

What's the Matter?

4th Grade

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References:

- “Matter, Physical and Chemical Changes” lesson plan from 4th grade curriculum guide

Benchmarks:

PS-4 (Benchmark B): Explain that matter has different states and that each state has distinct physical properties. SI-1 (Benchmark A): Select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature, and area in metric and English units. SI-3, 4, 5, 6 (Benchmark C): Develop, design, and safely conduct scientific investigations and communicate the results.

Objectives:

In this lesson, the students will learn that a physical change is a change in size, shape, or state of matter of a substance. Usually a change in state of matter is dependent on temperature, which tells us something about what the atoms in the material are doing.

Materials:

- Hot plate
- 8-12 ice cubes
- One small pot or pan
- Lab sheet per student (**Found in student journal**)

Initial Demonstration:

Students will stand and move to resemble the molecules in the three states of matter. First, have all the students stand very close together and very still. Have the students stand with one person per tile on the floor in some ordered fashion. Then pose the question to the students about what form of matter do they represent. Then, have all the students to begin to move around more freely and a little farther apart. Make sure the students understand that they are not to move all around the room, then pose the same question about the state of matter they represent. Now all students can move all over the room, or very apart. Again pose the question about the state of matter they best represent. Discuss with the students the arrangement of the molecules in each of these three states of matter. Once the activity has been shown, then use large flash cards with each of the states in written in large letters. Hold these cards up so that the students can see them and have them arrange themselves into the respective state of matter.

Target Observations:

- Molecules in solids are tightly packed and ordered.
- Molecules in liquids are more loosely packed, but they take the shape of their containers.
- Gas molecules are very loosely packed and bounce off each other; however, they do not take the shape of the container they are in

Target Model:

- A physical change requires a change in the size of the object, shape of the object, or the state of matter. Even though water is frozen, it is still water, and likewise for water vapor.

Procedure:

Explain to the class that you will be doing a demonstration for the class using water in the three states of matter. You will be demonstrating how an ice cube can move through the three states of matter and allow students to see that it is in fact a physical change. This is because there is a change in the size of the ice cube, a change in shape and a change in the state of matter.

The state of an ice cube depends on its temperature. Each substance has a melting point and a boiling point. The response of the materials to temperature tells us something about what the atoms in the material are doing. Place the hot plate at a spot in the room where the students can see the demonstration. Remind students to not get close to the hot plate for safety issues. Give each student a lab sheet to complete during the process. Take out 8-12 ice cubes. *What state of matter are the ice cubes currently in?* Place the ice cubes in the pot. While you wait for them to melt, discuss the affect temperature will have on the ice. *Will it cause a physical change?* Have the students fill in their lab sheet using a written description of the change in size and shape of the ice cube.

Show students how the cubes melt and form water, which is both a physical change and a change in the state of matter. Have them write liquid next to #2 in the chart on the lab sheet and complete the written description for the size and shape of the water. Finally, the water will have a change in state of matter again when the water turns to steam with enough heat. Point out that they can see the gas. Students should complete the table on the lab sheet.

Target Observations:

- Water can exist in all three states of matter
- Temperature affects the state of matter in which a substance is in
- A change in state of matter is considered a physical, not a chemical change

Summary:

Physical properties of a substance are those that can be determined using the five senses. Changing any of these properties results in a physical change. Matter can change states or phases and water is a perfect example of a substance that can be found in all three states. The teacher has demonstrated how an ice cube can move through all three of these stages so that the students can observe that only a physical change is taking place.