



CHILDREN'S CLEAN WATER FESTIVAL

Where Youth Are Making Waves!

Properties of Water

Background:

The physical and chemical properties of water make it one of the most unique substances on earth. Water is the only natural substance that is found in all three states: solid, liquid and gas. At the temperatures normally found on earth, water is constantly interacting, changing, and in movement. Because of its unique chemical properties, water can dissolve more substances than any other liquid, which is why it's called the "universal" solvent.

Properties of Water: What Makes Water Special?

CIM CORRELATION: Science

- Common Curriculum Goal: Understanding structure and properties of matter: identify unique properties of each state of matter
- Common Curriculum Goal: Understand chemical and physical changes: recognize that heating and cooling causes changes in states of matter
- Common Curriculum Goal: Use interrelated processes to pose questions and investigate the physical world: design a simple scientific investigation to answer questions or test hypotheses.

What Makes Water Special?

- **Grade Level:** Elementary
- **Subject Areas:** Physical Science
- **Duration:** Preparation time 30 minutes, Activity time 50-minutes
- **Setting:** Classroom or laboratory
- **Skills:** Analyzing (identifying components and relationships); Interpreting (describing); Evaluating (testing, assessing)
- **Vocabulary:** Properties of water, liquid, solid, gas, float, sink, dissolve

Summary: Students describe the unique characteristics of water and brainstorm ways to distinguish it from other clear liquids.

Materials:

- Three large glass containers
- Liquid oil
- A piece of solid oil like Crisco
- Liquid wax
- A piece of solid wax
- Water
- Ice
- Hot plate with two burners, or two hot plates
- Oven mitts
- Two pots

If you are going to do this as a classroom activity then you will need enough glass containers, oil, wax, ice for each group.

Background:

Earth is a unique planet. It is the only planet in our solar system with liquid water. As a result, Earth is the only planet capable of supporting life as we know it. Because of the amazing properties of water, it keeps the planet from getting too hot or too cold. Water also exists in three states - solid, liquid and gas or steam - and can dissolve things.

Demonstration or Activity

Part I

To begin this demonstration put two pots on a burner - one filled with water and one without. Let them sit there for a few minutes while you ask your class what they know about water. See if they can describe the unique characteristics of water.

Explain to your class that water has the ability to store heat. Show your class what is happening to the pot that doesn't have any water in it. It is burning up. Then show them the pot with the water in it. It is doing fine. Explain that as long as there is water in the pot that the water is taking and absorbing the heat, boiling the water and turning it into steam. The pot will be ok until the water is gone.

Think of the Earth as the pot, and the ocean as the water in the pot. Without water taking the heat from the sun our planet would be too hot for us. Water keeps the planet from being too hot.

Part II

Part II can be done as a demonstration or in small groups. To begin this part of the demonstration fill one of the containers with water and melt a block of wax and pour that into another container. Fill the last container with oil. On a plate have a piece of ice, a block of wax, and a block of oil (Crisco baking bars work well). Try to make sure each piece is about the same size.

Explain to the class that another property of water is that solid water floats in liquid water. Other substances do not do this. Take the piece of wax and put it in the liquid wax, put the piece of Crisco into the oil. Lastly, put the piece of ice in the water. Have students record the results.

Have students talk about why it is important that ice floats?

If ice didn't float, if water froze and sank to the bottom, then eventually all the water on earth would freeze from the bottom up and there would be no water left. Water keeps the planet from getting too cold.

Part III

This part of the demonstration will show that water dissolves things and that other substances do not. Using your three containers from Part II, put drops of food coloring or a spoonful of sugar into each container. Have students record the results.

Water has the ability to dissolve other materials. This is good because without it our bodies would not be able to dissolve and digest food.

Part IV

How would you describe water to someone if you couldn't use the words *water*, *clear*, or *liquid*. Have students think of a number of ways to describe the characteristics of water with out using these words.

Was it hard to describe without using the words water, clear, liquid?

Have students brainstorm ways they can distinguish water from other clear liquids, without tasting them, based on the properties of water.

Possible answers or test they could perform include:

- Testing to see what dissolves in water (solubility)
- Testing to see if something floats on the liquid (density, surface tension)
- Looking at evaporation and condensation (temperature, phase change)
- Looking at pH (acidity)
- Look for chemical reactions

Part V

Using up to seven clear liquids, take the answers from Part IV and design a procedure to test your hypotheses.

- Water
- White vinegar
- Clear soda
- Alcohol
- Hydrogen peroxide
- Glycerin or mineral oil
- Corn syrup

Other Resources:

Websites:

1. The Remarkable Ocean World: <http://www.oceansonline.com/resources/index.html>
2. San Diego State University: <http://www.biologylessons.sdsu.edu/classes/lab1/lab1.html> (Lesson 1)
3. USGS – Water Science for Schools: <http://ga.water.usgs.gov/edu/waterproperties.html>

Local Contacts or Possible Field Trips: None Available

What Makes Water Special? Data Sheet

Part I	List what you know about water:		
Part II	Jar 1	Jar 2	Jar 3
	What is in jar: Observation:	What is in jar: Observation:	What is in jar: Observation:
Part III	Observation:	Observation:	Observation:
Part IV	List how many ways you can distinguish water from other clear liquids:		

