

Ice cream in a bag



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1. Supplies

- Sugar
- Half-and-half. Milk or heavy whipping cream may also be used.
- Vanilla extract
- Salt. Try experimenting with different types of salts, such as table salt or rock salt.
- Ice cubes
- Measuring spoons
- Measuring cup
- Small sized sealable bag
- Gallon-sized sealable bag or large tupperware with lid
- Small towel

2. In the small sealable bag, place one tablespoon of sugar, $\frac{1}{2}$ cup of half-and-half, and $\frac{1}{4}$ teaspoon of vanilla extract. Seal the bag well.

3. Add four cups of ice to the large bag. Then add $\frac{1}{2}$ cup of salt to the bag.

What do you think the salt will do?

4. Place the small bag into the large bag. Be sure both bags are sealed shut.

5. Wrap the bag in a small towel and shake the bag for five minutes. Check the smaller bag every few minutes.

What happens to the ingredients over time?
What about the ice cubes, how do they change over time?

Now try the experiment without salt. How do the outcomes compare?

The salt allows the ice and salt mixture to get colder than pure water ice. This extra-cold mixture of salt and ice is able to freeze the ingredients in the bag and turn them into ice cream!

Digging Deeper

Pure water freezes at 0 degrees Celsius.

The addition of salt lowers the freezing point by a few degrees called freezing point depression. This means when salt is added to the ice in the outer bag, the ice, which is at 0°C, is above its freezing point, so it starts to melt. Melting needs energy. This energy comes from the ingredients in the inner bag. Heat energy is absorbed from the ice cream ingredients making ice crystals form between the tiny fat molecules of the dairy which in turn makes ice cream.