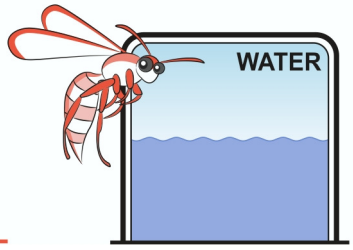
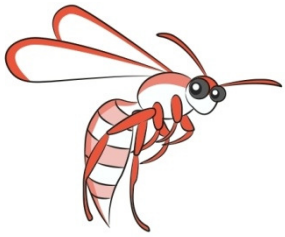


Breaking Surface Tension - Teacher Notes

Water molecules are attracted to each other. This tension between them allows them to form drops with resistant curved surfaces. If you add detergent, it moves between the water molecules and decreases surface tension. These two fun activities demonstrate this.

Dispersed pepper on left

Racing fish

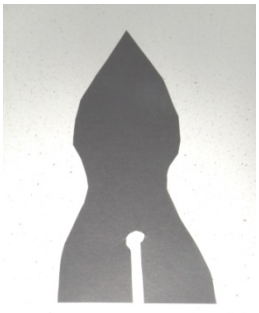


Plummeting Pepper

Equipment required per student or per group:

- 1 Pasteur pipette/transfer pipette
- Small container of detergent
- Small beaker of water
- Finely ground black pepper

Sprinkle the pepper on the surface of the water. Pepper is held on the top by surface tension. Draw up a very little amount of detergent into the pipette (or use a straw) and drop it into the centre of the surface of the pepper covered water.
Detergent will break surface tension in the immediate area and pepper there will fall to the bottom of the container.



Racing boat or fish

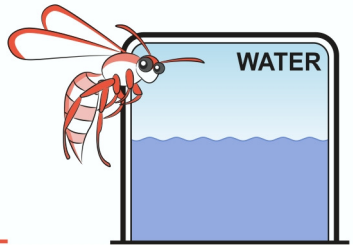
Equipment per student or group

- Large flat tray of water. The tray under student desks is ideal.
- Thin cardboard and scissors
- 1 Pasteur/transfer pipette with a few drops of detergent

Cut the cardboard into the shape of a fish or boat. At one end slice to create a channel. Place the cardboard object at one end of the tray and carefully drop a little detergent into the central hole. The boat will scoot across the tray. Water released from surface tension will rapidly flow along the channel in the cardboard and push the boat along. Ask students to repeat the experiment. Those who do not empty out the detergent contaminated water will find the boat no longer moves as the earlier detergent drop has spread throughout the water. Discussion can follow as to how to design the best racing fish and how to reduce variables to make the competition a "fair test"

Why should you not touch the walls of a tent when it is wet? Because it will break surface tension of water held in bubbles on the outside of the tent and water will flow inside the tent.

Breaking Surface Tension - Teacher Notes



Extension Floating needle or paperclip

A very carefully placed needle may be held on the water surface by surface tension. However it needs to be placed on a square of toilet paper first. The toilet paper will sink leaving the needle floating.
Normally a paperclip would sink in water. There are many similar activities on "You Tube".

Extension Colour chaos

Take three different food dyes. Place a small drop of each widely apart in a shallow dish of milk. Dip a toothpick in detergent and gently stroke each drop of coloured dye. The colours will swirl as detergent breaks water surface tension releasing the dyes to diffuse.

Fascinating information

Jaundice is not uncommon in neo-natal children. Doctors can sprinkle powdered sulphur on a specimen of the child's urine. If the child is healthy, surface tension will hold the sulphur on the water. If the patient has jaundice the sulphur will sink. Their urine has less surface tension because of the presence of bile.

We sometimes use wetting agents to overcome this tendency of water to stick together and not move. Our WA soils are hydrophobic (hydro=water phobic=hater) and watering the garden with a sprinkler only results in blobs of water sitting on the surface and being evaporated away by the Sun's heat. Like detergent, wetting agents break surface tension and make the water "runnier" to penetrate into pores between sand grains to get into soil. We don't usually use detergents however as they also have negative effects on plant growth. Most wetting agents are not frog friendly.