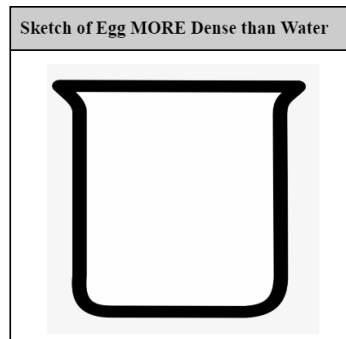
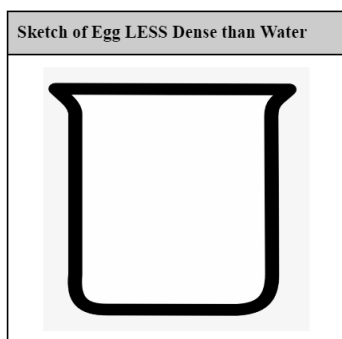
Observations of Raw Egg in Different Types of Water	
Amount of Salt (spoons)	Float or Sink?
0	
2	
4	
6	
8	



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Analysis Questions:

1. Complete the sketches below based on your observations from the lab.



2. What happened in plain tap water? Why does this make sense? (HINT: Use Physical Properties table.)

3. Approximately what amount of salt is needed to float an egg in water? Use the Observations of Raw Egg table to explain your answer.

4. Eventually, there was enough salt added to float the egg. Soooo, what does dissolving salt do to the density of water? Explain.

5. What would be an appropriate value for the density of water with 8 spoons of salt dissolved? (HINT: Use Physical Properties table.)

- a. 0.93
- b. 1.78
- c. 1.00

Explain your answer: _____

6. THROWBACK QUESTION: Is dissolving salt to water a chemical or physical change? Explain.

7. THROWBACK QUESTION: Is saltwater a homogeneous mixture or heterogeneous mixture? Explain.
