

Investigation Three – Condensation Chambers

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 skills2. Manifest scientific attitudes and interests3. Understand science concepts and principles

Standard I

Objective 1

Background Information

The process by which water vapor turns into liquid water is called condensation. When warm, moisture-laden air is cooled, the water vapor in the air changes into its liquid state and forms water droplets. This is evident when water condenses on the cool surface of a mirror or window in a bathroom while you are taking a shower or when chilled car windows fog up on the inside. Condensation is generally associated with warm water vapor in contact with cold surfaces or other relatively cold solid particles.

Pre-Assessment/Invitation to Learn

1. Hold up a mirror. Ask students how they might get water to form on the mirror. If no one suggests breathing on it, do so and indicate that the warm moist air from your lungs hits the colder mirror and condenses.
2. Discuss the process of condensation. (Refer to the background information if needed.) Indicate that students are going to construct condensation chambers.



Instructional Procedure

1. Refer to the worksheet, “Condensation Chambers.” Share a pre-constructed condensation chamber, and instruct the students to follow the steps outlined.
 - Write your name or group name/number on the cup.
 - Measure 20 ml (2 tablespoons) of water and add it to one cup.
 - Place the second cup upside down over the first cup as illustrated.
 - Use tape to connect the two cups.

Materials
<i>Teacher:</i>
<input type="checkbox"/> Small mirror
<i>Per Group</i>
<input type="checkbox"/> 2 small clear plastic cups
<input type="checkbox"/> Water
<input type="checkbox"/> Tape
<input type="checkbox"/> Graduated cylinder
<input type="checkbox"/> Worksheet, “Condensation Chambers”

2. Have each group place their chambers in a warm, sunny place. After it has sat for 1-3 hours, students should record their observations on the worksheet.
3. The following day have students record the rest of their observations on the worksheet.

Curriculum Extensions

Science –

- As an open-ended experience, allow students to plan, carry out, and design other experiments related to the findings questions found on the worksheet. (ILO 1)

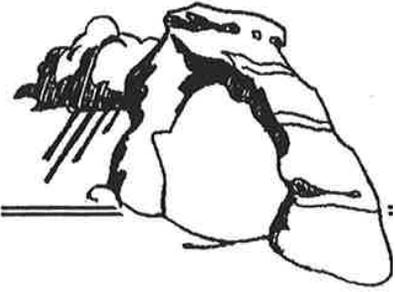
Assessment Suggestions

Using the questions found on the backside of the student worksheet, you may lead on oral discussion or have the students work individually to explore the process that took place with their condensation chambers. Have students review appropriate scientific language as you discuss the appearance of the condensation chamber before and after placing it in a warm, sunny place. Listen for facts such as the concept of energy from the sun warming the chamber and causing evaporation to occur within it. (At night the cool air outside the chamber will make the lid cool off and the water vapor will condense on the inside of the chamber. Condensation will most likely be more concentrated on the side facing the window. Ask students to explain why there was more condensation on the side of the lid facing the window. The temperature outside was colder and so the side facing the window cooled more than the side facing the heated room.)

Homework & Family Connections

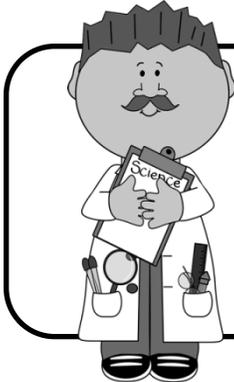
- Have the students investigate different places condensation may appear in their houses – bathroom mirror, windows (winter), pitchers with ice and water (spring/summer/fall), objects in the refrigerator, etc. Have them write what they found and return it to school.
- Have students do the worksheet “A Water Cycle Chamber” at home. Have them record what they observe every half-hour for two hours on the back of the home work paper. Answer the findings questions.

Condensation Chambers



Discussion Question:

Why does water collect on the bathroom mirror when someone takes a hot shower?



NEAT FACTS:

- Condensation of water vapor occurs when a mirror appears to fog up when someone takes a shower.
- Condensation also occurs when chilled car windows fog up on the inside.

Create your own condensation chamber by following the steps below.



Materials:

- 2 clear plastic cups
- tape
- 1 graduated cylinder
- Water

Assembly Steps:

- Step 1: Write your name or group number on the cup.
- Step 2: Measure 20 ml (2 tbsp.) of water and add it to one cup.
- Step 3: Place the second cup upside down over the first cup as illustrated.
- Step 4: Use tape to connect the two cups.

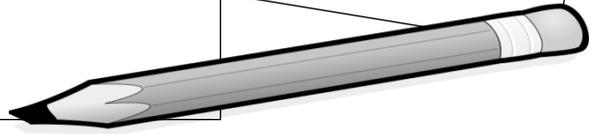


Condensation Data Collection

Draw the chamber just after closing
with tape:

Draw the chamber after
24 hours:

Draw the chamber after it has been
sitting in a sunny location for 1-3
hours



Findin

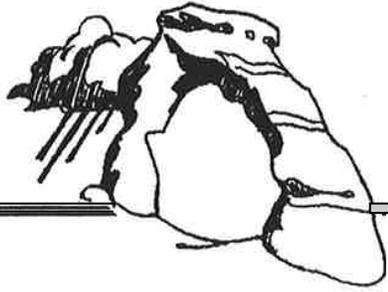
Explain what you think happened by answering the following questions. Include the following words in your discussion: temperature, evaporation, and condensation.

Is heat a factor in making the condensation chamber work? How?

How does the sun affect the chamber?

What do you think happens to the chamber at night?

If the temperature is warmer or colder on one side of the chamber than the other, what happens?



A Water Cycle Chamber

Discussion Question:

When a cup filled with a cold drink is placed in a warm room, what happens to the outside of the cup? What?

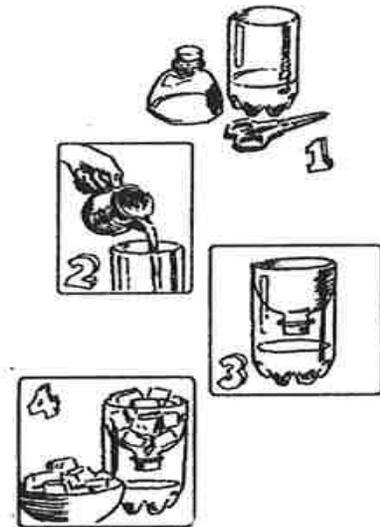


Materials:

Clear 2-Liter pop bottle with lid
Lamp
Scissors

Ice in Ziploc® bag
Warm water

- Step 1: Have an adult help you cut the top off the clear 2-liter pop bottle. Cut just where the side straightens out. (An adult will insert a knife to make a hole, then use scissors to cut the top off the bottle.)
- Step 2: Place a cup of very warm water in the bottom part of the bottle.
- Step 3: Invert the top of the bottle and place it in the bottom section of the bottle.
- Step 4: Fill the inverted top with the bag of ice.
- Step 5: Darken the room and observe the chamber using the lamp.
- Step 6: Check the bottle over a two-hour time period to observe what is happening inside the bottle.



Findin

What does each part of the water cycle chamber represent?

Ceiling of the bottle:

Ice cubes in the bag:

Warm water:

Lamp:

Where is water evaporating?

Where and why is water condensing?

Tell what you know about clouds, cold surfaces, and condensation nuclei from this demonstration.