



Activity Name: Ice Cream

Ice Cream

A Really Cool Experiment

This experiment is useful to illustrate freezing point depression, or as a fun introduction of chemistry to a class.

The physical properties of a solution and those of the pure solvent are illustrated in this experiment. The difference in temperature between the freezing points of a solution and of the pure solvent, known as the "freezing point depression" will be demonstrated.

Pure water freezes at 0°C and one atmosphere. The freezing point of salt and water can be lower than 0°C . The decrease in temperature allows our milk and sugar to freeze and make ice cream. The freezing point is the temperature at which there is an equilibrium between the solid and liquid phases of a substance. The temperature when this occurs is specific for different substances. Freezing point depression is usually used in climates where it snows. The salt is put on the roads to prevent ice from forming.

TERMS:

Freezing Point Depression

Solvent

Solution

MATERIALS

- Large Ziploc Bag
- Small Ziploc Bag
- Thermometer
- Measuring cup / Graduated Cylinder
- Spoons
- Ice Cubes
- Sodium Chloride (large crystals/rock salt)
- sugar
- vanilla extract
- whole milk
- triple beam balance

PREPARATION

Add 100 ml of milk, 17.0g sugar, 2 drops vanilla extract to small ziploc bag. Place in refrigerator for an hour to chill.

PRESENTATION

Place small ziploc bag inside the large bag. Put 400g cubed ice and 102g sodium chloride in the large bag. Allow the bag to rest on side for one minute. Flip the bag over, arrange the ice and allow it to remain for another minute. Repeat this for 10 minutes. The ice needs to be moved around so that it surrounds/covers the small bag. After 10 minutes, open bag and take temperature of ice/salt solution. Remove small bag and rinse it off. Enjoy the treat!

QUESTIONS

1. At what temperature does water normally freeze?
2. What was the temperature of our salt water solution?
3. What do you think happened?
4. What does the sodium chloride do?
5. Where can we use this lesson in real life?

References:

Journal of Chemical Education V66, No. 8, August 1989. P. 669.

