

Colligative Properties

Colligative properties are properties of solutions that are affected by the concentration of the solution. We will study freezing point depression and boiling point elevation in this lab. Students will work in groups of two on the lab.

1. You will collect 100.0 g of ice. Measure the temperature of the ice as soon as possible after collection using the data meter and probe or a thermometer. Record the temperature after it stabilizes.
2. While the temperature stabilizes, measure out the mass of salt the teacher assigned for you, somewhere between 5.0 and 15.0 grams.
3. Add the salt to the ice.
4. Again, allow the solutions temperature to stabilize. Record the temp.
5. Now start to heat the solution on the hot plate. Record the temperature every 30 seconds.
6. Record all data in the table.
7. Continue recording data for 4 minutes after the solution boils.

Prelab Questions:

1. Explain colligative properties.
2. What are the 3 things affected by the concentration of a solution.
3. If 15.0 grams of table salt is added to 150.0 grams of water, what would the molarity and molality of the solution be?
4. What would be the boiling point elevation for the above solution? The freezing point depression?

Questions:

1. Calculate the Molarity and molality of the above water solution.
2. According to the mass of salt you added to the water, what should have the boiling point and freezing point have been?
3. Compare what the point should have been and what it was (both freezing and boiling). Calculate a percent error for your measured values.
4. Give at least 3 'real world' uses of colligative properties.
5. Compare the phase change diagram for ice from this lab and compare it to the one from the phase change lab you did 3rd quarter. How are the diagrams different?
6. Calculate the heat needed to boil away your salt water sample.