

2017-10-30

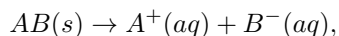
## Lecture 21: Solubility and Intro to Acid-Base Chemistry

### Mixtures vs Solutions

- **Mixtures** = any combination of two or more substances
  - Mixtures can be **homogenous** or **heterogeneous**
    - \* **Homogeneous** = uniform throughout; well-mixed
    - \* **Heterogeneous** = not uniform throughout; not perfectly mixed
- **Solution** = a special term for a homogenous mixture

### Solubility

- Mantra goes “like dissolves like”
  - This means that polar/ionic compounds dissolve polar/ionic compounds, whereas nonpolar compounds dissolve nonpolar compounds
- $K_{SP}$  = a metric of the equilibrium point for which a compound dissolves
  - *eg.* For



$$K_{SP} = [A^+][B^-]$$

- Note that  $[AB]$  isn't included in calculation, because it is **solid**

### $\Delta G_{sol}$ and $\Delta H_{sol}$

- $K_{SP}$  is an indication of what the Gibbs Free Energy change over the course of dissolving
  - High  $K_{SP}$  indicates spontaneity and negative  $\Delta G_{sol}$
- You can measure  $\Delta H_{sol}$  and use the equation of Gibbs free energy to do additional analysis

$$\Delta G = \Delta H - T\Delta S$$

### Solubility of Gases

- **Henry's Law** = the solubility of a gas is directly proportional to it's partial pressure

$$C = kP_{gas}$$

### Acid-Base Chemistry

- Arrhenius definition
  - **Arrhenius acid** = substance that increases the concentration of hydronium( $H_3O^+$ )

- **Arrhenius base** = substance that increases the concentration of hydroxide( $OH^-$ )
- Bronsted-Lowry definition
  - **Bronsted-Lowry acid** = a proton donor
  - **Bronsted-Lowry base** = a proton acceptor
- **Conjugate pair** = the corresponding acid/base which is created when a base/acid is neutralized