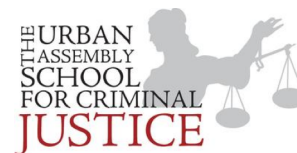


Name: _____ Date: _____

Chemistry ~ Ms. Hart

Class: Anions or Cations



2.14 Ice Cream Making Lab

Have you ever wondered what it is about throwing salt on ice that makes it melt? And just why does it melt? Where does the heat come from to melt the water? Why does it freeze again on the road at night? These questions and many more about freezing and thawing will be looked at in this lab.

To start you off though let's talk about how energy flows in any system. When you studied the air and weather you found that things always flow from areas of higher concentration to areas of lower concentration. This automatic transfer of energy and material will always work to balance the amount of energy and material. This is a natural law. From this we can deduce that heat energy will always flow from areas of higher temperature to areas of lower temperature. Knowing this simple rule, let's look at a very tasty application of it.

Today we will be exploring the colligative properties by making our very own ice cream! For this experiment, we will use the following recipe:

Materials:

- 1/2 cup milk
- 1/2 cup whipping cream (heavy cream)
- 1/4 cup sugar
- 1/4 teaspoon vanilla or vanilla flavoring
- 1/2 to 3/4 cup sodium chloride (NaCl) as table salt or rock salt
- 2 cups ice
- 1-quart Ziploc™ bag
- 1-gallon Ziploc™ bag
- measuring cups and spoons
- cups and spoons for eating your treat!

Problem is, we are scientists that use the metric system and these measurements are NOT metric! Step one: show the calculations to convert 1/2 cups to the proper metric units using the factor label method!
1 cup = 237 mL

1/2 cup milk = _____

Procedure:

- Add sugar, milk, whipping cream, and 1/4 teaspoon vanilla to the quart ziploc™ bag. Seal the bag securely.
- Put 2 cups of ice into the gallon ziploc™ bag.
- Use a thermometer to measure and record the temperature of the ice in the gallon bag.
- Add 1/2 to 3/4 cup salt (sodium chloride) to the bag of ice.
- Place the sealed quart bag inside the gallon bag of ice and salt. Seal the gallon bag securely.
- Gently rock the gallon bag from side to side. It's best to hold it by the top seal or to have gloves or a cloth between the bag and your hands. Check the temperature after 2 minutes and 5 minutes.
- Continue to rock the bag for 10-15 minutes or until the contents of the quart bag have solidified into ice cream.
- Open the gallon bag and use the thermometer to measure and record the temperature of the ice/salt mixture.
- Remove the quart bag, open it, serve the contents into cups with spoons and ENJOY!

Data: (include units!)

Initial temperature of the ice: _____

Temperature two minutes after addition of salt: _____

Temperature five minutes after addition of salt: _____

Analysis:

1. What happened shortly after you added the salt to the ice cubes? Was the temperature above or below the freezing temperature for water?

2. What is the only factor that could have caused the changes shown in question 1? What does this tell you about the freezing point temperature of salt water compared to fresh water?

3. Describe the direction of heat transfer in your baggies. Where is the energy flowing from and where is it going to?

4. In the radiator of your car you put a combination of antifreeze and water to keep your car engine cool in the summer and prevent the radiator from freezing in the winter. Explain how you think this works in terms of what you saw in the experiment you just did.
