Name: _____ **Date**: _____ **Hmrm/Period**: _____

Assignment: Chemical Reactions of Making Ice Cream

Background:Certain substances affect the state of ice. When salt is sprinkled on ice, for example, it causes the ice to melt. This reaction is actually a heat energy transfer. Water freezes at 0°C. A saturated saltwater solution freezes at -32°C. If you sprinkle salt on ice, the ice will melt because the salt lowers the freezing point of water. When the salt makes contact with the ice, it starts a chemical reaction that transfers heat energy from the surrounding environment. Therefore, if a road is icy in the winter and we sprinkle salt on top of it, the salt-ice mixture will draw heat energy from the road, the air, and the friction from car tires and transfer it to the ice, which then melts.

Learning Objectives: To develop observation skills, understand the scientific process through active experimentation and comparison, and understand that chemicals can change the properties of water.

Materials:

1/2 cup milk
1/2 teaspoon vanilla
1 tablespoon sugar
4 cups crushed ice
4 tablespoons salt

*1/2 cup milk, 1/2 cup whipping cream (heavy cream), 1/4 cup sugar, 1/4 teaspoon vanilla or vanilla flavoring (vanillin) (If using chocolate or strawberry flavoring, use about 1-2 teaspoons to taste), 3/4 cup sodium chloride (NaCl) as table salt or rock salt, 2 cups ice, 1-quart Ziploc bag, 1-gallon Ziploc bag, Themometer, Measuring cups and spoons, Cups and spoons for eating your treat!

Procedure: (Follow the directions carefully).

1. Add 1/4 cup sugar, 1/2 cup milk, 1/2 cup whipping cream, and 1/4 teaspoon vanilla to the quart (small) Ziploc bag. Seal the bag securely.
2. Put 2-3 cups of ice into the gallon (large) Ziploc bag.
3. Use a thermometer to measure and record the temperature of the ice in the gallon bag.
4. Add 1/2 to 3/4 cup salt (sodium chloride) to the bag of ice.
5. Place the sealed quart bag inside the gallon bag of ice and salt. Seal the gallon bag securely.
6. 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 because the bag will be cold enough to damage your skin.**
7. Continue to rock the bag for 10-15 minutes or until the contents of the quart bag have solidified into ice cream.

8. Open the gallon bag and use the thermometer to measure and record the temperature of the ice/salt mixture.
9. Remove the quart bag, open it, serve the contents into cups with spoons and ENJOY!

Data:

1. What kind of ice cream are you making? _____

2. Document the temperature of the ice in the gallon bag before adding the salt.
   _____

3. Document the temperature of the ice/salt mixture (**not the ice cream**) in the gallon bag when the ice cream mixture begins to solidify. _____

4. What is the temperature difference before adding the salt and after mixing for 10 minutes? _____

Conclusion Questions:

1. Did you notice any difference between your ice cream mixture and the ice cream of someone who made a different flavor? Explain. _____
   _____
   _____
   _____

2. What may have caused the differences between the flavors? _____
   _____
   _____
   _____

3. What modifications would you make to this lab? _____
   _____
   _____

4. Look up the term "freezing point depression." How does it apply to making ice cream?
   _____
   _____
   _____

5. What were some problems or issues you encountered during this lab?
   _____
   _____
   _____

6. Would you say that making ice cream is a physical or chemical change/reaction? Think about all of the parts involved and be specific when answering the question.

7. This is a very simplistic way to make ice cream. How do you think ice cream companies make the mixtures more efficiently in the factory?

8. What methods or techniques do you think ice cream companies use to give ice cream its texture and consistency? How does it retain the ice cream properties in transport to your freezer? Do a little research and explain.

*Check out my website for a companion page to answer question #7 & #8 above.