

Investigation Two – Why Does a Puddle Shrink?

Standard I Students will understand that water changes state as it moves through the water cycle.
Objective 1 Describe the relationship between heat energy, evaporation and condensation of water on Earth.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills3. Understand science concepts and principles4. Communicate effectively using science language and reasoning.

**Standard
I**

**Objective
1**

Background Information

The sun provides the energy needed (solar energy) to change liquid water to Water vapor. Approximately 80% of all evaporation is from oceans and the balance comes from inland water, soils, and transpiration from vegetation. Winds carry the water around Earth. When moist air rises and cools, the water vapor condenses from a vapor to very small liquid water droplets forming clouds.

Pre-Assessment/Invitation to Learn

1. Distribute a wet cotton swab and paper towel to each student. Have students compare evaporation rates when the back of the hand and an equal area of a paper towel are moistened with the wet swab.
1. Discuss the results. Lead the discussion to inquire about the roles heat energy and material saturation play in evaporation.

Instructional Procedure

1. Distribute clipboards, pipettes, a square of aluminum foil and water to each group of students. Instruct them to place the foil on the clipboard, and then place the clipboard in a level location where it will be kept for the remainder of the experiment. (The clipboard needs to be somewhere that will not be disturbed overnight.)
2. Students are to make three puddles of water on the aluminum foil. Each puddle should receive ten more drops of water than the previous one. The first puddle should be made using five drops of water, the second with 15, and the third with 25.
2. Have the students make a table similar to the one below in their journals.

Materials*Per Student:*

- Water
- 1 Cotton swab
- 1 paper Towel

Per Group:

- 1 Clipboard
- Square of aluminum foil
- 1 ruler (metric)
- 1 Pipette (eye dropper)

4. Have the students record the starting amount of water (number of drops) and the starting diameter (measure in centimeters) of the puddles in their journals.

NOTE: Be sure that the puddles are as round as possible before the students measure them.

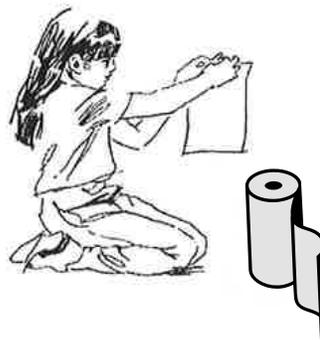
5. Discuss the factors that will remain constant, for example, same surface, same temperature, and same air movement. Then help the students conclude that the factor that is different for each puddle is the surface area. Have them record these similarities and differences in their journals.
6. After the water has sat overnight, have the students measure and record the diameter of each puddle in their journals.
7. Have students determine the ending amount of water by drawing the remaining water into a pipette and then counting the drops as they are squeezed out. This information should also be recorded.
8. Have students use the formula (starting amount of water minus ending amount of water) to determine the amount of water that evaporated.
9. Have students create a graph (i.e., bar graph or line graph) that represents their data.
10. Discuss findings and compare. Have students record their comparisons in their journals.

Measurements	Puddle A	Puddle B	Puddle C
Starting amount of water (number of drops)			
Starting diameter/size			
Ending diameter/size			
Ending amount of water (number of drops)			
Amount of water evaporated			

Curriculum Extensions

Science –

- Evaporation Art (ILOs 1, 3, 4)
 1. For each food color fill a cup with water, Add a few drops of food coloring.
 2. Place a paper towel in a tray.
 3. Using a pipette (eye dropper) and different colors of water, make a Pattern on the paper towel.
 4. Hang the paper to dry.
 5. Observe changes as water evaporates.
 6. When dry, add lines to make a picture.



Materials

- Paper towels
- Metal or plastic trays (cookie sheets)
- Food coloring in a variety of colors
- Cups
- Pipettes (eye dropper)
- Water

Assessment Suggestion

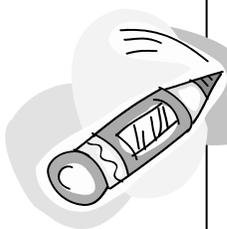
Check for students' understanding by viewing their evaporation data charts.

Homework & Family Connections

Introduce students to the Take Home Activity – Drying Laundry. Go over what they need to do in order to carry out the experiment by reading and discussing all the components of the activity.

HOME ACTIVITY

Drying Laundry



Today I learned that

Temperature and surface area affect evaporation rates. In class we measured and compared how different-sized water puddles evaporate.



Fun Focus:

This home activity will demonstrate some of the factors that influence evaporation.



Materials:

4 Paper towels
Water
Teaspoon
Fan



Procedure:

- 1 Place one teaspoon of water on each of the 4 paper towels.
- 2 Put one towel in a cold place and one towel in a warm place. Observe both to see which dries first. Record the drying times.
- 3 Put another towel in a breezy place (fan) and one where there is not a breeze. Record the drying time.

Condition	Cold	Warm	Breezy	No breeze
Location				
Drying time				

- 4 Discuss what happened with family members.
- 5 Talk with a grandparent or an older neighbor and ask how they dried clothing when they were young. Write about your discussion.
- 6 What conclusions can be made from doing this activity?