

LET'S MAKE ICE CREAM!

Topic Area: Physical science, changes in matter

Introductory Statement: Students will make ice cream in plastic bags so they can observe the process of the liquid changing to a solid.

Math: Measuring and counting

Science: Observing, comparing and interpreting data

Materials:

Part 1: large container (preferably transparent), thermometer, ice and salt

Part 2: (each bag of ice cream) $\frac{1}{2}$ cup milk (low fat works), 1 tbsp. sugar (or $\frac{1}{2}$ cup chocolate milk with sugar omitted), $\frac{1}{4}$ tsp. vanilla, 1-gallon size zip-type freezer plastic bag, 1-pint size zip-type freezer plastic bag, ice, salt, spoon, and a towel or newspapers (For a class of 30, you will need about 20lbs. of ice and 2lbs. of salt)

Key Questions: What changes do you observe both inside and outside of the small bag when you are making the ice cream?

Background Information: Substances can be changed from a solid to a liquid or from a liquid to a gas if they are provided with the necessary energy. If we want to melt a block of ice or make water into steam and water vapor, we need to provide heat energy. The energy will be absorbed as the change takes place.

When the process goes in the other direction, from gas to liquid to solid, the opposite process takes place and energy is released. To freeze water, we place it in a freezer compartment where energy will be extracted, allowing the water to freeze.

When students are making ice cream, they can observe changes of matter in both directions. As the ice and salt melt to a liquid, they absorb energy; they absorb this energy from the liquid milk mixture since it is warmer. This, in turn, causes the milk mixture to cool because energy is being removed from it. When the milk mixture has had enough energy removed from it, the liquid will turn to a frozen mixture or ice cream.

The addition of salt to the ice lowers the freezing temperature. This will help the milk mixture to freeze sooner, because the mixture will reach the freezing temperature sooner. When a thermometer is placed in the small bag, students can observe that the contents are actually below zero degrees Celsius (32 degrees Fahrenheit) as the ice cream freezes.

Management:

1. This activity has two parts. Part 1 will take about half a class period and can be either a demonstration or a small group activity.
2. Part 2 will take one class period. Individual students or groups of four can do this activity. If each group makes one bag of ice cream, they can take turns rolling and shaking the bag for about one minute each.
3. Beforehand, fill the large bags half full of ice and store in ice chests until the children are ready for them. Set the ingredients up with the recipe cards cafeteria-style on a long table.

Procedure:

Part 1

1. Hold a thermometer until it stabilizes at room temperature. Note the temperature. With young children, mark the temperature setting on the thermometer with red marking pen or a piece of tape.
2. Fill the container about half full of ice cubes.
3. Put the thermometer in the ice. Wait until it stabilizes. Note the temperature again, this time with blue marker.
4. Add salt gradually to the ice, stirring occasionally. The temperature reading on the thermometer will go down again. See how low you can get the temperature to go. Note the temperature again.

Part 2

1. Put ice in each large bag if you did not do it beforehand.
2. Put milk, vanilla and sugar into the small bag. Seal, squeezing out all of the air.
3. Place the sealed smaller bag containing the milk mixture into the large bag containing the ice.
4. Add 6 tablespoons of salt to ice bag. Seal, squeezing out all the air.
5. Place the bags on a towel or several thickness of newspaper and roll back and forth or shake until the mixture reaches a thick ice cream appearance. This takes four to five minutes. Open carefully so salt does not get into the ice cream. Your ice cream is now ready to eat.

Discussion:

1. What happened to the temperature on the thermometer when we held it?
2. What happened to the temperature of the ice when salt was added to it?
3. What did you notice as your liquid mixture began to change to a solid?
4. Did your liquid change to a solid at the same time as everyone else's did?
5. Did the amount of rolling or shaking have anything to do with how soon your liquid changed to a solid?
6. What is the difference between a liquid and a solid?
7. What happened to the color of the milk mixture?

Extensions:

1. Try to make ice cream without adding salt to the ice.
2. Make a graph of favorite flavors of ice cream in the class.
3. Survey the whole school and make a school-wide graph of favorite flavors of ice cream. Put the graph in the hall or on the cafeteria wall.

Curriculum Integration:

Language Arts

1. Read: *Eighteen Flavors* by Shel Silverstein, *Ice Cream* by William Jaspersohn, *The Ice Cream Ocean* by Susan Russ, *Three up a Tree* by James Marshall, *The Hokey Pokey Man* by Steven Kroll
2. Write a description of your favorite ice cream.
3. Write a story of how we made ice cream.

Assessment:

Have students write or dictate a story of how salt is used to make ice cream.

Home Links:

Have students copy the recipe and take it home to share with their families.

Name _____

We made Ice cream today!

Here is the recipe:



1 pint-size zip-type plastic bag
1 gallon-size zip-type plastic bag

Procedure:

Fill the large bag half full of ice. Add the salt. Seal the bag. Put milk, vanilla, and sugar into the small bag. Seal it. Place the small bag inside the large one and seal again carefully. Shake until mixture is ice cream, about 5 minutes. Wipe off top of small bag. Then open carefully and enjoy!