

Chemistry All Around Us - Week 5

Day 5: Changing Matter

Teacher/Parent Background:

You probably don't think that gold could ever exist as a gas, but it can! Almost all substances, including gold, can exist in all three states of matter. You're probably most familiar with the three states of water. Water can exist as a solid, a liquid and a gas. So can metals such as gold. All you have to do to change a substance from one state to another state is add or subtract heat energy.

Overview:

In this activity, young learners will explore various types of matter as they change state in order to explain how heating and cooling can cause change.

Related Standards:

- **Plan and carry out investigations** to gather evidence to support an explanation on how heating and cooling can cause a change in matter.

Key Terms:

- matter - the "stuff" that everything is made of
- properties - characteristics of a substance
- senses - touch, taste, hear, smell, see
- solid - a state of matter in which the substance has a definite shape and a definite volume
- liquid - a state of matter in which the substance has a definite volume but not a definite shape. It takes the shape of its container.
- gas - a state of matter in which the substance takes the shape and volume of its container

Materials List:

- Jello mix
- hot water
- bowl
- spoon
- ice cube
- ice cube tray
- hair dryer (optional)

Activity Description:

1. Revisit the types of matter the student has been exploring during this week's lessons.
 - This week, you have been sorting different types of matter (objects) into groups or categories called solids, liquids and gases. How did you decide which objects to group together? Name a few of each type of matter.
 - Yesterday, we explored an interesting type of matter called oobleck. What did you observe/notice about oobleck? Can you think of other examples of matter that act like oobleck? What are they?
2. After revisiting the three types of matter, solids, liquids and gases, introduce the student to changes in matter via several explorations:
 - Exploration 1 - Making Jello
 - Show the student the Jello powder/mix.
 - What type of matter is Jello powder? (solid)
 - How do you know? (Has a definite shape and takes up space)
 - Add water to the Jello powder as directed on the box.
 - What happens to the powder? (A solid is mixed with a liquid. The solid dissolves in the liquid leaving only the liquid.)
 - Place the Jello mixture in the refrigerator as directed on the box.
 - What do you think will happen to the liquid Jello?
 - Remove the Jello from the refrigerator as directed on the box.
 - What happened to the liquid Jello? (The Jello is now a solid.)
 - Why do you think this happened? (The Jello got cold in the fridge causing it to freeze/get stiff/get solid.)
 - Exploration 2 - Melting Ice
 - Show the student an empty ice cube tray.
 - What is this called? (An ice cube tray.)
 - What do we do with it? (Make ice cubes.)
 - What type of matter is an ice cube tray? (Solid)
 - Pour water into the ice cube tray until filled.
 - What are we adding to the ice cube tray? (water)
 - What type of matter is water? (liquid)
 - Place the filled ice cube tray in the freezer.
 - What do you think is going to happen to the water in the ice cube tray? Why?
 - Once enough time has passed for the water to form cubes, remove the ice cube tray from the freezer.

- What happened to the liquid water that we poured into the ice cube tray? (It turned into ice/a solid/hard.)
- Dump the ice cubes from the tray.
- Explain that the water poured into the ice cube tray is still in the tray but it changed states/form. The liquid water is now in a solid state/form.
 - How do you think we can change the water back to a liquid?
- Apply heat to the ice cube using a hair dryer or by placing the cube in the sun or other warm location (depending on the amount of time you have to observe the change in states).
 - What is happening to the frozen water? (It's melting/changing state.)
 - What state did the water start out in? (Solid)
 - What state did the water end up in? (Liquid)

Closure:

Explain that adding or taking away heat energy from matter can cause it to change state.

- When we added heat energy to the Jello by mixing it with hot water, we caused the solid Jello to change into liquid Jello. When we removed heat energy from the liquid Jello by placing it in the refrigerator, the Jello changed into a solid.
- When we removed heat energy from the liquid water by placing the ice cube tray in the freezer, the water changed into a solid. When we added heat energy to the solid water, it changed back into a liquid.

Extension:

Read About It

- [What's the Matter in Mr. Whiskers' Room](#) by Michael Elsohn Ross
- [Matter](#) by Andi Diehn

Watch and Learn

- [What's the Matter?](#) - PBS Learning Media