

Colligative Properties Lab (A.K.A. Ice Cream in a Baggie)

Procedure:

1. Wash your hands.
2. Put your initials on a sandwich bag. Add $\frac{1}{4}$ cup sugar, 1 cup half and half, and $\frac{1}{4}$ teaspoon vanilla to the bag.
3. Seal the bag with as little air in it as possible. Mix the ingredients by gently squeezing the bag.
4. Place the sandwich bag in a quart bag. Seal the quart bag with as little air in it as possible.
5. Measure and record the mass of approximately 4 cups of ice. Put the ice in a gallon bag.
6. Measure and record the mass of $\frac{1}{2}$ cup of salt. Add the salt to the ice in your gallon bag.
7. Place the double-bagged ice cream mixture in the gallon bag, sealed end up. Seal the gallon bag.
8. Put on gloves or use a towel to protect your hands from the cold ice.
9. For 10 minutes, shake or rock the bag to mix the ice cream mixture as it freezes.
10. Open the gallon bag to measure and record the temperature of the water in the ice-salt mixture.
11. If necessary, add more ice and salt, and continue shaking/rocking the bag until the ice cream is frozen. (This may take another 10-15 minutes.)
12. Dump the ice/salt mixture in the bucket. Return the gallon bag and the quart bag to Mrs. Haney.
13. Rinse the salt off your hands.
14. Enjoy your ice cream!

Data:

Mass of Ice (g)	Mass of Salt (g)	Temperature of Salt-Ice Mixture ($^{\circ}\text{C}$)

Questions:

1. Calculate the moles of solute (NaCl).
2. Calculate the kilograms of solvent (ice).
3. Based on #1 and #2, calculate the molality of your salt-ice mixture.

$$\text{molality} = \frac{\text{moles of solute}}{\text{kg of solvent}}$$

4. Calculate the effective molality and the theoretical freezing point depression. (For water, $K_f=1.86\text{ }^{\circ}\text{C}/m$)
5. Experimental freezing point depression = _____