Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Changes of State—Ice Cream Lab**

**Objective**: Is making ice cream an endothermic or exothermic activity?

**Materials**: one large baggie, one small baggie, one thermometer, 250 ml beaker, one tablespoon, ¼ teaspoon, 1 plastic spoon, 1 packet of sugar, vanilla, milk, one measuring cup, rock salt, ice

**Procedure**:

1. Fill the large baggie with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of ice.
2. Measure and pour 120 ml of milk into the 250 ml beaker.
3. In the small baggie, put the measured 120 mL of milk, 1 packet of sugar and ¼ teaspoon of vanilla. **Record the temperature** of the milk mixture in the chart.
4. **RINSE** OFF the thermometer.
5. Press the air out of the baggie, seal it, squeeze it gently to dissolve the sugar and set it aside.
6. **Record the temperature** in the large baggie, making sure that the tip of the thermometer is in the ice.
7. In the large baggie, add three tablespoons of the salt to the ice.
8. Seal and shake the baggie for 3 minutes to mix up the salt and ice.
9. Place the thermometer back in the large baggie, in the salt/water mixture, and **record the temperature** as before.

10. Remove and **RINSE** OFF the thermometer.

11. Place the small **SEALED** baggie inside the large baggie.

12. Push some of the air out of the large baggie and seal.

13. Look at the clock and time the next step.

14. Vigorously shake the baggies until you think it is the consistency of ice

cream. If the large baggie begins to leak, put another large baggie over it.

15. Look at the clock and record how much time it took to turn to ice cream.

16. **Record the temperature** of the milk mixture.

17. **RINSE** OFF the thermometer.

18. **Record a final temperature** of the Ice Water mixture in the large bag.

19. **RINSE** OFF the thermometer.

20. Take the small baggie out of the large baggie, observe the consistency of

the mixture.

21. Get a plastic spoon YOU CAN EAT YOUR SCIENCE THIS TIME!

**Data Collection:** Fill out the chart below.

|  |  |  |
| --- | --- | --- |
| Procedure Step Number: | Temperature in Fahrenheit | Temperature in Celsius |
| 2. Milk Mixture |  |  |
| 5. Ice in large bag |  |  |
| 8. Ice/Salt/Water mixture |  |  |
| 15. Milk Mixture |  |  |
| 17. Melted Ice Water |  |  |

**Analysis:**

1. Draw a diagram of the baggie-ice cream freezer. Add arrows and labels to the diagram to indicate the direction of heat transfer (i.e. from the ice cream to the salt mixture or vice versa).

2. How many minutes did it take for your ice cream to freeze? \_\_\_\_\_\_\_\_\_\_\_\_

3. Was the process by which the milk mixture turned into ice cream endothermic or exothermic? Explain why.

4. Describe the changes in the physical properties of the ingredients before and after making the ice cream.