

Materials (per serving)

- 2 re-sealable plastic bags (1 gallon size and 1 quart size)
- ½ cup 2% or whole milk, 2 T sugar, ½ teaspoon vanilla extract or cocoa powder
- 2 trays ice cubes, 6 T salt
- Waterproof winter gloves
- Optional ingredients: ¼ cup chocolate chips or 1 T flavoring syrup/extract
- *For the class:* Measuring cups and spoons, scissors, serving bowls and spoons

Preparation

- Calculate total material needs for the entire class and purchase ingredients
- Divide students up into work groups (or work stations) and distribute materials

PROCEDURE

Step 1: Place Ice Cream Ingredients in Quart-Size Bag

- Put ½ cup milk and 2 tablespoons of sugar in the quart size bag. Seal and shake for 1 min. to dissolve sugar.
- Re-open the bag. For vanilla ice cream, add ½ teaspoon vanilla extract. For chocolate ice cream, add ½ teaspoon cocoa powder.
- Add any optional ingredients (chocolate chips, flavoring syrups), then SEAL THE BAG.

Step 2: Make a Gallon-Size Ice Bag

- Combine 2 trays of ice and 6 tablespoons of salt in a gallon-size bag. Seal and shake to combine.
- Re-open the bag. Put the smaller bag full of ice cream ingredients inside the bigger bag. Make sure the smaller bag is sealed completely.
- Seal the gallon-size bag over the smaller bag.

Step 3: Shake it!

- Put on waterproof winter gloves and shake the bag vigorously for 7—10 minutes

Step 4: Enjoy Your Ice Cream!

- Remove the small bag, which now contains ice cream.
- Snip a hole in the corner of the bag and squeeze it into small bowl.
- Enjoy the finished product.
- Clean up.

Making Ice Cream

Patterns & Preparation

ENGAGE

Imagine you're enjoying a giant scoop of ice cream on a hot summer day. What happens if you let that scoop of ice cream sit in the hot sun for ten minutes? Almost immediately, the warmer outside temperatures begin to melt your ice cream, transforming it from a solid to a liquid state. After ten minutes, it's melted completely.

We know that heat melts, but what about the other way around? In what ways do cold temperatures transform our food?

Objectives

- Students will understand how cold temperatures transform the ice cream ingredients from one physical state to another.
- Students will understand how temperature energy (hot and cold) is exchanged between bags during the ice cream making process

EXPLAIN

How is ice cream formed?

Your quart-size bag contains all the ingredients you need to make ice cream: milk, sugar, and flavoring. At the start of the process, the ice cream ingredients are about as cold as the temperature inside a refrigerator. These ingredients need to be exposed to super cold temperatures in order to freeze, thereby forming ice cream. This is where the large bag full of ice comes in. The ice provides the cold temperatures needed for the ingredients to transform from liquid to a solid, frozen state. When you add salt to the ice, it lowers the freezing point of the ice, making it even colder. Creating super cold ice is important – it's more resistant to melting from outside forces (like your hands as you shake the bag) and is more efficient at freezing the ice cream ingredients.

When we put our smaller bag full of ice cream ingredients inside the larger bag of full of ice and salt, an important transformation takes place. During this process, energy is transferred from the super-cold ice bag to the comparatively cooler ingredients. The more you shake, the more the ice cream ingredients absorb the colder temperatures from the bag full of ice. As they get colder, the contents of the bag slowly change from a liquid state to a solid state, thereby forming ice cream.

Temperature is essentially transferred between both bags. Over time, the ice cream bag gets colder with the help of the bag full of ice. However, the bag full of ice slowly loses its super cold energy the more you shake it. At the end of the process, both bags even out to about the same temperature. Cold, but not super cold. Just right for ice cream.

ADDITIONAL CONTENT INTEGRATION *(See previous page)*

Step 1: Use a thermometer to measure the temperature of the liquid ingredients before processing. **Step 2:** Before putting the salt in the gallon-size bag, use a thermometer to measure the temperature of the ice. Record this data and hypothesize on what the temperature might be after adding ice. **Step 3:** After shaking the bag for 7–10 minutes, open the bag and measure the temperature of the ice/salt mixture. Is it colder after the addition of salt?

Additional Materials

- Thermometer
- Flip chart and markers

EVALUATE

Journal prompt: How do the ice cream ingredients transform into ice cream?