

Chemistry Chapter 11 – Physical Properties of Solutions

- Suspensions** – relatively large particles of at least one component are distributed throughout another
Ex, sand in water, blow being blown in the air, precipitate in reaction mixture, settle in influence of gravity
Suspensions don't change **fp/vp**. Molecules are too large, plus too little numbers to have significant effect
- Solutions** – both solute/solvent are distributed among one another to form single homogeneous phase
Solution properties different from just solvent properties and solute properties
- Colloids** – mixtures that are intermediate between solutions/suspensions. Ex, homogenized milk
Also called **Colloidal dispersions or colloidal suspensions**. Contains mid sized particles
Dispersed phase – stuff being dispersed, “solute” **Dispersing medium** – stuff being dispersed in “solvent”
Suspended for long periods, *will not separate under influence of gravity?* Can't have gas colloids
Tyndall Effect – scattering of light. **Emulsions** – liquids dispersed in liquids **Stop them from colliding**
Emulsifying Agent – something that forms protective layer around oils/fats so water can mix with them
Adsorption – a process where something sticks to the surface of something else (solid/liquid dispersions)
- Substitution solid** – solute replaces solvent (ZnS) **Interstitial solid** – Solute squeezes between solvents (WC)
- Mole Fraction** – moles/total moles **Weight Fraction** – weight/total Weight **Molality** – Moles/1kg
- Miscible** – dissolvable. When A-B = A-A and B-B, then it's soluble. One polar, one not, not soluble
For solid to dissolve, must overcome great forces. Molecular stuff is easy to break by non-polar stuff,
But not polar stuff (polar solvents attract each other too much). If solid is polar or ionic, can't dissolve
In non-polar solvents (solute sticks to each other too well). Need polar stuff like water(ions)
- Solvated** – being surrounded by molecules of a solvent. **Hydrated** – surrounded by water
Substances that exhibit SIMILAR IMF's tend to be soluble in one another “Like Dissolves Like”
Hydrophobic – the tail of a “soap” such as Stearate, scared of water. **Hydrophilic** – like water, head
Micelles – collections of fatty acid anions (tails)
- Heat of Solution** – Amount of energy that is absorbed/released when a substance enters solutions
Exothermic = - number, **Endothermic** = + number Put in Lattice Energy, get back Hydration Energy
Ideal solution – all attractions are equal. Solid same as liquid – lattice first, then hydration
Hydration Energy – net attraction for the solvent dipoles
- Solubility** – at any temperature, a saturated solution in contact with undissolved solute is at equilibrium (no gas)
Solubility increases with temperature, If you put more solute in it, solubility goes down as temp goes up
For most solid/liquid substances in a liquid, solubility increases with temperature. **Gases less soluble**
Fractional Crystallization – burn the hell outta it until what you don't want dissolves, then cool it
Pressure has little to do with liquids/solids. **Solubility of gases increase with increasing pressure**
Henry's Law – Solubility is directly proportional to the PARTIAL PRESSURE. Works for gases only
- Vapor Pressure** – When making solutions, chemical properties don't change, just physical ones
*****When a nonvolatile solute is dissolved in liquid, vapor pressure is lowered.*****
Raoult's Law – VP of solution = Mole Fraction of solvent * VP of pure solvent. Nothing to do w/ solute
When both substances evaporate, get partial pressure of A, then B, add them together
Ideal solutions – follows Rault's Law. **Nonideal** – stuff that doesn't Higher VP, + deviation. Lower, -
When A-A/B-B less than A-B, - deviation. A-A/B-B more than A-B, + deviation
- Colligative Properties** – properties that depend on the number of particles instead of their chemical nature
Ex, Vapor Pressure. Boiling Point elevation – lower VP, higher BP, only for non-volatile substances
Freezing Point Depression – Freezing point lowered, lower VP, lower FP
- Electrolytes** – number of moles
When dealing with VP, when getting mole fraction, especially total moles, take into account NaCl is 2 mols

Rast Problem

$T = K_m$ More concentrated a solution, more off the FP/BP

K - molal FP/BP constant

$M = K \cdot w \cdot 1000 / T \cdot W$

w – weight of unknown solute

W – weight of camphor – solvent

T – temperature change

K - constant