



Super Science Connections: Ice Cream Scientist

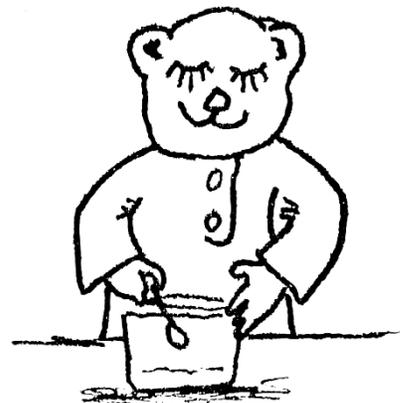
Is salt needed to make ice cream?

This activity is intended for children entering grades K-4 in the next school year—but children of all ages (and adults) have fun making ice cream. To carry it out safely there must be a responsible older person to prepare materials, read directions aloud, and supervise the activity. This could be a parent, guardian, or older sibling. The supervisor should do the preparation steps and consult the science background information and extension activity (which can be done concurrently with this activity) on the last page before leading children through the activity.

This recipe is adapted from *Let's Make Ice Cream!* By Marilyn McMasters and *The Amazing Milk Book* by Catherine Ross. Another good reference is *The Scoop on Ice Cream* by Vicki Cobb.

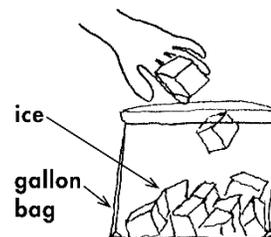
Materials:

- 1 gallon plastic zipper freezer bag
- 1 pint plastic zipper freezer bag
- 1 tablespoon (15mL) measure
- ½ teaspoon (2.5mL) measure
- ½ cup (120mL) measure
- 2 cups (470mL) ice
- 6 tablespoons (90mL) of salt (say table salt??)
- ½ teaspoon (2.5mL) vanilla
- ½ (120mL) milk (2% or whole milk tastes the best)
- 1 tablespoon (15mL) of sugar
- Mittens or gloves (optional, but the activity usually results in cold hands without them)



Directions:

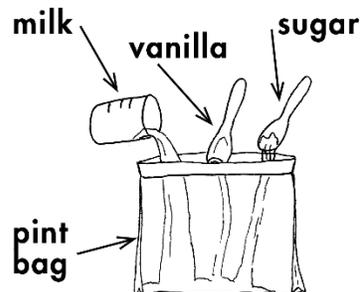
1. Put the ice in the gallon plastic zipper bag.



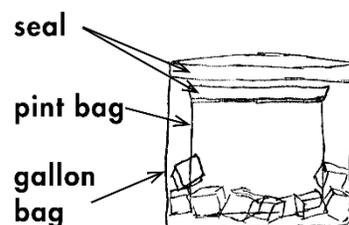
2. Add 6 tablespoons of salt to the ice. Then seal the bag and shake it.



3. Now take the pint bag and mix 1 tablespoon of sugar, ½ teaspoon of vanilla, and ½ cup of milk in it. Then carefully seal the bag.



4. Now open the gallon size bag of ice and put the sealed pint bag inside it. *Check that the pint bag is completely sealed.* Now reseal the gallon size bag.



5. Shake the bags for about 5 minutes (or until the mixture inside the pint bag looks as if it is frozen) and watch what happens. Record observations. The bags will get very cold, so consider wearing gloves or mittens when doing this part.



6. Open the outside bag and remove the pint bag. Wipe the outside of the pint bag with paper towels before opening it so all the salt water is removed.



7. Open the pint bag and enjoy eating your ice cream!



Science Background:

Water freezes at 32 °F (0 °C), but, if anything is dissolved in the water the freezing point is lowered below “freezing”. For example, depending on the quantity of water and salt, a mixture of salt and water can get as cold as –4 °F (–20 °C). The milk-sugar-vanilla mixture will not freeze inside a bag containing just ice and water because the protein, sugar, and vanilla dissolved in the water reduce the freezing point. To make ice cream requires a lower temperature than 32 °F (0 °C). When enough salt is added to the ice, the temperature in the outside bag surrounding the milk-sugar-vanilla mixture gets low enough that the milk-sugar-vanilla mixture freezes and becomes ice cream.

Extension:

Forget the salt! We suggest that a parent/guardian do this activity along with the participant(s) but deliberately “forget” to add salt to the ice. Make a point of noting that your mixture doesn’t seem to be “working” while the participants observe that their milk-sugar-vanilla mixture is freezing.

Ask the participants if they have any suggestions for how to solve the problem! (If they are having difficulty with suggesting you forgot to add the salt, tell them that you put all the ingredients in the *smaller* bag just as the directions said.)

When the lack of salt has been identified as the problem, get another gallon bag and add the ice and salt, and then add your pint bag with its mixture and shake. Now it will freeze.

Reinforce the concept that the salt and ice is needed for the freezing, and that ice alone will not freeze the mixture in the pint bag. Label one gallon bag “ice” and add some ice. Label another gallon bag “ice and salt” and add ice and 6 tablespoons of salt. Seal and shake both bags to mix. Ask the participants to touch each of the bags. Does one feel colder than the other?