LO: Students will be able to identify colligative properties and calculate the freezing point depression and boiling point elevation of water.

DOL: Students will correctly answer questions at least 4/5 times about colligative properties.

Mar 29-7:34 AM

Solution: a liquid mixture in which the minor component (the solute) is uniformly distributed within the major component (the solvent).

solvent = what does the dissolving
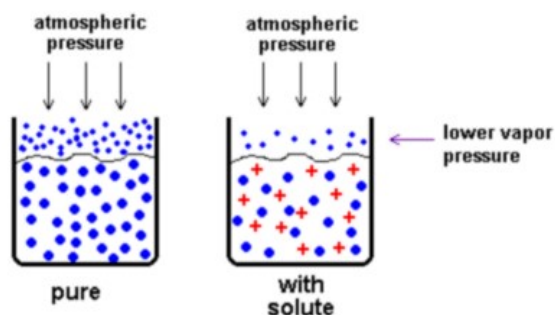
solute = what is being dissolved

solution = solvent + solute

Colligative Properties of Solutions

   -properties that depend on the concentration
of solute particles but not on their identity
   - molality (which we will discuss in more detail later) is how
concentrated a solution is.
   - the symbol for molality is *m* (lower case script "m")

Mar 29-8:45 AM

Freezing-Point Depression

   molal freezing point constant for water is

   K_f = -1.86 K/m

   K_f is different for different solvents.

   freezing point depression is how much the
freezing point is lowered due to the
concentration of particles of solute in a solvent -

   $\Delta t_f = K_f m$

Mar 29-8:56 AM

Boiling-Point Elevation

molal boiling point constant for water is

$K_b = 0.51$ K/m

K_b is different for different solvents.

boiling point elevation is how much the boiling point is raised due to the concentration of particles of solute in a solvent -
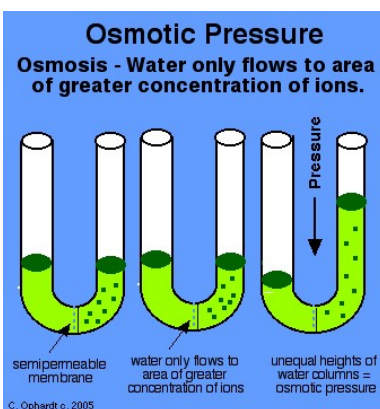
$\Delta t_b = K_b m$

Mar 29-9:05 AM

Osmotic Pressure

osmosis is the movement of solvent through a semipermeable membrane from the side of lower solute concentration tot he side of higher solute concentration

osmotic pressure is the external pressure that must be applied to stop osmosis

Mar 29-9:15 AM

Regulation of osmosis is vital to the life of a cell because cell membranes are semipermeable. Cells lose water and shrink when placed in a solution of higher concentration. They gain water and swell when placed in a solution of lower concentration. In vertebrates, cells are protected from swelling and shrinking by blood and lymph that surround the cells. Blood and lymph are equal in concentration to the concentration inside the cell.

Apr 4-8:04 AM

Electrolytes and Colligative Properties

   -when nonelectrolytes (we will talk more about electrolytes later) dissolve, their particles remain whole, so a 1 *m* solution of sucrose has 1 mol of particles in it. When electrolytes dissolve, the number of particles increases.

   -NaCl disassociates into Na and Cl ions, hence 1 *m* NaCl becomes 2 mols of particles. 1 *m* $CaCl_2$ becomes 3 mols of particles.

Apr 4-8:07 AM

Determine the freezing point depression of 62.5 g $Ba(NO_3)_2$ dissolved in 1.00 kg of water.
K_f H_2O = -1.86K

Apr 4-8:11 AM