Floating Eggs

THE BASICS	THE TOOLBOX
 Grade Level: K-12  Estimated Time: 30 min.	• 2 tall clear drinking glasses • 1 cup salt • 2 uncooked eggs • 2 spoons • Water • Paper towels • Food coloring • Straw or coffee stirrer

EDUCATION STANDARDS	**Physical Science Content Standard:** Understanding that adding a solid to a liquid changes the density, but not necessarily the volume of the liquid.
SAFETY CONCERNS	Be careful of slipping on wet floors. Clean up spills quickly.
FOR KIDS WITH DISABILITIES	Participants with mobility and visual impairments may work with a partner.

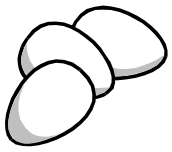
What To Do

Educational Objective:

To develop an understanding of the properties of solubility and density. To demonstrate that water density changes when substances are dissolved in it, and that dissolving a solid in a liquid does not always cause an increase in volume.

Questions to Ask Students As They Do This Activity:

- What happened to the egg in plain water?
- What happened to the egg in salt water?
- Why do you think the eggs acted the way they did in each glass?
- What happened to the egg in the glass that contained both plain and salt water?
- How can the full glass of water hold so much salt without overflowing?
- What happened to the salt as you mixed it into the water?



Why It Happens:

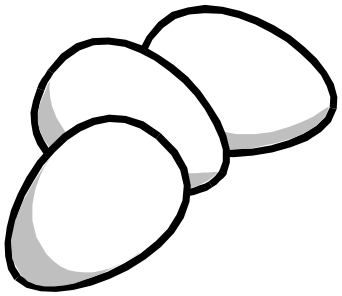
Sometimes the size of an item can be deceiving about its weight because of density. Density is how much a certain volume of a substance weighs. Solids, liquids, and gases all have densities. For example, water has a

much higher density than air because it weighs more. Even though a golf ball and a ping-pong ball are approximately the same size, the golf ball weighs more, and therefore has a higher density. Another example would be two exact containers filled with the same amount of water and oil. The container with the water would weigh more than the one with oil, because water is denser than oil.

Whether an item will sink or float in a liquid depends on the density of the object and the liquid you are using. If an object is more dense than the liquid, it will sink. If an object is less dense, it will float. In the glass with plain water, you noticed the egg sank. This is because the egg is denser than water. In the glass with salt water, the egg floated, which means that salt water has a higher density than the egg. (Note: If your egg floats in plain water, it is not a fresh egg.) If the plain water is layered onto the salt water, the egg will float in-between the two layers, because the egg is lighter or less dense than the salt water, but heavier than the plain water.

In the last part of the activity, you will see that a large amount of salt could be dissolved into the already full glass of water, without making it spill out of the glass. When you dissolve the salt or other substances in a liquid, the salt molecules are able to "fit" in-between or bond to the water molecules. Therefore, the water level doesn't have to rise in order to hold the salt. This increases the weight of the water, without changing the volume of the water, and therefore you increase its density. If you keep adding salt, eventually you will reach a point when no more salt will dissolve, and you will have a saturated solution. After that, if more salt is added, the water level will have to rise to make more room for it.

Extensions:
Would a hard-boiled egg give the same results as the raw egg? Try it.



Web Sites

- **Water Science for Schools**
  http://ga.water.usgs.gov/edu/mwater.html (Grades 4-12)
- **The Weight of Water**
  http://www.seaworld.org/water/weight.html (Grades K-3)

Software

- **Learn About Physical Science: Matter, Measurement and Mixtures**
  Sunburst, 2000
  (Grades K-2)
- **Bumptz Science Carnival**
  Theatrix/Sanctuary Woods, 1995
  (Grades 1-5)

Reading Room

- Asimov, Isaac, and Elizabeth Kaplan. **How Do Big Ships Float?** Gareth Stevens, 1993. (Grades 3-6)
- Gibson, Gary. **Making Things Float and Sink**. Copper Beech Books, 1995. (Grades K-4)
- Ward, Alan. **Water and Floating**. Watts, 1992. (Grades 3-6)

Career Connections

Meteorologists can use the study of fluid dynamics to understand weather patterns - such as El Niño and La Niña, global warming, and the interaction of our atmosphere with our oceans.

FLOATING EGGS ACTIVITY SHEET

Part One

1. Fill one glass a little less than half full with water. Add about 10 heaping teaspoons of salt, one at a time. Stir after you add each one until all, or almost all, of the salt dissolves.

2. Fill another glass with plain water until it reaches the same level as the one with salt water.

3. Using the 2 spoons, lower an uncooked egg (do not crack the egg) into each glass. What happens? Does the egg sink or float? Why do you think you got the result you see?

4. Remove the egg from the saltwater, add more salt, and then return the egg to the saltwater. Does the egg act different now? What if you continue adding more salt?

Part Two

5. Use the spoons to remove the eggs from the glasses of water.

6. Add a few drops of food coloring to the plain water and mix thoroughly.

7. Carefully pour some of the plain water on top of the salt water by aiming it down along the inside wall of the glass and using a spoon to break the fall of the plain water. Pour enough of the plain water to fill the glass about ¾ full, with salt water on the bottom and plain water on the top.

8. Now use your spoon to add one of the eggs to this glass again. What happens? Why do you think this happens?

Part Three

9. Pour out the water from the glasses. Rinse the glasses well, and fill one all the way to the top with plain water.

10. Dry the other glass thoroughly. Measure about two tablespoons of salt into your empty glass. Do you think you can pour all of this salt into the glass without making it overflow?

11. Gently sprinkle some of the salt onto the surface of the water. Gently stir with a straw or coffee stirrer until the salt dissolves. Stir very carefully so that the water doesn't splash out of the glass.

12. Continue adding salt from the pre-measured amount in your glass into the full glass of water, stirring gently after each addition. How much of the salt can you dissolve without overflowing the glass? Are you surprised?