Wondrous Water-Cycle

Objectives

Students will:

- Simulate the natural water cycle
- Be able to explain each phase water goes through

Background

Water might be called our most recycled resource because the water on earth is constantly moving in a cycle. The water molecules here today are the same ones that were on earth millions of years ago. Consider, for example, that the water you bathed in last night may have contained the same water molecules that were part of the bath water for an ancient Egyptian princess. The water you spray on your garden may be the same water an early american pioneer poured on his garden. The distribution of the earth's supply of water changes in time and space, but the amount remains basically constant. This constant movement of water molecules is kept in motion by a phenomenon known as the "hydrologic (or water) cycle." This cycle is powered by the sun's energy and is aided by the force of gravity.

As a rule, the water from our faucets comes from "groundwater" or "surface water." Ground and surface water combined makes up less than 1% of the total water on earth. Approximately 97% of the water is in the world's oceans and about 2% is found in ice and snow primarily in polar ice caps.

Explain to your students the "water" that they can see is made up of billions of molecules of water. These tiny molecues of water (H_2O) are made up of 2 atoms of hydrogen and 1 atom of oxygen. It is these molecules that are constantly circulating throughout the cycle.

Review this cyclic process with your participants. Explain the snow, sleet and rain that falls from the sky by the force of gravity is one part of the cycle. This falling water (sleet and snow is frozen water) comes from land and surface water which was evaporated by the sun's energy. The water was heated by the sun, rose into the atmosphere, was then cooled sufficiently to condense into clouds and finally fell back to the earth as precipitation. Some of the precipitation which falls on the land is used by plants and animals, some percolates down through the soil, some runs off and eventually reaches the ocean and some lands on the ocean and other water surfaces.

The water that percolates down through the soil becomes groundwater. This groundwater eventually flows into our rivers, streams and lakes where it is then exposed to the sun to be evaporated once again. The evaporated water cools as it rises until it condenses into clouds once again, thus continuing the cycle. Water molecules are also given off from plants through a process called "transpiration" (plant sweat).

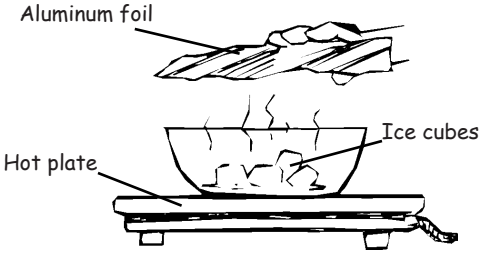
Procedure

- Put some ice cubes into the container and heat it on the hot plate until the ice changes to water and the water begins to evaporate.
- Place a piece of aluminum foil over the boiling water so the students can see the vapor condensing. *See illustration*
- Demonstrate "rain" by placing a shallow pan of ice cubes over the vapor from the boiling water.

Materials

- Hot plate
- Glass container, or container that won't break when heated
- Ice cubes
- Aluminum foil or Aluminum pie plate

Adapted by permission from *New Hampshire's Water Resources*, New Hampshire Cooperative Extension Service, University of New Hampshire, Durham, NH.



Condensation on aluminum foil

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The Water Cycle Song

(Tune of: She'll Be Coming Around the Mountian)

Oh we have a water cycle, yes we do.
(Yes we do!)
Oh we have a water cycle, yes we do.
(Yes we do!)
It's goes up as evaporation,
Forms clouds as condensation,
Falls down as precipitation, yes it does!
(Yee Haw!!)

Oh we have a water cycle, yes we do.
(Yes we do!)
Oh we have a water cycle, yes we do.
(Yes we do!)
It's goes up as evaporation,
Forms clouds as condensation,
Falls down as precipitation, yes it does!
(Yee haw!!)

Discussion and Evaluation

Name the many ways that water appears in the natural environment.

Examples: rain, snow, hail, sleet, dew, clouds, fog, ice on ponds and lakes, water vapor. These may be listed under one of three forms: Solid, liquid, or gas.

Introduce water to participants as one of the most essential substances to all forms of life on earth. Discuss, observe and demonstrate the following:

What is one of the most important substances we have on earth?

A compound known as H_2O - water.

Why is water so important to all living things?

All living things are made up mostly of water which must be replenished for survival.

In what forms do we see H_2O?

Solid, liquid, and gas.

What is a water cycle?

It is a magical way water can change into different forms and cycle through the environment so we can use it over and over again.

Where does most of our fresh water enter the water cycle?

From the ocean, only the H_2O goes up into the atmosphere leaving the salts and other solids behind.

How does water go up into the sky or atmosphere?

By processes called evaporation and transpiration, which use the sun's energy to change liquid water into a gas so it can be light enough to rise into the atmosphere.

What is evaporation?

A liquid changing into a gas.

What is transpiration?

It is the process in which plant tissues give off water vapor to the atmosphere. This is an essential physiological process.

What is water vapor?

A name for water that has changed into a gas.

What is condensation?

A name for water vapor changed or condensed back into a liquid.

What is precipitation?

A name for water condensed and dropped back to earth in the form of rain, ice or snow.

What is the world's greatest solvent? It is a substance that can dissolve or break down almost anything, including the mountains.

Water.