



WHAT'S SO SPECIAL ABOUT WATER: ABSORPTION

Project Skills:

- Youth will test if objects repel or absorb water.
- Youth will create and test possible explanations why some repel, while others absorb.

Life Skills:

- Communication

Science Skills:

- Making hypotheses
- Using “if-then” thinking

Academic Standards:

- Science C. 4.2. Use the science content being learned to ask questions, plan investigations, make observations, make predictions, test predictions, and offer explanations.

Grade Level(s): 3-5

Time: 10-15 minutes

Supplies Needed:

- Clay
- Cotton
- Eyedropper
- Paper
- Plastic cups
- Rocks
- Sponge
- Toothpicks
- Water
- Waxed paper

Do Ahead:

- Read through this entire activity plan and perform the experiments.
- For more information on water properties, review web sites listed under “Additional Web Links.”

BACKGROUND

Science can be fun, as kids learn science skills along with exploring the natural world of water. They also learn how to share their observations, hypotheses, experiments, and conclusions with each other. This lesson is about the cohesive and adhesive properties of water and why water molecules are attracted to each other.

Key vocabulary words:

- *Cohesion* is the attraction of one water molecule to another. Cohesive property of water is evident in the rounded shape of the water drops on waxed paper.
- *Adhesion* is the attraction of unlike molecules. Adhesive property of water is evident in the attraction of the water molecules to the molecules of the toothpicks. The water drops are attracted to the toothpick and then absorbed by them.
- *Repel* is when water is not absorbed by the object.
- *Absorption* of water is when water becomes a part of the object and does not stand alone.

WHAT TO DO

Activity: Absorb or Repel

In this activity, first have the youth drop water onto a series of objects, such as:

- clay
- cotton
- feather
- paper
- plastic
- rocks
- sponge
- waxed paper

Have the youth record what happens to the water when it reaches each object. They can sort the objects into two groups: Group 1 for items that *repel* water and Group 2 for items that *absorb* water. Repeat the activity by adding salt or soap to the water. Record the results.

TALK IT OVER

Reflect:

- What helped you decide how to sort the objects into Group 1 or 2?
- Why do you think some objects *absorb* water?
- Why do you think some objects *repel* water?
- How did adding salt or soap to the water affect the results? Why?

Activity: Oh, My Stars

Tape a piece of wax paper onto the table. Break five toothpicks in the middle but leave them connected. Then arrange the broken toothpicks on the waxed paper like the toothpicks in the illustration on the next page . . . like spokes of a wheel.



Sources:

- Lead author: Sally Bowers, 4-H Youth Educator, UW-Extension, Dane County.
- Contributions by: Dolly Ledin, UW Center for Biology Education and UW Adult Role Models in Science (ARMS); Tom Zinnen, UW-Extension Biotechnology Policy and Outreach Specialist; Linda Eisele, City of Madison, Office of Community Services; and Kathi Vos, Wisconsin 4-H Experiential Learning Specialist.
- “Oh, My Stars” activity adapted from “Oh, My Stars!” by Betty Cordel, <http://www.aimsedu.org/magazine/MindBoggler/ohstars.html>.



Next, use the eyedropper to place a few drops of water in the center of the wheel. Wait patiently to observe what happens. (Hint: The water formed one drop first. The water then collected around the toothpicks. The toothpicks started moving apart and formed a star. The water will eventually disappear and be absorbed by the wood.)

TALK IT OVER**Reflect:**

- Explain what you observed during this activity.
- How did you feel when you saw the toothpicks moving apart?
- What happened to the water? Where did it go?

Apply:

- How did the toothpicks form a star? What caused it?

What are some other ways you could test your ideas about water absorption? (Hint: For example, to test the idea that wood absorbs water, put wooden toothpicks side-by-side with toothpicks that have been coated with wax or soaked in vegetable oil, then add water. Or try using plastic toothpicks.)

ENHANCE

Encourage youth to create other experiments to further explore what they are seeing and learning about water absorption.

- For example, “if” the toothpicks form stars because dry wooden toothpicks absorb water, expand in size, and the expansion causes the toothpicks to move, “then” you might expect moist toothpicks to behave differently. Since they’re already moist, you might predict they would not absorb as much water, not expand, and therefore not move as much as dry toothpicks.
- Using dry toothpicks, repeat this same experiment several times so more focused observations can be made.
- Try the same experiment with toothpicks using colored water to watch the absorption process.
- Use colored toothpicks to observe if they react differently than the non-colored.

Do a side-by-side comparison test. Drop plain water on one group of toothpicks and water that has a couple of drops of dishwashing liquid on the other set of toothpicks. Have the youth share their observations and conclusions regarding the differences.

HELPFUL HINTS

- Coaching youth while doing these science activities is not about *telling* them the answers. It’s about *asking* open-ended questions. More importantly, it’s about getting them to ask questions that lead to experiments to test possible explanations. Then the search begins for both the teacher and the learner! It’s like teaming up to put together a puzzle.

ADDITIONAL WEB LINKS

- U.S. Geological Survey, Department of the Interior/USGS, explains the capillary action of water, <http://ga.water.usgs.gov/edu/capillaryaction.html>.
- The Green lane™, Environment Canada’s World Wide Web Site, gives examples of water molecules binding to one another through capillary action, http://www.ec.gc.ca/water/en/nature/prop/e_motion.htm.

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