Ch 22 Acids, Bases and Salts

I. Acids and Bases

A. *Acids*- formula starts with at least one hydrogen that ionizes when mixed with water

1. H^+ ion combines with water to make a *hydronium ion* (H_3O^+)
2. Properties
    a. Taste sour
    b. Corrodes metal making hydrogen gas
    c. Turns *indicators* color – organic compound that changes color due to acid or base
        1) Litmus- red
        2) Phenolphthalein- clear

B. Common Acids- memorize

1. Strong Acids
    a. HCl- hydrochloric acid- stomach acid
    b. HNO- nitric acid- makes explosives
    c. H_2SO_4- sulfuric acid- battery acid
2. Weak Acids
    a. $HC_2H_3O_2$ – acetic acid- vinegar
    b. H_2CO_3- carbonic acid- carbonated water (soda)

C. *Bases*- substance that forms *hydroxide ion* (OH^-) in water

1. Properties
    a. taste bitter
    b. feel slippery
    c. corrosive- eat away metal
    d. turn indicators colors
        1) litmus- blue
        2) phenophthaline- pink

D. Common Bases- memorize

1. Strong Bases
    a. NaOH- sodium hydroxide- make soap, drain cleaner
    b. KOH- potassium hydroxide- make soap

c. $Mg(OH)_2$- magnesium hydroxide- milk of magnesia

2. Weak Bases

a. $(NH_4)(OH)$- ammonium hydroxide- household ammonia

b. $Bi(OH)_3$- bismuth hydroxide- in pepto bismol

E. Dissociation/ ionization- ions separation base or acid

1. More complete dissociation- strong acid or base

II. Strength, Concentration, and pH

A. Strength – depends on how completely an acid or base separates into ions

1. *strong acid* – ionizes completely in water
2. *weak acids* – incomplete ionization in water
    a. safer to touch and in many foods
    b. chem eqn uses a double arrow
3. *strong base* – dissociates completely in water
4. *weak bases* – incomplete dissociation

B. Concentration- how much acid or base is in given amount of water

1. Concentrated- lots acid or base
2. Dilute- little acid or base
3. Concentration and strength not relate

C. pH- measure of concentration of hydrogen ions in solution

1. measures strength of acid or base
2. measured with pH paper, liquid indicator, or pH meter
3. pH scale: numbers 0-14
    a. pH= 7 neutral solution- neither acid nor base (pure water)
    b. lower pH – stronger acid
    c. higher pH- stronger base
4. Buffer- substance that keeps pH from changing easily
    a. In blood, which must maintain pH between 7.0 and 7.8

III. Salts- metal from base and nonmetal from acid

A. Neutralization- adding acid and base to make salt and water

1. Complete neutralization makes pH= 7

B. Many Kinds of Salts

Ex) KNO_3- potassium nitrate- saltpeter- ingredient in gun powder
$CaCO_3$- calcium carbonate- chalk

Titration- adding acid and base for complete neutralization

1. if know concentration of either acid or base, can find conc. of other
2. endpoint- when indicator turns color- happens at complete neutralization

D. Soaps and detergents

1. Soaps – organic salts (Ch21)
    a. saponification- base + fat make soap (KOH or NaOH)
    b. don't work well in hard water
2. Detergents- work well in hard water