Name: _____ Date: _____

Making Ice Cream

Introduction

Ice cream can be made quite easily using by taking advantage of one of water's colligative properties, freezing point depression. Adding salt to the ice between the plastic bags lowers the freezing point of water below 0˚C, which is necessary to freeze the milk. Heat energy is easily transferred from the milk through the plastic bag to the cold, salty ice water. This causes the ice cream mixture to freeze and the ice to melt.

In this lab, we will make ice cream using two kinds of milk: whole and skim. Whole milk contains 4% fat, while skim milk contains no fat at all. You will make these two varieties in separate plastic bags so you can determine the effect of fat content on the flavor of ice cream.

Materials *(* = optional)*

chocolate Nesquik flavoring*
ice
salt pellets
skim milk
strawberry Nesquik flavoring*
sugar
vanilla extract*
water
whole milk

Equipment

measuring cup
plastic cup, 2
plastic spoon, 2
Ziploc freezer bag, 1-gallon
Ziploc freezer bag, 1-quart, 2

Safety Considerations

- Be careful not to expose your ice cream mixture to the lab station surface or any lab equipment; this could contaminate it with chemicals and make it inedible.
- The mixing process makes the ice very cold; you may want to consider wearing gloves when making your ice cream.
- Wash your hands thoroughly after completing this lab.

Procedure

1. Add 1 cup whole milk, 4 spoons of sugar, and 1 spoon vanilla extract (or if desired, 2 spoons of chocolate or strawberry flavoring) to a 1-quart ziploc freezer bag. Carefully squeeze out any remaining air and seal tightly.
2. Using skim milk instead of whole milk, repeat Step #1 with a second plastic bag.
3. Place both quart ziploc bags with the ice cream ingredients inside a 1-gallon ziploc bag. Pack ice around the small bags and add the salt and approximately 150 mL of water. Squeeze out any remaining air in the 1-gallon bag and seal.
4. Carefully shake the bags between your hands until you can see that the ice cream has frozen. Take care not to allow the smaller bags to leak - it will ruin your ice cream!
5. Open the outer bag and discard the ice and salt mixture in the sink. Rinse the outsides of the quart bags containing the ice cream ingredients prior to opening.
6. Transfer the ice cream to a plastic cup, eat and enjoy! *(Students who are allergic to milk or milk products should not eat the ice cream.)*
7. Record your observations of each step of the process in your lab notebook.

Clean-up

1. Rinse and return the gallon ziploc bags.
2. Dispose of the small ziploc bags, plastic cups, plastic spoons and used paper towels in the trash can.
3. Wipe down your lab area and wash your hands before leaving the lab.

Data Table

Property	Skim Milk Ice Cream	Whole Milk Ice Cream
time it takes to completely freeze		
color		
texture/thickness		
flavor *(be as descriptive as possible!)*		

Questions

1. While you're mixing the ice cream, why does the large, outer Ziploc bag seem to suddenly fill up with water?

_____

_____

2. Was the flavor of your ice cream affected by the amount of fat in the milk you used? Why or why not?

_____

_____

3. Why does the process of mixing or churning the ice cream mixture make it smooth rather than full of noticeable crystals?

_____

_____

4. Freezing point depression allows us to melt the ice while keeping its temperature below 0°C. Besides ice cream, what is another practical use of freezing point depression?

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5. List one way you could change this lab and describe how your results might be different.

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