Chapter Fourteen: Mixtures and Solutions
Section 3: Factors affecting Solvation

If the attractive forces between the solvent and solute particles are greater than the attractive forces holding the solute particles together, the solvent particles pull the solute particles apart and surround them.

$NaCl\ (s) + H_2O\ (l) \rightarrow NaCl\ (aq)$

Solvation: the process of surrounding solute particles with solvent particles to form a solution

- Solvation in water is called hydration
- "Like dissolves Like"
- The charged ends of the water molecule attract the positive and negative ends (for example in salt, the water attracts the Na^+ and Cl^-)
    - Gypsum is insoluble in water because the attractive forces between the ions are so strong that they cannot be overcome by the attractive forces of the water molecule

Factors that affect solvation:

1. Agitating a solution…stirring or shaking
    a. moves dissolved solute particles away from the contact surfaces more quickly…allows new collisions between solute and solvent

2. Increasing the surface area of the solute…crushing the substance
    a. a greater surface area allows more collisions to occur

3. Heating a solvent
    a. hotter solvents generally dissolve more solid solute
    b. Carbonated drinks lose its fizz faster at room temperature than when cold

Unsaturated Solution: a solution that contains less dissolved solute for a given temperature and pressure than a saturated solution

- more solute can be dissolved in an unsaturated solution

For every combination of solute with a given solvent at a specific temperature, there is a limit to the amount solute that will be dissolved

Saturated Solution: a solution that contains the maximum amount of dissolved solute for a given amount of solvent at a specific temperature and pressure

- If more solute is added, the solute will fall to the bottom of the container and not go into solution

Supersaturated Solution: a solution that contains more dissolved solute than a saturated solution at the same temperature

- For instance, if you added more solute at an increased temperature and then let cool undisturbed and slowly, the particles will remain in solution and not settle out
- https://www.youtube.com/watch?v=XSGvy2FPfCw

Henry's Law: at a given temperature, the solubility (S) of a gas in a liquid is directly proportional to the pressure (P) of the gas above the liquid

- $S_1/P_1 = S_2/P_2$
  - S = Solubility in g/L
  - P = Pressure in atm or kPa
- Think of a carbonated beverage. It contains CO_2 dissolved in an aqueous solution at a higher pressure than atmospheric pressure.
  - When the bottle is opened, the pressure above the liquid decreases. This causes bubbles of CO_2 gas to form in solution, rise to the top, and escape.
  - This will continue until all the carbon dioxide is released and it goes flat.
- Example: A gas has a solubility of 0.66 g/L at 10.0 atm of pressure. What is the pressure on a 1.0 L sample that contains 1.5 g of gas?

  $S_1 = 0.66$ g/L = $S_2 = 1.5$ g/1.0 L = 1.5 g/L

  $P_1 = 10.0$ atm $P_2 = ?$

  $P_2 = 22.73$ atm = 23 atm