Chemistry **Mr. Thaler**

Unit-V *(Solutions, Rates & Eqm, Acid-Base Chem, and Ocean Acidification)* Outline
Formulas and constants you should how to use (not memorize):

M = mol solute / L soln

$K_w = [H_3O^+][OH^-] = 1.0 \times 10^{-14}$; pH = $-\log[H_3O^+]$; pOH = $-\log[OH^-]$; pH + pOH = 14

$M_A V_A = M_B V_B$ (when H_3O^+: OH^- is 1:1)

KNOW AND UNDERSTAND:
Concentration: molarity (M) = mol solute/ L solution

Reaction rates and equilibrium: factors (temp., concentration, surface area, catalyst) affecting reaction rate (i.e., collision theory) and equilibrium (Le Chatelier's principle), as they are the basis for understanding weak acids and bases as well as buffer solutions

Affect of a catalyst on reaction rate: lowers activation energy (E_a)—see energy diagram

Properties of acids and bases: taste, feel, electrical conductivity, indicator color change

Naming acids and bases: **3 rules for acids: 1.** binary acid: change –*ide* of anion to –*ic*, add *hydro-* prefix, ex. HCl = hydrochloric acid; **2.** change –*ate* of anion to –*ic*, ex. HNO_3 = nitric acid; **3.** change –*ite* of anion to –*ous*, ex. HNO_2 = nitrous acid.
Name common bases as ionic compounds (except for ammonia, NH_3).

Strong vs. weak acids and bases: 6 strong acids (memorize: 3 binary involving halides, and 3 involving polyatomic anions), and strong bases (alkali metal hydroxides and alkaline-earth metal hydroxides, from calcium down)

Arrhenius definition of acids (H^+ producers) and bases (OH^- producers)

Brønsted-Lowry definition of acids (H^+ or proton donors) and bases (H^+ or proton acceptors)

Lewis acids are electron-pair acceptors, and bases are electron-pair donors

Conjugate acid-base pairs: Conjugate a-b pairs differ by the gain or loss of a single proton (or H^+).

Salt hydrolysis: Judging from the strength of parent acids and bases, will a salt when added to water produce a solution that is acidic, basic, neutral, or dependent?

Auto-ionization of water and the ion-product constant for water (K_w) as the basis for the pH scale:
- $K_w = [H^+] [OH^-] = 1.0 \times 10^{-14}$;
- pH = $-\log[H^+]$ (or $-\log[H_3O^+]$);
- pH scale: 0-14; 0 most acidic, 14 most basic

Acid-base titration: Identify equivalence point on a titration curve, determine if unknown is strong or weak acid or base (standard solution always strong), and calculate molarity of unknown using $M_A V_A = M_B V_B$.

Buffers: Which way will the equilibrium shift (i.e, reaction rate increase) if small amount of acid or base is added to a buffer solution?

Ocean Acidification (Chapter 16): Ocean pH levels, the ocean as a carbon sink, the ocean and climate change, consequences of ocean acidification