

ICE CREAM IN A BAG LESSON PLAN

Lesson Overview

Students have explored and defined matter as anything that has mass and takes up space.

In this lesson the children will change matter from liquid to solid by changing the temperature. They will discover that energy causes the matter to change. They will also practice following directions and measuring with accuracy.

- Describe chemical and physical changes, including changes in states of matter.
 - Matter exists in three states: solid, liquid, gas.
 - Solids have a definite shape and volume
 - Liquids do not have a definite shape but have a definite volume
 - Gases do not hold their shape or volume
- Temperature can affect the state of matter of a substance.
- Changes in the properties or materials of objects can be observed and described.



Background Knowledge

States of matter are the forms that different phases of matter take on. The states are solid, liquid and gas. In a solid state, the matter maintain a fixed volume and shape.

The particles that make up a solid are closely packed together and do not have much space to move. Thus, solids keep their shape.

Liquids flow and do not have a definite shape. A liquid maintains a fixed volume but adopts the shape of its container. The particles that make up a liquid are farther apart than solids, and they can move around more readily. This allows liquids to flow and spread out. A gas expands to occupy whatever volume is available.

Liquid water turns into steam, a gas, when it is heated to the boiling point, 212 degrees F. There is also a fourth state of matter, plasma, which is a type of gas, which conducts electricity. Gases also flow and do not have a definite shape.

The particles that make up gases are farther apart than liquids, so gases can spread out in all directions to take the whole space of a container. Different kinds of energy can cause matter to change states.

Most children have experience with ice cream melting on a hot day or ice cubes melting in a glass. When a substance melts, it goes from a solid to a liquid. Heat causes the temperature of the substance to increase and particles to gain more energy.

They are able to move faster and flow, causing a solid to change into a liquid. Different objects (types of matter) can be mixed together. A mixture is two or more things put together – like salads, soups, cakes, etc. Some mixtures can be easily separated – like picking the tomatoes out of your salad. Some mixtures are hard to separate – like separating the chocolate from your chocolate milk. When a solid (like chocolate powder) completely mixes with a liquid (like milk), we say that the solid has completely dissolved into the liquid. Some objects can be mixed together to create something completely new. We can use a solid and a liquid to create a gas (like the air we breathe – CO₂) or we can use different liquids to create a solid. If we change the temperature of some objects, we can create something completely new like ice cream. Heating an object can evaporate it (if it's a liquid) or melt it (if it's a solid). By cooling or taking heat way from a liquid, we can freeze it or turn the liquid into a solid, like ice cream!

Lesson Objectives:

- To introduce three states of matter.
- To describe the properties of solids, liquids and gases.

Student Activity:

- Begin by discussing the characteristics of milk (liquid state).
- Explain how we are going to change the liquid form of matter into a solid.
- Follow directions for making ice cream.

Materials Needed:

- 1/2 cup half and half
- 1 Tablespoon sugar
- 1/4 tsp vanilla
- 3 cups crushed ice
- 1 gallon size Ziploc bags
- 2 sandwich size Ziploc bags
- 1/4 cup rock salt (or course salt)
- Towel or cloth pouch (optional)

Directions

- In one of the small Ziploc baggies, mix together the milk, vanilla and sugar. Squeeze excess air from the baggie and zip baggie tight.
- Double check for a tight seal.
- Put the small bag inside the gallon size bag and fill the bag with ice, then sprinkle salt on top.
- Again let all the air escape and seal the bag. Put this bag in a cloth pouch or wrap a small hand towel around it (to keep your hands from getting cold in the process of shaking).
- Shake the bag, making sure the ice surrounds the cream mixture.
- About five minutes is adequate time for the mixture to freeze into ice cream.

Possible Questions for Discussion

How are the characteristics of the liquid milk different from the solid ice cream?

In order to change the liquid to solid, what had to happen?

What happened to the heat energy that left the milk?

What are the variables we could change in making ice cream?

What ideas do you have for freezing the ice cream faster?

Why did the outside of the bag get wet?