

Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This TOPS Idea is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

water domes

...adapted from **COHESION/ADHESION #13**
by TOPS Learning Systems

1. Set a dry penny on a dry bottle cap.

2. Count how many drops of water you can heap on the penny without spilling. Go for a record!



3. Build a 20-drop water dome.

a. If you poke it with a clean, dry pin, does this break the cohesive (attractive) bonds between water molecules?

b. Dip the pin point in liquid soap, then poke the water dome again. What happens?



4. How does soap affect surface tension (the cohesion of water)?

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OBJECTIVE

To observe that cohesive forces hold water together on a penny as a rounded dome; that adding soap significantly weakens this cohesion.

LAB NOTES

Steps 1-2. Start with a clean, dry penny. Traces of moisture may cohesively attract the dome to spill over the edge too soon. A bottle cap raises the penny above water that spills during repeated trials.

Students will naturally compete to see who can heap the most water on their pennies. Drops should free fall onto the dome for counting accuracy.

ANSWERS

2. A penny typically holds 20 drops of water (1 mL) or more before spilling over the side.

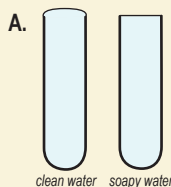
3a. No. A clean, dry pin does not cause the dome to spill. Cohesion between water molecules is stronger than their adhesive attraction to the dry pin.

3b. A soapy pin immediately causes the dome to collapse and spill off the penny.

4. Soap significantly weakens the cohesive bonds between water molecules (reduces "skin-like" surface tension), allowing the dome to collapse.

EVALUATION

Q. You have 2 test tubes. One holds just as much clean water as possible, the other as much soapy water as possible. Show each water line with accurate drawings.



EXTENSION

Q. Build a water dome, then sprinkle pepper or salt on the top. What happens?

A. Pepper flakes land on the dome, then typically slide off the crown and collect around the sides. Salt sinks through the water and eventually dissolves. The cohesive forces are not weakened by either additive, and the dome stands.

MATERIALS

- An eyedropper and clean tap water.
- A bottle cap, small cork, or similar platform.
- A penny; a paper towel to clean and dry it.
- A straight pin.
- Liquid hand soap or dish detergent.
- A shallow container to catch spills (optional).
- For extension: pepper and salt.

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