

Questacon at HOME

Activity Sheet – Surface Tension

Surface Tension

Background

Have you ever seen a water-strider or small spider appear to balance on the surface of water? This is possible because of something called surface tension. The surface tension of water causes its surface to behave like a stretched elastic skin. In this experiment, we will take objects that would normally sink and attempt to balance them on top of still water using surface tension alone!

Materials

- A wide container of water
- Small, light objects that are denser than water, such as:
 - Paperclips
 - Bread tags
 - Plastic card (Rewards Cards work well)
- Pepper or tea leaves
- Detergent

Safety

This experiment uses lots of water. Spilled water can create a slip hazard and is hazardous near electronics.

Adult supervision is recommended at all times

Procedure

Part One:

1. Set up a container of water and carefully lower the small object onto the surface of the water so that it appears to float or balance.
2. Submerge the same object. If you have chosen something denser than water, it should sink!
3. Very carefully add drops of detergent to the water while the object balances on its surface.
 - Does this change anything? What about if you add more detergent?

Part Two:

1. To a fresh container of water, shake some pepper or tea leaves onto the surface of the water.
2. Touch the surface of the water gently and observe what happens.
3. Add a drop of detergent to the tip of your finger and try again.
 - What happens this time?



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Tips and Tricks

- Balancing an object on the surface of water using only surface tension can be challenging! Ensure the object is parallel to the surface of the water and lower as gently as you can. A bent paper clip or fork can help to carefully lower your object.
- Ensure equipment is cleaned and rinsed properly with no soap or detergents remaining as they will lower surface tension and make this activity much more difficult.

What's the Science?

Surface tension will be present if the molecules that make up a liquid are more strongly attracted to each other than they are to air. The force of attraction between molecules of the same substance is called **cohesion**. Water is strongly cohesive, which is why it likes to sit in little pools and falls in perfect rain droplets. This cohesion is also why water exhibits a high surface tension.

Surface tension causes the surface of water to act like a stretchy elastic skin. This is what allows objects that are denser than water to sit on its surface without sinking. Objects held up by surface tension alone may fall if you add detergent, which is a type of **surfactant** (surface-active agent). Surfactants are chemicals that lower surface tension. Other surfactants include hand soap, surface cleaners, toothpaste and most commercial shampoos.

What questions should I be asking?

- Does the detergent make the surface tension stronger or weaker?
- Why does detergent cause pepper or tea leaves to move?
- Where can you see surface tension in real life?
- Can surface tension hold up any object? Why not?

If anything unexpected occurs, ask your child why they think that happened - it both confirms their understanding and can lead to extension activities. Ask your child to come up with ways to test their ideas!

What's next?

- Does it make a difference if the small object is wet or dry? Why might this matter?
- Try this experiment with milk instead of water. Add drops of food dye and do not mix them. Place a drop of detergent carefully into the milk and observe what happens!
- Try this experiment with different liquids (e.g. oil). Do these liquids behave differently?
- Try it in reverse! Carefully drop water onto the face of a coin. How much water can you balance? What shape is formed by the water? Why does this work?

