Experimenting with Surface Tension

SYNOPSIS
Students will complete an experiment in which they find out how soap affects the surface tension of milk.

OBJECTIVES
Students will be able to describe how soap pollution in water bodies can detrimentally affect an aquatic insect such as a water strider.

VOCABULARY
- surface tension
  - a property of liquid that results in the molecules of the liquid sticking to each other but not to the air above the liquid. This results in the liquid forming a skin-like surface.
- surfactant
  - a contraction of the phrase "surface active agent." It reduces the surface tension of a liquid when it is dissolved in the liquid. Frequently used in soaps to increase wetting resulting in the soap reaching more parts of the material to be cleaned.
- water strider
  - an aquatic insect that lives on the surfaces of ponds, slow streams, and other still waters. It "walks" on the water, relying on the surface tension.

MATERIALS
- food coloring – 4 colors / group (just a few drops needed per color)
- whole milk at room temperature – 2 cups / group
- containers – 1 clear bowl / group
- hand dishwashing soap (Dove works best) – 1 tablespoon / group
- toothpicks – 2 / group

PROCEDURES

1. Divide students into cooperative learning groups of three to four students.

Student Instructions

2. Pour the milk into the container.
3. Place a few drops of each food coloring around the edge of the container.
4. Discuss or write down your observations. Do the drops of food coloring stay on the surface of the milk or do they sink? Why do you think this happens?
5. Make a prediction about what you think will happen when the soap is introduced into the liquid.
6. Dip the end of a toothpick into the soap.
7. Dip the soapy toothpick into the center of the bowl in the liquid.
8. Discuss or write down your observations. What happens to the food coloring and the milk?
9. Repeat the process of putting soap into the liquid. You can experiment by placing the soapy toothpick in different locations of the bowl and different amounts of soap.
10. Discuss or write down whether or not your prediction (made in #5) was correct.
11. Discuss or write down the results of the experiment. Why did the substances act the way they did?

DISCUSSION

Help the students understand what is happening in this experiment by describing surface tension and surfactants to them. Use the definitions provided in this lesson plan as well as additional background research. You may want to have the students conduct their own research to figure out what is happening.

CHECK FOR UNDERSTANDING

Have the students write a paragraph describing how soap pollution (with surfactants) can affect aquatic organisms.

EXTENSION

Some biodegradable and/or environmentally-friendly soaps do not have surfactants in them. Students can research which brands of soaps do not have surfactants.