

“Using Science to Swim” Density Lessons

Did you ever wonder how flotation devices work? If you go to the ocean to swim, you may find that it's much easier to float in saltwater. In fact, an average person can float like a log with much less effort in saltwater than in fresh water. Here are two quick and easy experiments to bring density into focus.

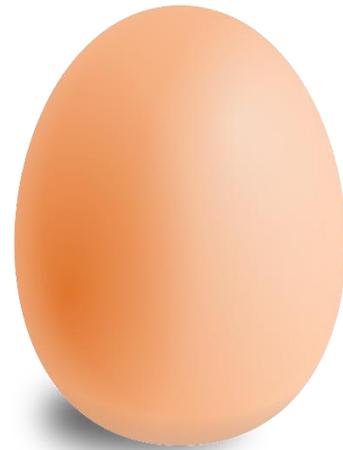
Floating an Egg

Student Learning Objective:

Students will conduct a controlled experiment to discover how adding salt to tap water changes the density of the water.

Materials:

- Table salt
- Two glass containers (4 cup capacity)
- A measuring cup
- A tablespoon
- A spoon
- Tap water
- Two raw eggs



Procedure:

1. Fill each of the two containers with four cups of tap water.
2. Add 6 tablespoons of salt into one container. Stir well with a tablespoon until the salt has completely dissolved in the water.
3. Place one egg in each of the containers. Observe which egg floats in the container and which one sinks.
4. Record your observations on a chart.

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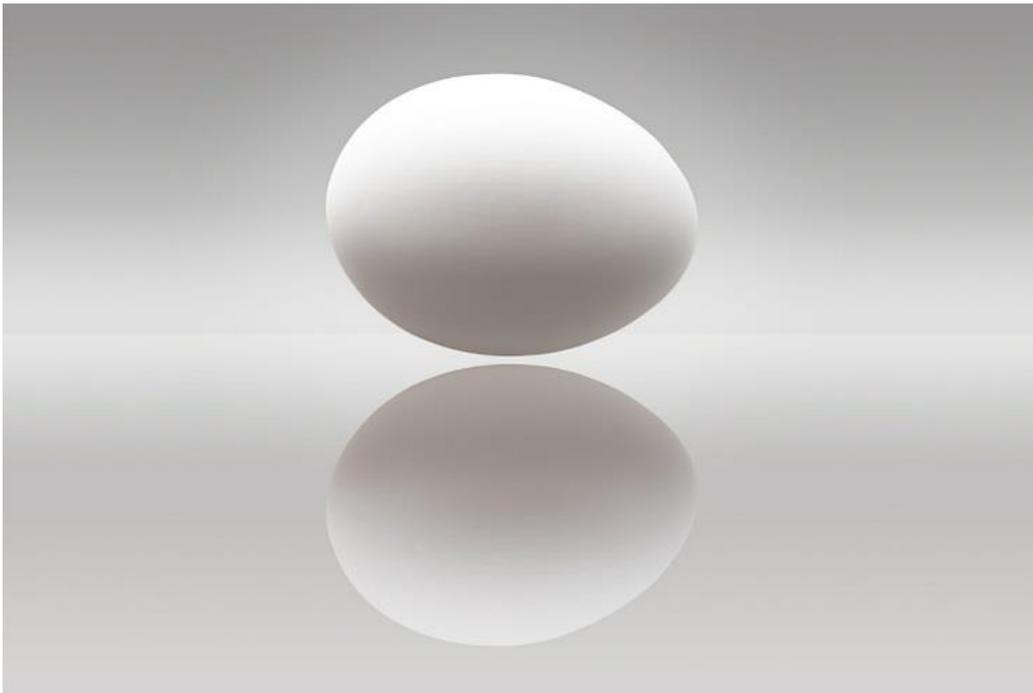
Discussion:

The explanation behind this phenomenon is simple—DENSITY! In this experiment, you observed that the egg placed in saltwater floated, but the one in tap water did not. Why? Because the egg is denser than the tap water.

The egg pushes away water particles so it can make space for itself—hence the sinking motion. But since saltwater is heavier than ordinary tap water, it is more capable of holding the egg up—hence the egg floating.

When you use saltwater to swim or float an object, it’s science! When salt is added and dissolved in water, it breaks down into ions that are then attracted to the water molecules. This attraction causes them to bind tightly, increasing the amount of matter per volume (density).

Instead of just having the molecules hydrogen and oxygen in the water, sodium and chlorine joins the equation (since salt is made up of sodium and chlorine particles). Saltwater now has more particles in it compared to the ordinary tap water we started with. This is why saltwater is denser than tap water.



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Water Wings for Raisins

At the beach or pool, you may have seen children swimming with “water wings” on their arms. What is the science behind using these air pillows to defy density?

Student Learning Objective:

Students will observe that when air bubbles attach to an object, its density properties temporarily change.

Materials:

- Two glass container (2 cup capacity)
- Magnifying lens
- One 12 oz can of soda water
- 12 oz of tap water
- 10 raisins



Procedure:

1. Fill one container with soda water. Fill the second container with tap water.
2. Place five raisins into each container.
3. Make observations of how the raisins respond to the soda water as compared to the tap water. Use the magnifying lens to see details. Record your observations on a chart.

Discussion:



During the experiment, carbon dioxide (CO₂) bubbles from the soda water attached to the sides of the raisins. The density of CO₂ is less than water. When enough of the bubbles attached to a raisin, it floated to the top of the container. In contrast, the raisins in the tap water sank and stayed on the bottom of the container because they are denser than water.