

CHEMISTRY DAILY PLAN

Class:

Date:

Subject: *Boiling Point Elevation*

Time:

The vapor pressure of solutions containing nonvolatile liquid or solid substances is lower than the vapor pressures of its pure solvent. And the relation example is;

Vapor Pressure_{1L pure H₂O} > Vapor Pressure_{1L H₂O contain 1 mol sugar} > Vapor Pressure_{1L H₂O contain 1 mol NaCl}

Boiling Point Elevation

The boiling point of a liquid is the temperature at which its vapor pressure equals the external pressure over the liquid. (In a cup external pressure is atmospheric pressure)

Pure water boils at 100 °C. If we add substance in water the vapor pressure of solution decrease. In order to equate the vapor pressure of the solution to the external (atmospheric) pressure, the solution must be heated to higher temperature than the water in a pure state at the same conditions. This leads to an increase in the boiling point temperature and this is known as boiling point elevation.

The boiling point elevation of a solvent depends on the concentrations of the solute particles dissolved in this solvent and this concentration is expressed in terms of molal concentration. The boiling point elevation can be calculated by the following formula;

$$\Delta T_b = K_b \cdot m$$

ΔT_b shows the amount of increase in the boiling point.

$$T_{b \text{ solution}} = T_{b \text{ solvent}} + \Delta T_b$$

K_b is the molal boiling point elevation constant and m is the total molality of the particles dissolved in the solution.

If we compare the boiling points of solutions, which contain equal amounts of solvent. Which one contains more number of particles, the boiling point of it is highest.

Problems in Class

1. Compare the Bp of the solutions prepared by dissolution of the following substance in 1 L of water. a) 180 g water b) 1 mol of KCl c) 1 mol of Ca(NO₃)₂.
2. What is the boiling point of the solution prepared by dissolving of 10.7 g of NH₄Cl salt in 500 g water? ($K_{b \text{ water}}$: 0.52 °C/molal, NH₄Cl : 53.5 g/mol)
3. How many grams of sugar are required in 250 g of water, in order to increase the boiling point of water to 101.04 °C? (Sugar:180 g/mol)