

Floating Paperclip and other Surface Tension Experiments

Introduction

The surface tension of water is the reason water skaters can glide on the surface of water, why water collects in droplets, and why water can travel up a plant stem. You can experiment with surface tension using everyday household items such as strawberry baskets and paperclips.

Material

Bowl

Paperclips

Strawberry Basket

Liquid Dish Soap

Water



To Do and Notice

Fill the bowl with water. Drop a paperclip in the water and observe what happens. Since the paperclip is denser than water, it will sink to the bottom. Now try to float a paperclip on the surface of the water. It helps if you bend one end of the clip up to give your fingers something to hold on to without touching the surface of the water. Lower the paperclip flat against the surface, slowly, and without touching the surface of the water with your fingertips. The strong attraction between the water molecules on the surface forms an elastic skin that supports the weight of the paperclip. Once you have the paperclip floating on the cup of water, put a drop of dish soap in the water. This will bind with the water molecules, interfering with the surface tension. The paper clip will sink.

What's Going On?

Surface tension is due to an attraction between the molecules in water. Water is a polar molecule. At different ends of the molecule, it has positive and negative charges. Water molecules tend to arrange themselves so that the positive end of one is next to the negative end of another. It is the attraction between polar water molecules that is responsible for what is called surface tension, which causes the surface to act in an elastic manner. When you put liquid dish soap

into water, it disrupts the order of the water molecules and weakens the intermolecular forces. Now the surface tension isn't strong enough to support the weight of a paperclip.

Going Further

Sprinkle pepper on the surface of the water. Put a drop of liquid dish soap into the center of the dish. What happens to the pepper?

Try to float other lightweight household items such as a plastic strawberry basket. See what happens when you add liquid dish soap.