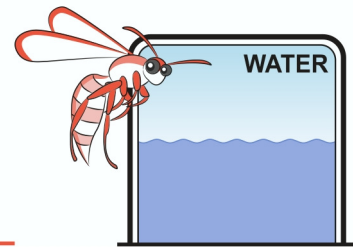


Surface Tension - Teacher Notes



Cohesion = Surface Tension

Introduction activity

Materials per student or group:

- 1 Glass slide or clean tray or plate or piece of waxed paper
- 1 Pasteur/transfer pipette
- Container of water

HINT If you don't have a pipette, place drinking straw in water and close top end with fingertip. Water can be carried in the straw and released when the finger is removed.

Students first use the pipette or straw to drop one bead of water onto a clean flat surface and observe the curved surface of the water bead. I heartily recommend that a fall of less than 1cm is encouraged. The water finds itself more attractive than the tray and forms round beads. This creates surface tension. If more water is added the bead will grow until the force of gravity exceeds the attractive force.



Surface tension is the result of cohesive forces between water molecules.

ASIDE An activity using pipettes and 5c pieces was included in the Laboratory Rules section. If students have not done this already, it might be included here.

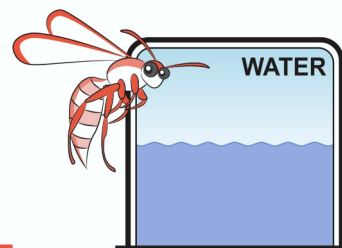
Pasteur pipettes are great fun and have lots of uses. They can be used to draw up mosquito larvae to examine with a hand lens, place vinegar in baking powder and add detergent to water. The end of the bulb can be cut off with scissors and the remains used as excellent large bubble blowers. Schools may wish to purchase a box of 500 for about \$20.00 (2012) and share them with others in their cluster.

Teacher Demonstration

***Charged balloon with stream of water
(Static electrical charge of water molecule)***



Surface Tension - Teacher Notes



Materials

- A well stretched balloon
- A thin stream of water
- A student with a good head of hair

Stretch then inflate a balloon and tie it off. Rub it against hair or man-made fibre. Friction will remove some of the outer negative electrons from the balloon's skin resulting in an overall positive charge. Hold the balloon near a thin stream of water (tap or carefully poured jug) and the stream will be deflected by the electrical charge.

Water molecules can easily align themselves when flowing and opposite poles attract "pulling" the water stream towards the balloon. The negatively charged ends of water molecules will be attracted to the positively charged balloon.

A thin plastic ruler or comb can also be charged by rubbing and will deflect the stream of water. This activity will demonstrate to students that water molecules are like tiny magnets, one end has a positive charge and the other a negative charge. Their cohesive attraction explains surface tension, the curved surface of water.

Hint This activity works best on a dry day. Recharge the balloon/ruler every time and keep it dry. Students may repeat the experiment to determine if the colour of the balloon or colour of hair affects the result.

Extension Bubbles and surface tension

Bubbles can be blown to demonstrate surface tension using a pipette with the end cut off and bubble mix. Water forms a thin skin around air pockets. When the bubble hits another object the tension is broken and the bubble collapses.

Bubble mix recipe

7 parts water

3 parts detergent (dishwashing liquid)

1 part glycerine (chemist or supermarket)

Students may even try to blow bubbles within bubbles!

This requires inserting a loaded pipette into the centre of an already blown bubble and inflating it.

Blowing bubbles inside bubbles



Cohesion explains why:

- Water falls in raindrops and taps drip
- Puddles form after rain
- Some insects can walk on water
- Tides and waves rise and fall
- Drops form on the surface of raincoats until they become too heavy and run off
- Light rain stays on the surface of soil and can evaporate before it sinks in
- Bubbles keep their shape (for a while!)