ON YOUR MARK, GET SET, EVAPORATE

6 - 8

SUBJECTS:
Chemistry, Math

TIME:
50 minutes

MATERIALS:
chalkboard
chalk
sponge
pail of water
salt
clock with second hand
student sheet

OBJECTIVES

The student will do the following:

1. Explain the hydrologic cycle.

2. Explain the terms evaporation, condensation, and precipitation.

BACKGROUND INFORMATION

Evaporation is the main way water on land is transferred to the atmosphere. It is the process whereby liquid moisture is turned into gaseous moisture. Energy is supplied from the sun or atmosphere. This energy causes the water molecules to vibrate faster which causes them to move further apart. As temperatures increase, molecules at the water surface detach and move into the atmosphere. Saturation of the lower atmosphere occurs, dependent upon atmospheric conditions. Cold, humid air undergoing little movement will quickly saturate, but warm, dry air undergoing turbulent mixing as a result of wind will saturate slowly leading to higher evaporation rates.

Factors influencing evaporation:

Meteorological Factors
1. Radiation: This can come directly from the sun or indirectly from the surrounding atmosphere. This causes an increase in the temperature of the air and water.
2. Wind: Evaporation is higher in areas that are open and subject to air movement than in sheltered areas with little movement of the air. Air movement and turbulence is desirable to mix up air and cause saturated lower layers to mix with drier upper air.

Physical Factors
1. Salinity: An increase in salinity leads to a proportional decrease in evaporation rates.
2. Surface Area: As the surface area of the water body increases, the total evaporation increases.

Terms

condensation: the act or process of reducing a gas or vapor to a liquid or solid state.

evaporation: the act of converting or changing into a vapor with the application of heat.

hydrologic (water) cycle: the cycle of the Earth's water supply from the atmosphere to the Earth and back which includes precipitation, transpiration, evaporation, runoff, infiltration, and storage in water bodies and groundwater.

precipitation: water droplets or ice particles condensed from atmospheric water vapor and sufficiently massive to fall to the Earth's surface, such as rain or snow.

ADVANCE PREPARATION

A. Assemble all of the materials you will need for this activity.

PROCEDURE

I. Setting the stage

A. Fill a glass full of water.

B. Set it on a table close to a heat source.

C. Show the students the glass of water.

1. Ask the students what they think will happen to the water over a period of time.

2. Ask them to explain the process of evaporation.

3. Ask the students what they think will happen to a glass of oil, coca cola, and syrup over time.

II. Activity

A. Distribute the student sheets. Divide the class in half and get two volunteers to come to the chalkboard. Two other volunteers will watch a clock.

B. Have the volunteers draw a circle about two feet in diameter on each half of the blackboard. Provide the two volunteers with a wet sponge.

C. Ask the volunteers to stand in front of the circles. When you say “go,” the volunteers will then wet the circle with a sponge.

D. The students who are seated will observe the spot and alert the clock person when their spot is completely dry. The volunteers with the clocks have to immediately stop the clocks when their spot dries.

E. The race is run 2 out of 3 times. The best 2 out of 3 wins.

III. Follow-Up

A. Ask the students the following questions:

1. What happened to the water that the volunteers wiped on the board?

2. Where did the water go?

3. Do you think various substances diluted in water would affect the rate of evaporation?

4. Think of ways to make the water evaporate faster. (Shining a hot light on the circle, using a fan, etc.)

5. What are natural occurrences or results of evaporation? (Answer: lowering of lake levels during warm, dry periods.)

6. What happens within streams and lakes with evaporation relative to pollutants? (Answer: pollutants concentrate.)

IV. Extensions

A. Use saltwater instead of freshwater to conduct the above race.

B. Use alcohol.

RESOURCES

Siepak, Karen L. Water. Carson-Dellosa Publishing Company, Inc., Greenboro, NC, 1994.

Hackett, Jay & others. Science, Merrill Publishing Co., Columbus, OH, 1989.

Evaporation: http://giswww.king.ac.uk/aquaweb/main/evaporat/evapo1.html

Directions: Complete the following chart.

Time it takes for the water to evaporate:

	Race #1	Race #2	Race #3
Volunteer #1			
Volunteer #2			

Time it takes for the alcohol to evaporate:

	Race #1	Race #2	Race #3
Volunteer #1			
Volunteer #2			

SUMMARY:

Explain the results in the space below: