



Properties of Water Lesson Guide

Unit Overview

Unit Title: Properties of Water

Lesson Summary: Chemistry is essential to understanding the life process.

Subject Area(s) and Grade Levels: Click box(s) of the subject(s) and grade(s) that your Unit targets.

Life Science Physical Science Earth Science 5th 7th Biology

Arkansas Framework: http://arkansased.org/education/word/biology_9-12_06.doc

SLE – Student Learning Expectation Details



- MC.1.B.3 Investigate the properties and importance of water and its significance for life: surface tension, adhesion, cohesion, polarity, and pH.



- Graph the number of drops of water with detergent vs. the number of drops of water without detergent that stay on the coin.



- Integrate reading books about water, utilize library skills by having students research properties of water or utilize exploration skills on the internet. Journal entries, lab reports.
<http://www.sciencedaily.com/releases/2006/06/060620171022.htm>

National Standards: <http://www.education-world.com/standards/national/index.shtml>

National Standards Details: NSES Content Standards for Grades 9-12:

- Standard B - Physical Science B1: Structure of Atoms; B2: Structure and Properties of Matter.

Student Objectives and Procedures: (All 7-E's may not be present in a single lesson)

Objective:

- Sketch or construct a molecule of water demonstrating polarity and hydrogen bonding.
- Compare and contrast cohesion/adhesion.
- Give examples of life processes related to the properties (adhesion, cohesion, surface tension) and importance of water.

Focus Question:

- How do the properties of water affect life?

Prerequisites / Background Information:

- Document: Properties of Water Background Information

Timeline: 1-2 Class periods depending on instruction time

- Preparation:** • 1 Hour
- Elicit/Engage:** • 10 min
- Explore:** • 1 Hour
- Explain:** • 20 min
- Cleanup:** • 30 min

- Teacher Preparation:**
- Teacher lesson plan, water information, lab set up and student response sheets are included in the link next to the engage instructions.
Modifications: Place students in mixed ability groups or mixed learning style groups. Other modifications may be made as determined by an individual IEP.
 - Interventions: Address misconceptions by explaining the difference in adhesion and cohesion. Discuss the reason water is known as the "Universal Solvent" even though it does not dissolve everything.
 - Intellectual Challenges: GT students can research and present other activities that demonstrate the properties of water or research ways these properties are associated with living things.

Materials:

- Document: Properties of Water Lab Materials

Technology – Hardware: (Click boxes of all equipment needed)

- | | | |
|---|---|---|
| <input type="checkbox"/> Camera | <input checked="" type="checkbox"/> Computer(s) | <input type="checkbox"/> Digital Camera |
| <input checked="" type="checkbox"/> Projection System | <input type="checkbox"/> Television | <input type="checkbox"/> VCR |
| <input type="checkbox"/> Video Camera | <input checked="" type="checkbox"/> Internet Connection | <input type="checkbox"/> Other: |

Technology – Software: (Click boxes of all software needed.)

- | | | |
|--|--|---------------------------------|
| <input type="checkbox"/> Database/Spreadsheet | <input type="checkbox"/> Multimedia | <input type="checkbox"/> Other: |
| <input checked="" type="checkbox"/> Internet Web Browser | <input type="checkbox"/> Word Processing | |

Internet Resources:

Procedures:



- No eating or drinking in the lab
- Follow written & oral instructions
- No horse play
- Wear appropriate safety gear (goggles, apron, gloves)

Teacher’s Notes:

Elicit

- In groups of two or three, have students discuss and write in science notebooks, illustrate what they know about the structure and properties of water.
- Share responses on the board or chart paper so that students can add to their own science notebook entries any ideas they did not already have.
- Writing Prompts:
 1. Is water really the universal solvent?
 2. Can you give an example of something that does not dissolve in water?

Engage

- Water:
"Ballooney" is the engagement; however, the teacher may choose any of the lab stations for a demonstration.

Explore

- Chemistry-Properties of Water Lab --teacher will choose as many as possible of the activities out of the remaining activities.

Explain

- Review the Properties of Water and Explanation of the Lab documents prior to the lesson.
- Review properties of water with students and discuss why these properties are important for living things (water's significance for life).
- Ask questions about lab, such as:
 1. Which properties of water are being demonstrated at this station?
 2. How is this property important for living things?
 3. What are some other properties of water not covered in the lab and how are they important for living things?
- Possible Misconceptions:
 1. Adhesion is the same as cohesion.
 2. Water dissolves everything.
 3. Water atoms expand or change when ice melts.
 4. A film on the surface of water does nothing to the water.
 5. Liquids rise in a straw because of "suction".
 6. See additional misconceptions below in the provided web links.
- Vocabulary
Adhesion, cohesion, polarity, surface tension, pH, capillary action, acid, base, hydrogen bonding, solvent.



- The student may complete any of the chemistry lab activities not previously completed, or may design experiments to test the questions they generated during the lab.



Formative Assessment

- Water formative assessments
- Make a "foldable" whereby students compare adhesion/ cohesion, list 5 properties of water and/or write an application for each of the properties of water to life.
- Questions for Reflection:
 1. Two things I learned about water that I did not know.
 2. One thing I am unclear about.

Summative Assessment

- Unit Summative Assessment



- Environment Movie - Water Supply Lesson - Web
- Frozen People

- http://www.thefutureschannel.com/dockets/hands-on_math/water_supply/
- <http://www.sciencedaily.com/releases/2006/06/060620171022.htm>



Cross-Curricular

- Document: Properties Of Water Cross Curriculum
- Technology:
 1. Water samples from various sources can pH probes.
 2. Water scavenger hunts via internet are another way for students to interact with the learning.

Notes:

- 21st Century Skills: Teaming, Collaboration, Inventive thinking.