



UW-MADISON EXTENSION

Natural Resources - Water

WHAT'S SO SPECIAL ABOUT WATER: SOLUBILITY & DENSITY

Activity Plan – Science Series

ACTpa025

Project Skills:

- Discovery of chemical and physical properties of water.

Life Skills:

- Critical thinking – develops wider comprehension, has capacity to consider more information

Science Skills:

- Making hypotheses

Academic Standards:

The activity complements this academic standard:

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

Grade Levels: 3-5

Time: 15-20 minutes

Supplies Needed:

- Clear jar
- Clear glasses
- ¼ cup colored water
- ¼ cup vegetable oil
- ¼ cup corn syrup
- Water
- Sugar
- Kool-Aid mix that needs sugar
- Measuring cups

Do Ahead:

- Read through the activity plan and perform the experiments beforehand.
- Review the helpful hints and web sites as vocabulary and water

BACKGROUND

Water is able to “dissolve” other substances. The molecules of water attract and associate with the molecules of the substance that dissolves in it. Youth will have fun discovering and using their critical thinking to determine why water can dissolve some things and not others.

Key vocabulary words:

- *Solvent* is a substance that dissolves other substances, thus forming a solution. Water dissolves more substances than any other and is known as the “universal solvent.”
- *Density* is a term to describe thickness of consistency or impenetrability. The scientific formula to determine density is mass divided by volume.
- *Hypothesis* is an explanation for a set of facts that can be tested. (American Heritage Dictionary)
- The *atom* is the smallest unit of matter that can take part in a chemical reaction. It is the building block of matter.
- A *molecule* consists of two or more atoms chemically bonded together.

WHAT TO DO

Activity: Density

1. Take a clear jar, add ¼ cup colored water, ¼ cup vegetable oil, and ¼ cup dark corn syrup slowly. Dark corn syrup is preferable to light so that it can easily be distinguished from the oil.
2. Add all liquids carefully and don't shake up.
3. Closely observe which liquid is on the bottom, middle and top. Write down your observations.

TALK IT OVER

Reflect:

- What happened with all the liquids?
- Predict what will happen when you shake this up.

Activity: Shake It Up!

1. Shake the jar so everything mixes.
2. Let jar sit for 10 minutes and observe again.
3. Develop an hypothesis on why the vegetable oil floats on the top of the dissolved corn syrup and water. Remember, an hypothesis is “an explanation for a set of facts that can be tested.”

TALK IT OVER

Reflect:

- What are the different ways to test your hypothesis?
- What information did you have to think about to create your hypothesis?

Activity: Solubility

1. Take a clear glass, add water, Kool-Aid mix and sugar according to directions on Kool-Aid package.
2. Drink your Kool-Aid.

properties are explained there.

- Read the “[Science with Kids, Science by Kids](#)” paper on how to teach science.

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.
- Kool-Aid photo: commons.wikimedia.org

TALK IT OVER

Reflect:

- What happened to the water when mixed with Kool-Aid and sugar?
- What happened to the Kool-Aid?
- What happened to the sugar?
- Why do you think this happens?
- What are the different ways to test your hypothesis?

Apply:

- Where else do you see water dissolving substances that it encounters? Not dissolving?
- How did these activities help you think in new ways?
- Where else can you use this new way of thinking?



ENHANCE

- In separate glasses, add sand to water. Compare Kool-Aid granules to sand granules by rubbing them separately between your fingers. How are sand and water different from Kool-Aid and water? What might be some ways that water might affect the sand?
- Show a picture of the erosion of rocks where the force of water can over time change materials.

HELPFUL HINTS

- Water molecules break the bonds between the individual molecules of the sugar and Kool-Aid mix. The sugar and Kool-Aid don't disappear; their individual molecules are separated from each other and are mixed with the water molecules.
- Some materials, like sand and oil, are bonded together too tightly for water to break the bonds between the molecules.

ADDITIONAL WEB LINKS

- U.S. Geological Survey with the Dept. of the Interior/USGS has a diagram showing how the molecules “stick” together which creates a density where objects cannot penetrate and thus repel water molecules:
https://www.usgs.gov/special-topic/water-science-school/science/capillary-action-and-water?qt-science_center_objects=0#qt-science_center_objects.
- An educational geography web site which explains about forces of erosion and water as an agent of erosion:
<http://geography.about.com/od/physicalgeography/a/erosion.htm>.

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