



Family Activity | Grades K–2

Make Ice Cream in a Bag

SUMMARY OF CLASSROOM LEARNING

Students have been learning about physical properties and states of matter. This extra do-it-yourself treat also serves as a simple chemistry lesson. Investigate changing states of matter, chemical reactions, and the properties of ice and salt while working for your dessert.

OBJECTIVE

Students are able to:

- take the temperature of a liquid.
- observe and describe the changes in states of matter.

BACKGROUND INFORMATION

Salt makes ice melt. That's why people sprinkle it on icy roads and driveways in cold climates. How does salt do this? It actually lowers the freezing point of the ice. Water normally freezes at 32 degrees Fahrenheit, or 0 degrees Celsius. Salt water is harder to freeze than plain water. You have to make salt water colder than 32 degrees Fahrenheit in order to freeze it. That's one of the reasons why a freshwater pond will freeze before one that's mixed with salt water from a nearby ocean. If you put two ice cube trays in the freezer, one with plain water and the other with a salt water solution, the plain water will freeze first. Not all types of salt work the same. The larger the salt crystals, the more time it takes to dissolve. This keeps it colder, longer. As salt melts, the compound (NaCl) breaks into two parts—Na and Cl. These particles then disrupt the arrangement of the ice crystals. This process changes the state of matter. For example, the liquid (milk mixture) turns into a solid (ice cream). As the liquid gets colder it expands. (Have you ever put a soda bottle in the freezer and forgotten about it? The liquid expands and then explodes!) The molecules in the liquid slow down and eventually freeze in place.

HOME ACTIVITY

Make ice cream as a family. Observe and discuss the changes that occur in the states of matter and temperature.



MATERIALS

- 1 cup half & half or milk
- ½ teaspoon vanilla
- 2 tablespoons sugar
- 4 cups crushed ice
- ½ cup rock salt
- 2 quart size zip-top plastic bags
- 1 gallon size zip-top freezer bag
- crushed cookies, candies, nuts, or berries (optional for add-ins)

VOCABULARY

Use the following words while having conversations with your young scientist.

- **States of Matter:** solid, liquid, and gas.
- **Freezing Point:** the temperature measured when a liquid turns into a solid.

THOUGHT/CONVERSATION STARTERS

- What is the freezing point of water?
 - Answer: 32 degrees Fahrenheit or 0 degrees Celsius
- What is the freezing point of salt water?
 - Answer: It depends on how salty it is.
- Is the freezing point of salt water warmer or colder than plain water?
 - Answer: Colder.
- What happens when you put salt on ice, like on an icy road in winter?
 - Answer: The salt melts the ice.
- So why do we mix salt with ice to freeze ice cream?
 - Answer: Let's make it and find out!



STEPS

Parent/Guardian Note: Be sure to take the appropriate safety precautions. If needed, use a towel or gloves if the bag becomes too cold for the young scientist.

1. Pour the first three ingredients into a quart-size zip-top bag.
2. Squeeze out air and seal the bag tightly.
3. Place inside the second quart-size bag, and seal.
4. Place the double-bagged ingredients inside the gallon-size freezer bag.
5. Fill the freezer bag with ice, pour in the rock salt, squeeze out air, and seal.
6. The salt will begin to melt the ice because salt lowers the freezing point of water.
7. Now comes the fun part: Gently shake the bag, making sure the ice is evenly spread out. Continue to gently shake and knead the bag in your hands.
8. The energy from shaking and kneading—and the heat transferred from your hands—causes the ice to melt further. Melting ice doesn't look as cold as frozen ice, right? But remember, it's mixed with salt. As the melting ice combines with the salt, the salt-water solution has a lower freezing point than plain water. So the melted ice is actually colder than the original ice! Can you guess how long it will take for the liquid to freeze into a solid? (It should take between 5–10 minutes.)
9. During the ice cream-making process, the ice (a solid) turns into a liquid (melted ice). When ice absorbs energy, it changes the phase of water from a solid to a liquid. The ice absorbs energy from the ice cream ingredients and also from your hands as you hold the bag. The molecules start moving around again as the ice melts. Use a thermometer to find the temperature of the melted ice. Was your guess on the mark? Eat your ice cream straight out of the bag, then wash and recycle the bag to use again!

DOCUMENT THE LEARNING IDEA

- Predict the temperature of the melted ice. Document the prediction and the actual temperature. In a notebook, draw and label to remember what happened.
- Take photos throughout the process of making ice cream, measuring the temperature, and enjoying the dessert out of the bag. With the young scientist, compile photos in order to remember the experience using a collage building app like [PicCollage](#). Consider decorating it and adding vocabulary like solid and liquid to share the change in the state of matter. Share the creation with the class.



CONTINUE MAKING CONNECTIONS

- Look out for matter that changes states throughout the day (ice, popsicles, butter, ice cream, snow cones, evaporated water from a plant, steam) and have conversations about what is causing the change.
- If the temperature will be below the freezing point, wonder with the young scientist what will happen if a plastic cup of water or a dog bowl of water is left outside overnight. Try it out. If there is salt on the road, revisit what happened in the experiment and how this is helpful.
- If the temperature is warm, wonder what will happen if an ice cube is left outside. Will it evaporate?