13.2A Boiling Point Elevation II– De-icing salt

Subjects: Solutions, Boiling point elevation, colligative properties

Description: The boiling point of water is increased with addition of road salt.

Materials:
Salt mixture
200 mL water (200 grams)
400 ml beaker
Hot plate*
Thermometer

*Shared item: Located in the top drawer in the center bench opposite the chemical storage cabinets.

Procedure:
1. Add water to the beaker and bring to a boil. Record the temperature (100° C)
2. Dissolve some de-icing salt in the water. The temperature will decrease initially.
2. Heat the solution until boiling again.
3. Measure the boiling point of the solution.

Discussion:
The equation for boiling point elevation is given below:

$\Delta T_{bp} = K_{bp} * m_{solute}$

Assume the salt is made up primarily of sodium chloride, with a molecular weight of 58.4 g/mol.

The K_{bp} for water is 0.5121˚C /m.

In this demo the boiling point of the solution is measured. This demo can be purely qualitative to show how addition of a solute raises the boiling point of water. The instructor could put an unknown amount of salt in the water and calculate the molality of the solution after the change in boiling point is measured. Alternatively, the amount of salt placed in solution can be measured and the BP elevation can be calculated prior to measurement.

Safety: Use caution working with boiling materials to avoid burns.

Disposal: Wash the solution down the drain with water.

References:
1. Prof. Fermann