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***Conservation Education***

***Pre & Post Content - Water Conservation***

***www.iercd.org***

# **LESSON: water molecule**

***Grade level:*** *2nd*

***NGSS:*** *2-ESS2-3.**Obtain information to identify where water is found on Earth and that it can be solid or liquid.*

### **Introduction:**

Comprehension of the critical role played by water in support of all life on Earth is an essential foundational element of the Inland Empire Resource Conservation District’s Water Use Efficiency classroom presentation. This activity is being provided to increase student awareness of water uses and benefits prior to program facilitation, and encourages development of this knowledge in a free-form, group exercise. The suite of concepts and vocabulary covered will depend on length of activity facilitated by the participating teacher, but at any length should increase student preparation for IERCD program participation. It would also be suitable for post-program facilitation, to reinforce concepts and vocabulary covered during the program for maximum content retention.

### **Objective:**

By participating in the activity students will:

* Identify the differences between solid, liquid, and gas.
* Obtain, evaluate and communicate information and experience.
* Learn information about the water cycle and the role the sun plays in changing water molecules into solid, liquid or gas.

### **Background**:

Water is fundamental to life on Earth. Most of the freshwater we use is from surface sources (such as rivers and lakes), and those bodies of water are replenished by rain. Although the Earth’s surface has more than 70 percent water, only about 3 percent is fresh water and less than 1 percent is available for consumption. Therefore, freshwater is a scarce and valuable resource. Humans use it for almost everything – agriculture, power generation, and personal needs. In the United States, we often take it for granted that we can turn on the faucet and have easy access to safe, clean water. However, many people in the world are not so lucky. Conserving our freshwater resources and monitoring our freshwater distribution are becoming very important issues.

### **Summary:**

This activity brings water molecules up to size (student’s size!) by physically involving students in simulating molecular movement in each of water’s physical states (solid, liquid, gas).

### **Materials**:

* Samples of water in each state of matter (Photos of a glass of water, ice, and boiling water or water evaporating on a sunny window ledge) (optional)
* 2 flashlights (one covered with red filter or transparency and one with a blue filter or transparency)

### **Skills developed**:

* Analyzing information, interpreting, and listening to instructions

### **Directions**:

1. Tell the class they are going to become water molecules. They will begin as water in its solid form, ice. As ice, students stand in place and move very little. (You may want to incorporate hand signals as an additional visual cue for students during changes in state: a fist for solid, open hand wave motion for liquid and wiggling fingers for vapor.)

2. Inform students that for this activity, a flashlight with a red filter will be used to represent the addition of heat energy. Shinning the light on a student represents heat energy traveling from an outside source (for instance the sun) to the water molecule (student), resulting in increased temperature and molecule motion (kinetic energy).

3. Beam the flashlight on a few students. They should begin to move slowly in place, gently bumping into each other. Through a chain reaction all students begin moving.

4. Tell the students they are now liquid. As liquid molecules, students should stay close together.

5. Add more heat; the liquid turns into gas. In its gaseous state, water molecules move freely. Students step away from each other and roam randomly around the room. \*Music may enhance the flow of “molecules” around the room.

6. Explain that eventually, heat energy is represented by the flashlight with the blue filter. (Heat travels from the molecule to the colder object.)

7. Shine the blue flashlight on the group of students. Droplets of water will begin to form around the room as molecules lose energy and move together. After all the students are liquid, continue to shine the blue light (representing a complete loss of energy) on students until they become ice.

### **Extension**:

**Root Beer Float Activity**

***Attention: Please consider your student’s allergies or medical needs, prior to conducting this activity! Make substitutions if needed!***

**Materials needed**: Pre frozen individual ice cream scoops, bowl, serving spoon, root beer, and cups.

**Directions:** Write students answers on the board during activity.

1. Have students discuss the answer to the question, “What do root beer floats and the 3 states of water have in common?”
2. Place pre frozen ice scream scoops in a bowl and pass them out to students along with a cup half filled with root beer.
3. Have students answer the following questions, “What is the solid?” and “What is the liquid?” as they add the ice cream to the root beer
4. Notice the gas rise when the ice cream is added to the soda.
5. Discuss the three states of matter and make the connection to the Water Molecule activity and the three states of water.