TITRATIONS

ACIDS.- a substance that produces hydrogen ions, H+, in an aqueous solution.

- Taste sour
- React with certain metals to produce hydrogen gas. (Zn, Fe, Mg, etc.)
- Changes litmus paper red
- Conducts electricity
- Reacts with bases to form salt, water.
- Arrhenius Acid - produces H+ ions or hydronium ions, like HCl
- Bronsted-Lowry acid: proton donor
    - A proton is really just a hydrogen atom that has lost an electron.

MONOPROTIC AND POLYPROTIC ACIDS

- Monoprotic: can donate only one hydrogen ion per molecule (HCl)
- Diprotic: can donate two hydrogen ions per molecule (H2SO4)
- Triprotic acids: can donate three hydrogen ions per molecule (H3PO4)

BASES.- a substance that produces hydroxide ions, OH-, in an aqueous solution.

- Arrhenius base: produce OH- ions like NaOH
    - One problem is that not all bases do not produce hydroxide ions.
- Bronsted-Lowry base: proton acceptor.
- Tastes bitter
- Feel slippery or soapy
- Conduct electricity
- Changes litmus paper blue
- Reacts with acids to form salts and water
- Alkali: a soluble base. When dissolved on water, alkalis all release the hydroxide ion.

CONJUGATE PAIRS, when one of the misses an electron compared to it´s pair.

AMPOTHERIC / AMPHIPROTIC SUBSTANCES

- Substances that can act like Bronsted-Lowry acids and bases, meaning they can either accept or donate a proton.

- These features allow them to have a double identity:
    - To be an acid, they must be able to dissociate and release H+
    - To act as base, must be able to accept H+, which means they must have a non bonding pair of electrons.
- Water is a perfect example- it can donate H+ and has two lone pairs of electrons.
    - Autoionization of water:
    - H2O + H2O <--- → H3O+ + OH-
- Amphoteric: can act as either acid or base
- Amphiprotic: type of amphoteric substance that can act as a base or acid but by specifically donating or accepting hydrogen ions.

STRENGTH OF ACIDS AND BASES

- Strong acids and bases of equal concentrations have higher conductivity than weak acids and bases.
- A strong acid is a good proton donor, and has a weak conjugate base.
- A strong base is a good proton acceptor, and has a weak conjugate acid.
- A strong acid ionizes completely in aqueous solutions
    - HCl, HBr, HI, HNO_3, $H2SO_4$, $HClO_4$
- A weak acid releases few hydrogen ions in aqueous solutions
- As with acids, the strength of a base depends on the extent to which it dissociates or adds hydroxide ions, to the solution.
- Seven strong bases completely ionize in water.
    - LiOH, NaOH, KOH, RbOH, CsOH, $Sr(OH)_2$, $Ba(OH)_2$, $Ca(OH)_2$
- Bases are strong when there are lots of OH^- ions in solution, because the compounds dissociate well.

% ionization = (amount ionized / initial concentration) *100

KEY REACTIONS

1. Acid + base → salt + water
2. Acid + metal → salt + hydrogen
3. Acid + metal carbonate → salt + water + carbon dioxide

NEUTRALIZATION

- Net ionic equation is $H^+(aq) + OH^-(aq) \longleftrightarrow H_2O\ (l)$

THE pH SCALE

- pH is a measurement of the concentration of hydronium ions in the solution while the pOH scale measures the concentration of hydroxide ions.
    - $pH + pOH = 14$
    - $[H^+] = 10^{-pH}$
    - $[OH^-] = 10^{-pOH}$
    - $pH = -\log_{10}[H^+]$
    - $pOH = -\log [OH^-]$
- Goes from 0 to 14
- pH 7 is neutral, anything less than 7 is acidic and anything more than 7 is basic.
- pH 1 is ten times stronger than pH 2, pH1 is a hundred timed stronger than pH 3, and so on...

LOGARITHMIC SCALE

- Is a nonlinear scale used when there is a large range of quantities. Common uses include earthquake strength.