



Drexel-SDP GK-12 ACTIVITY

Science

Weather and Aeronautics

Will It Float? Density

Grade Level 5

Lesson # 1 of 1

Lesson Dependency

Time Required 2 Days

Summary

In this lesson, density is demonstrated using water. We extend this during the aeronautics module to include density and its applications to flight.

Educational Standards: 3.5.7, 3.6.7

Pre-Requisite Knowledge

Learning Objectives

- Observe that density will affect the buoyancy of an object, regardless of the fluid (air or water). We can make an object displace air and fly just as we can have an object displace water and thus float.

Introduction / Motivation

Lesson Background & Concepts for Teachers

In this lesson, we continue our discussion of Aeronautics by demonstrating principles of density and force through displacement, and the basic forces of flight.

Today's activities open with warmup related to density and water displacement. To demonstrate, put a diet and a regular soda into a vat, but remove the labels first so students don't know which is which. Ask them to predict what happens, and then discuss what actually happens. Discuss weight, volume, density as weight per volume, and why one of them might have floated. Diet

soda contains less sweetener (aspartame) and thus floats.

Then have students predict which will float, an empty can or a full one, and why. Allow them to observe.

Associated Activities

- Now, use these properties of relative weight (emphasize that the densities are relative to one another), create a "water rainbow."
 - In the first glass, add one tablespoon (15 g) of sugar. In the second glass, add two tablespoons of sugar, three in the third glass, and four in the last glass. Then add three tablespoons (45 ml) of water to each glass, and stir until the sugar is dissolved. If the sugar in any of the glasses will not dissolve, add one more tablespoon (15 ml) of water to all of the glasses, and stir again. When the sugar is completely dissolved, add two or three drops of red food coloring to the first glass, yellow to the second, green to the third, and blue to the last glass.
 - In the remaining glass we will create our rainbow. Fill the glass about a fourth of the way with the blue sugar solution. Next, carefully add the green solution to the glass. Do this by putting a spoon in the glass, just above the level of the blue solution. Slowly pour the green solution into the spoon, raising the spoon to keep it just above the level of the liquid, until the glass is half full. Add the yellow solution, and then the red one in the same manner. What do you notice about the colored solutions?
 - The amount of sugar dissolved in a liquid affects its density. The blue solution has the most sugar dissolved in it and is therefore the densest. The other solutions are less dense than the blue solution, so they float on top of it. The densities of the solutions should be very close however, and the solutions are miscible, so you will see that the layers do not form well defined boundaries as in the first experiment. If done carefully enough, the colors should stay relatively separate from each other. What do you think will happen if you stir up the liquids in the glass?

References

- Soda can displacement warmup: <http://scifun.chem.wisc.edu/HOMEEXPTS/cans.htm>
- Layered Liquids: <http://scifun.chem.wisc.edu/HOMEEXPTS/layeredliquids.htm>

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Date

9/11/2007