



Ice Cream Lab Yum! ☺

Purpose: Adding certain substances to water can affect the temperatures at which the water boils or freezes. Today you will be adding some salt to water to see how it affects water's freezing point.

Prelab Questions:

- 1. What is the "normal" freezing point for water (in degrees Celsius)?
- 2. Do you think that salt will raise or lower the freezing point of water?

Supplies:

1 tablespoon sugar ½ cup half and half ¼ tsp vanilla ½ cup rock salt (Kosher salt) 1 quart sized Ziploc bag 1 gallon sized Ziploc bag Ice

Procedure:

- 1. Fill the **1-gallon** bag halfway with ice. Record the temperature of the ice in the data table provided.
- 2. Combine the sugar, half and half and vanilla in a **1-quart** resealable bag.
- 3. Measure and record the temperature of the mixture in the **1-quart** bag. *Wash your thermometer after you record this temperature!*
- 4. Squeeze the excess air out of the little bag and seal.
- 5. Measure out ¹/₂ cup of rock salt (Kosher salt) and add to the **1-gallon** bag.
- 6. Place the 1-quart bag into the 1-gallon bag. Now seal the big bag.
- 7. Wrap the bags in a paper towel and shake/knead the bags for about 10-15 minutes. (Your ice cream will not form if you do not shake/knead the bags this is a very important step in order for the ingredients to mix). You will know when to stop because your ice cream mixture will have the consistency of frozen yogurt.
- 8. Measure and record the new temperature of the ice/salt mixture (in the **1**-gallon bag). Wash your thermometer after your record this temperature!
- 9. Remove the 1-quart bag from the 1-gallon bag. Wipe off the outside of the 1-quart bag.
- 10. Measure and record the temperature of the ice cream mixture (in the **1- quart** bag).

Data:

Original temperature of the ice in the 1 gallon bag	
Original temperature of ice cream mixture in the 1 quart bag	
Temperature of the ice/salt mixture in the 1 gallon bag, after kneading	
New temperature of the ice cream mixture in the 1 quart bag, after kneading	

Questions:

- 1. Compare the temperatures of your ice to the ice/salt mixture. Did the salt increase or decrease the freezing point of ice?
- 2. Compare the temperatures of your *ice cream mixture* before and after putting it in the ice/salt bag. Did the ice cream mixture increase or decrease in temperature?
- 3. Is this lab an example of an exothermic or endothermic reaction? How do you know?

Visit this link to answer the next few questions:

http://www.makeicecream.com/howdoesrocsa.html

- 4. How cold does the ice cream mixture have to be in order to freeze?
- 5. In order for ice to melt into liquid water it must...
- 6. Where does the heat necessary to melt the ice come from?
- 7. What affect does this have on the ice cream mixture?

Visit this link to answer the next few questions:

http://chemistry.about.com/cs/howtos/a/aa020404a.htm

- 8. **Circle one:** Adding salt to ice (raises, lowers, has no affect on) the freezing point of ice. Because of this, (more, less, the same amount) of energy has to be absorbed by the environment to have the ice melt.
- 9. **Circle one:** The ice is now (warmer than, colder than, the same temp as) it was before adding the salt. This causes the ice cream mixture to (melt, freeze, stay the same).

http://en.wikipedia.org/wiki/Boiling-point_elevation

10. **Circle one:** Adding salt to water (raises, lowers, has no affect on) the boiling point of water.