

Soapy Boats



Activity Description

Have you ever noticed that water tends to “stick” to your skin? This is because of cohesion between water molecules.

Because of water’s unique molecular shape, each molecule of water is attracted to the next.

When you pour a glass of water, each of the millions of molecules are attracted to one another, much like the way two magnets are attracted to one another when opposite poles are placed near one another.

Water molecules below the surface are pulled equally in all directions because they are surrounded on by other water molecules on all sides. The molecules on the surface however are only attracted from below and to the sides. This results in a thin layer on the surface of water molecules that are especially close together, resulting in a property of liquids called surface tension.

Surface tension is a physical effect that causes the surface of liquids to act like layers of elastic sheets. This effect is the reason why water striders can “walk” on water. Water’s surface tension is strong enough to support the weight of the water strider without breaking. (continued on next page)

In this activity we are going to change surface tension of water by adding a surfactant.

Materials

1 pair	Scissors
1	Heavy Duty Paper (Photo paper from junk mail works well)
1	Toothpick
1	Shallow Bowl
¼ Teaspoon	Dish Soap

Preparation and Safety

Be careful to avoid getting soap in your eyes

bitesizeactivities

Activity Description (continued)

Surfactants work to weaken the attraction between water molecules. When you add soap to water, you decrease the attraction between water molecules, meaning that there is less surface tension.

You can think of the surface of the water like the skin of a balloon. The dish soap works like a pin. When you have a balloon full of air, and you poke it with a pin, the tension of the latex pulls the balloon away from the point of the pin, causing the balloon to pop.

Similarly, when you add dish soap to water, the tension between the water molecules pull the surface molecules away from the point where the soap was introduced.

Procedure

1. Fill a shallow, wide mouthed bowl half-way with water
2. We are going to move miniature boats using surface tension.
3. Cut out a small boat shape from your paper using the scissors. Make sure to include a slot in the back of the boat.
4. Place the boat into the bowl so that the surface tension of the water keeps the boat afloat.
5. Dip your toothpick into a very small amount of dish soap. You only need enough soap on your toothpick to coat the end.
6. Touch the soapy end of your toothpick in the slot on the back of the boat.
7. Watch what happens!
8. Repeat steps 5 and 6 until the boat no longer moves.

Extensions or Adaptations

- Try making different boat shapes
- Sprinkle pepper on the surface of the water and touch the surface with a soapy toothpick
- Try other liquids to see if their surface tension is as strong as water