

Photo Description



Long, white icicles hang down from the roof of a building. The icicles are different sizes and shapes. Some are thick and some are thin, and they all point down toward the ground.

Scientific Phenomena

This image shows the Anchoring Phenomenon of icicle formation through freezing and melting cycles. Icicles form when snow or ice on a roof melts due to heat from the building or sun, creating liquid water that drips down. As this water drips in cold air temperatures below 32°F (0°C), it refreezes into solid ice, building up layer by layer to create the hanging icicle formations we observe.

Core Science Concepts

1. States of Matter Transitions: Water changes from solid (ice/snow) to liquid (dripping water) back to solid (icicle ice) based on temperature changes.
2. Heat Transfer: Warmth from inside buildings or solar energy causes ice and snow to melt, while cold outdoor air causes the dripping water to refreeze.
3. Gravity's Effect: Liquid water flows downward due to gravity, creating the characteristic hanging shape of icicles as they form.
4. Temperature and Phase Changes: Water freezes at 32°F (0°C) and melts above this temperature, demonstrating how temperature controls matter's physical state.

Pedagogical Tip:

Use ice cubes in warm and cold environments to let students observe melting and refreezing firsthand. This concrete experience helps them connect the abstract concept to the icicle formation process.

UDL Suggestions:

Provide multiple ways for students to explore this concept: visual observations of real icicles, hands-on ice experiments, drawing the process, and acting out water molecules changing states through movement.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules slow down and arrange into organized crystal structures when they freeze, and speed up and move more freely when they melt. The repeated freezing creates the layered ice structure of icicles.

2. Zoom Out: Icicle formation is part of the larger water cycle system where water continuously moves between solid, liquid, and gas states throughout Earth's atmosphere, contributing to weather patterns and seasonal changes.

Discussion Questions

1. What do you think makes icicles form in some places but not others? (Bloom's: Analyze | DOK: 2)
2. How might the weather conditions affect the size and shape of icicles? (Bloom's: Evaluate | DOK: 3)
3. What would happen to these icicles on a warm, sunny day? (Bloom's: Apply | DOK: 2)
4. Why do you think some icicles are thicker than others? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

1. Misconception: "Icicles only form when it's snowing."
Clarification: Icicles form from melting and refreezing cycles, not directly from snowfall.
2. Misconception: "All ice is the same temperature."
Clarification: Ice can exist at different temperatures below freezing, and warmer ice melts more easily than colder ice.
3. Misconception: "Icicles grow from the bottom up."
Clarification: Icicles grow from the top down as new water drips and freezes onto the existing ice formation.

NGSS Connections

- Performance Expectation: 2-PS1-1 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- Disciplinary Core Idea: 2-PS1.A - Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature.
- Crosscutting Concept: Patterns - Patterns in the natural world can be observed and used as evidence.

Science Vocabulary

- * Freeze: When liquid water becomes solid ice because it gets very cold
- * Melt: When solid ice becomes liquid water because it gets warm
- * Icicle: A hanging piece of ice formed by dripping water that freezes
- * Temperature: How hot or cold something is
- * Liquid: Matter that flows and takes the shape of its container
- * Solid: Matter that keeps its own shape and doesn't flow

External Resources

Children's Books:

- The Magic School Bus: Wet All Over by Joanna Cole
- Water Is Water by Miranda Paul

YouTube Videos:

- "States of Matter for Kids" - Simple explanation of solid, liquid, and gas states with animations (<https://www.youtube.com/watch?v=ZkwXOgpU0mQ>)

- "How Do Icicles Form?" - Kid-friendly explanation of icicle formation process (https://www.youtube.com/watch?v=qBjLW5_dGAM)