Objective 4 Concentration of Ions in Solutions

1. Relate the structure of water to its function as the universal solvent
   Electrolytes : pH-electrolytic behavior
2. Relate the concentration of ions in a solution to the physical and chemical properties such as pH, electrolytic behavior, and reactivity **11th grade only**

Freezing Point Depressed

Molecules cluster in order to freeze. They must be attracted to one another and have a spot in which to cluster. Solute molecules get in the way! The more ions in solution, the greater the effect on the freezing point and the boiling point. A solution does not have a sharply defined freezing point. Useful for separation purposes in fractional crystallization.

Vapor Pressure Lowering-

The presence of a nonvolatile solute lowers the vapor pressure of a solvent. This is because the dissolved nonvolatile solute decreases the number of solvent molecules per unit volume. (Nonvolatile solute dilutes the solution). There are fewer solvent molecules on the surface to escape

Boiling Point Elevation

Because vapor pressure is lowered by the addition of a nonvolatile solute, boiling point is increased.

strong electrolytes

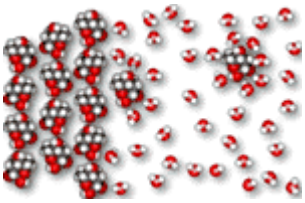
- completely dissociate into ions
- solutions strongly conduct electricity
- typical compounds: soluble ionic compounds
  strong acids

weak electrolytes

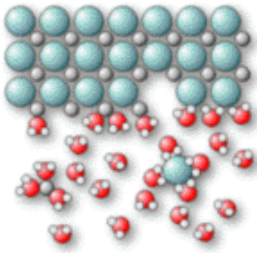
- incompletely dissociate into ions
- solutions weakly conduct electricity
- typical compounds: weak acids

nonelectrolytes

- no dissociation
- solutions don't conduct electricity
- typical compounds: molecular compounds



nonelectrolyte



electrolyte

<u>Boiling point elevation</u> - The increase in the boiling point of a solvent that occurs when a non-volatile solute is added to form a solution.

<u>Freezing point depression</u> - The decrease in the freezing point of a solvent that occurs when a solute is added to form a solution.

Acids taste sour, are corrosive to metals, change litmus (a dye extracted from lichens) red, and become less acidic when mixed with bases.
Bases feel slippery, change litmus blue, and become less basic when mixed with acids

Acids	0	HCl
	1	Stomach acid
	2	Lemon juice
	3	Vinegar
	4	Soda
	5	Rainwater
	6	Milk
Neutral	7	Pure water
Bases	8	Egg whites
	9	Baking Soda
	10	Tums® antacid
	11	Ammonia
	12	Mineral Lime - $Ca(OH)_2$
	13	Drano®
	14	NaOH

That **pH** scale we talked about is actually a measure of the number of $\mathbf{H^+}$ ions in a solution. If there are a lot of $\mathbf{H^+}$ ions, the pH is very low. If there are a lot of $\mathbf{OH^-}$ ions, that means the number of $\mathbf{H^+}$ ions is very low, so the pH is high.