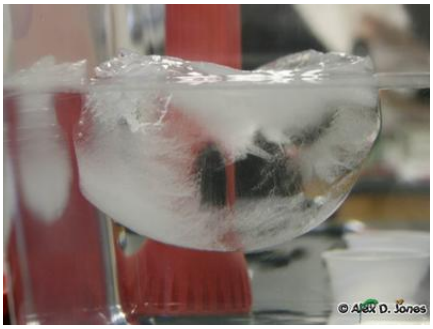
Ice

Physical Science | Lesson Guide

3rd Grade

Photo Description



A clear glass bowl sits on a table with ice cubes floating in water. The ice cubes look cloudy and white in some parts. You can see bubbles or air trapped inside the ice, making it look different from the clear water around it.

Scientific Phenomena

This image shows the anchoring phenomenon of states of matter in equilibrium. The ice cubes (solid water) are slowly melting into liquid water due to heat energy from the surrounding environment. The cloudiness in the ice is caused by air bubbles that became trapped when the water froze quickly. As the ice absorbs thermal energy from the warmer air and water around it, the molecular bonds weaken and the solid ice transforms into liquid water through the process of melting.

Core Science Concepts

1. States of Matter: Water exists in different forms - solid (ice), liquid (water), and gas (water vapor), depending on temperature and energy.

2. Heat Transfer: Thermal energy moves from warmer objects (room temperature air and water) to cooler objects (ice cubes), causing the ice to melt.

3. Physical Changes: Melting is a reversible physical change where the substance (water) stays the same, but its form changes from solid to liquid.

4. Air and Gases: The cloudy appearance in ice shows that air (a gas) can be trapped in solids when water freezes quickly.

Pedagogical Tip:

Use this image to help students make connections between everyday experiences (ice in drinks) and scientific concepts. Ask them to share their observations about ice cubes at home before introducing scientific vocabulary.

UDL Suggestions:

Provide multiple ways for students to engage with this concept: visual observation of the image, hands-on ice melting experiments, and kinesthetic activities where students act out water molecules in different states of matter.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules in ice are arranged in rigid, organized patterns held together by strong bonds. As heat energy is added, these molecules vibrate faster and break free from their fixed positions, allowing them to flow as liquid water.

2. Zoom Out: This melting process connects to the larger water cycle system on Earth, where ice in glaciers, snow, and frozen lakes melts to provide fresh water for rivers, streams, and groundwater that supports all living things.

Discussion Questions

1. What do you notice happening to the ice cubes in this bowl? (Bloom's: Observe | DOK: 1)
2. Why do you think some parts of the ice look cloudy while the water looks clear? (Bloom's: Analyze | DOK: 2)
3. How could you speed up or slow down the melting process? (Bloom's: Apply | DOK: 2)
4. What would happen if we put this bowl in the freezer overnight? (Bloom's: Predict | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Ice is not the same thing as water."
   Clarification: Ice and liquid water are the same substance (H ,O) in different states - only the arrangement and movement of molecules changes.

2. Misconception: "Cold makes ice melt."
   Clarification: Heat energy causes ice to melt. Even at room temperature, there is enough thermal energy to melt ice.

3. Misconception: "The bubbles in ice are water turning to gas."
   Clarification: The cloudy areas are air bubbles that got trapped when the water froze, not water vapor forming.

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

* Melting: When a solid changes into a liquid because it gets warmer.
* States of matter: The different forms that materials can take, like solid, liquid, or gas.
* Thermal energy: Heat energy that can move from one object to another.
* Physical change: When something looks different but is still made of the same material.
* Molecules: Tiny particles that make up all materials, too small to see.

External Resources

Children's Books:
- "What Is the World Made Of? All About Solids, Liquids, and Gases" by Kathleen Weidner Zoehfeld
- "Matter: See It, Touch It, Taste It, Smell It" by Darlene Stille
- "Solid, Liquid, or Gas?" by Fiona Bayrock

YouTube Videos:
- "States of Matter for Kids" - Simple explanation of solids, liquids, and gases with animations: https://www.youtube.com/watch?v=ZjjAXReznhE

- "Bill Nye the Science Guy: Phases of Matter" - Educational segment about how matter changes states: https://www.youtube.com/watch?v=zy8Cm5VyKdU