Weather

Grade 4 Subjects: Science, ELA

Cloud-in-a-Jar

Overview

Scientists often use models to help investigate natural phenomena. In this simple activity students can review the water cycle as they observe cloud formation in a gallon jar.

Standards/Benchmarks *

- Distinguish between solids, liquids and gases in terms of shape and volume. Science (4.2.1.2.2)
- Describe the transfer of heat energy when a warm and a cool object are touching or placed near each other. Science (4.2.3.1.1)
- Identify where water collects on Earth, including atmosphere, ground and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation. Science (4.3.2.3.1)
- Use precise language and domain-specific vocabulary to inform or explain a topic. ELA (4.6.2.2)

Background

In this model the warm water represents oceans that have absorbed solar energy. Smoke particles from the match represent particles of dust and pollutants suspended in air. The bag of ice, which is placed over the mouth of the jar, simulates the cool temperatures water vapor encounters as it rises into the upper atmosphere.

In nature, as moisture evaporates from the warm water, it rises and encounters microscopic particles in the higher cooler air. The water vapor condenses to liquid on these particles forming clouds.

Warm Up

1. If possible, take students outside to observe the clouds or use pictures of clouds in the *Minnesota Weatherguide Environment™ Calendar*. Discuss the different types of clouds.
2. Ask students what clouds are made of and how they think clouds form.
3. Review the water cycle.

The Activity

1. Tell students that they are going to use a model to simulate how clouds form. Take out the jar and have a student tape the black piece of paper on to one side of the jar. The paper will make the “cloud” easier to see in the jar.

Time:

15 min.

Skills:

Observing
Drawing Conclusions

Vocabulary:

evaporation
condensation
precipitation
water vapor
water cycle

Materials Needed:

· Large clear jar (half gallon or larger)
· 12 ice cubes
· Hot water
· Strike anywhere matches
· Plastic bag to hold ice cubes
· Sheet of dark construction paper
· *Minnesota Weatherguide Environment™ Calendar*
· Flashlight (optional)

2. Pour the hot water into the jar until it is about one quarter full. Swirl the water around to coat the sides. (This warms the glass to prevent condensation on the side of the jar. Obtain warm water from faucet or bring warm, not boiling water in a thermos.)

2. Light a match and hold it in the jar for a few seconds, then drop it in. Have a student quickly cover the jar with the bag of ice; the bag should completely cover the jar opening.

3. Have another student shine the flashlight on the jar. The flashlight can make the cloud easier to view.

4. Viola! A cloud! (As the warm, rising, moist air in the jar meets the cold air at the top, it cools. It is unable to hold all its water vapor, so some of it condenses on the smoke particles.)

Wrap Up & Assessment

Ask students to use sketches and write in their journals to explain the part of the water cycle that they see modeled in the jar.

Questions for Discussion

· What role does the smoke play? The smoke particles represent the dirt and dust particles in the atmosphere that condensed water molecules adhere to.

· What does the bag of ice do? The ice cools the rising air near the top of the jar. This cooling causes the condensation on the smoke particles.

· Why does the cloud appear to swirl around? The denser sinking cool air pushes the less dense warm air upward causing the swirling.

Extensions

· Draw a picture of how the cloud formed in the jar. Draw, write or describe the process of cloud formation from what you just learned. Write a poem about clouds, or a story from a cloud's point of view.

· Go outside. Observe the clouds, watching for swirling motions as condensation and evaporation occur. (Clouds change shape because of the condensation and evaporation occurring in the sky.) Name the kinds of clouds you see.

Resources

· *Minnesota Weatherguide Environment™ Calendar* See the Cloud Chart in back section of calendar.

· http://globe.gov/web/elementary-globe/clouds/story-book This site has information, written for students, regarding the types of clouds.

* Minnesota State Academic Standards

Standards Met

Subject	Code	Standard	Benchmark
Science	4.2.1.2.2	Solids, liquids and gases are states of matter that have unique properties	Distinguish between solids, liquids and gases in terms of shape and volume.
	4.2.3.1.1	Energy appears in different forms, including heat and electromagnetism	Describe the transfer of heat energy when a warm and a cool object are touching or placed near each other.
	4.3.2.3.1	Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.	Identify where water collects on Earth, including atmosphere, ground and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation
ELA	4.6.2.2	Write informative texts to convey ideas clearly	Use precise language and domain-specific vocabulary to inform about or explain the topic. Provide a concluding statement to the information presented.

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