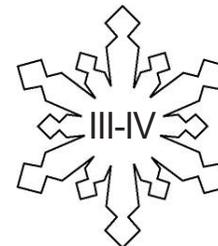


Humidity and Air Saturation

Levels



Grades 5-8

Overview:

A mix of demonstrations and activities displays the concept of humidity and how to measure it. Students will design and conduct an experiment to test how long it takes for air to become saturated.

Objectives:

The student will:

- understand the concept of humidity;
- understand the concept of air saturation; and
- conduct and perform an experiment to determine how long it takes for air to become saturated.

GLEs Addressed:

Science

- [6-7] SE2.2 The student demonstrates an understanding that solving problems involves different ways of thinking by comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem.
- [6] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by describing the weather using accepted meteorological terms (e.g., pressure systems, fronts, precipitation).
- [5-8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [6] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct simple repeatable investigations.
- [7] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings.
- [8] SA1.2 The student demonstrates an understanding of the processes of science by collaborating to design and conduct repeatable investigations, in order to record, analyze (i.e., range, mean, media, mode), interpret data and present findings.

Materials:

- Plastic sandwich bag
- Tape
- Water (2 liters per group)
- 2 clear, empty 2-liter bottles (1 with lid; 1 set per group)
- STUDENT WORKSHEET: "Air Saturation"
- TEACHER INFORMATION SHEET: "Alternative Experiment"

Teacher Note:

Temperature affects the air's ability to hold water (warm air holds more water than cold air), so humidity measurements are usually relative, that is they are a percentage of how much water is in the air based on how much it can hold at the time of measurement. Think of a thimble and a swimming pool. If both are full of water, then both would have 100% humidity, but there is more actual water in the swimming pool than the thimble. It's the same with air. Air that is very warm may have the same amount of water vapor in it as air that is very cold, but since air that is very warm can hold more water vapor the relative humidity is lower than the air that is very cold.

Activity Procedure:

1. Instruct students to place one hand in a plastic bag, seal with tape, and let sit for a few minutes. The hand should begin to sweat and become wet.
2. Ask each student to wet the other hand with warm water. Ask them how their hands feel. Does one feel cooler than the other?
3. Explain that humidity describes the amount of moisture there is in the air. The hand in the bag feels sticky and uncomfortable because the humidity is too high.
4. Explain that air saturation is the point at which air cannot hold any more water vapor. When air becomes saturated, any additional water vapor will turn back into water. When it comes to weather, this means that the water vapor will turn to rain.
5. Hand out the STUDENT WORKSHEET: "Air Saturation." Instruct students to complete the Hypothesis section.
6. Divide students into groups and ask them to work together to design an experiment using the materials provided to them. After they have designed their experiment, ask students to share their experiment procedures. As a class, discuss how the experiments might be fair (valid) or unfair (invalid) and why. Discuss controls and how they are used in an experiment.
7. Ask students to vote on an experiment to perform, or select one for them. Note: If students are unable to come up with a valid experiment, use the Alternative Experiment provided on the TEACHER INFORMATION SHEET.
8. As a class, decide what data to collect and instruct each student to list the data in the Data section on their worksheet.
9. Divide students back into groups and instruct them to complete the experiment, collect the data, and complete the worksheet. Depending on the experiment, this may take longer than one day.

Answers:

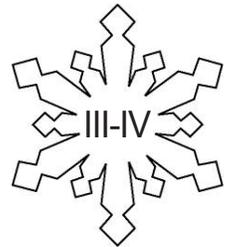
Answers will vary, except Further Questions: 1. a, the point at which air cannot hold any more water vapor.

Name: _____

Air Saturation

Student Worksheet (page 1 of 2)

Levels



Testable Question:

How long will it take the air in a 2-liter bottle filled with 1 liter of water to become saturated with water vapor?

Hypothesis:

It will take _____ (number of days, minutes, or hours) for the air in a 2-liter bottle filled with 1 liter of water to become saturated.

Experiment:

Materials:

- 2 liters of water
- 2 2-liter bottles with caps
- paper
- funnel

Procedure:

1. With the materials provided, create an experiment by writing down the steps you might take to prove the above hypothesis. If you need to add more steps, use another sheet of paper or write on the back of this sheet.

STEP 1: _____

STEP 2: _____

STEP 3: _____

STEP 4: _____

STEP 5: _____

STEP 6: _____

Name: _____

Air Saturation

Student Worksheet (page 2 of 2)

Data:

Conclusion:

1. It takes _____ (# of days, minutes, or hours) for the air in a 2-liter bottle filled with 1 liter of water to become saturated.
2. Was your hypothesis proved or disproved? _____
3. How did you come to your conclusion? _____

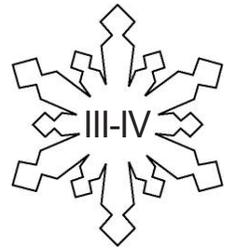
Further Questions:

1. What is air saturation?
 - a. the point at which the air cannot hold any more water vapor
 - b. the point at which it begins to rain
 - c. the point at which clouds form
 - d. the point at which water can no longer form vapor
2. What made the experiment a valid experiment, as opposed to an invalid experiment?

Alternative Experiment

Teacher Information Sheet

Levels



- STEP 1: Using the funnel, pour 1 liter of water into each of the 2-liter bottles.
- STEP 2: Tape a thin strip of paper to the outside of each bottle.
- STEP 3: With a pen, mark the date and the level of the water on the strips of paper on each bottle.
- STEP 4: Put a lid on one bottle and not on the other. At the top of the strips of paper label the bottle with no lid "Bottle A" and the bottle with a lid "Bottle B."
- STEP 5: Let both bottles sit for one week. Each day, mark the level of water on each strip of paper. At the end of the week, complete the remainder of the worksheet.