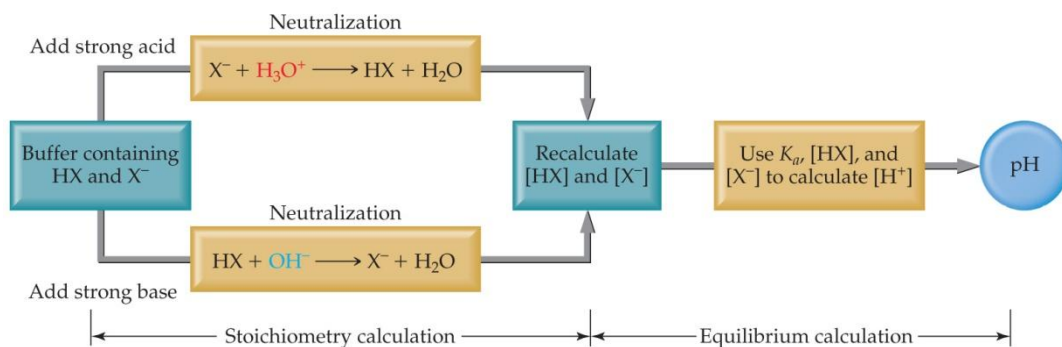


pH Range:

$$pH = pK_a + \log \frac{[A^-]}{[HA]} =$$

This gives the optimal pH of any buffer.

- Strong Acids/Strong Bases added to Buffer
  - Problem solving strategies
    1. Acid-Base neutralization reaction and its effect on the [HA] and [A-]. This step involves stoichiometric calculations.
    2. Use  $K_a$  and new concentrations of [HA] and [A-] from step 1 to calculate pH using the H-H EQ.
    3. Then find [H+] if needed.
  - Assumptions:



- Calculating pH changes in Buffers

A buffer is made by adding 0.300 mol  $HC_2H_3O_2$  and 0.300 mol  $NaC_2H_3O_2$  to enough water to make 1.00 L of solution. The pH of the buffer is 4.74. Calculate the pH of this solution after 0.020 mol of NaOH is added.

- Stoichiometric calculation

**ICE table**

	CH <sub>3</sub> COOH	OH <sup>-</sup>	H <sub>2</sub> O	CH <sub>3</sub> COO <sup>-</sup>
Initial				
Change				
Equilibrium				

- Equilibrium calculation  
Use H-H EQ to calculate pH.

$$pH = pK_a + \log \frac{[A^-]}{[HA]}$$

we know that when  $[HA]=[A^-]$ , the . So the equation will look like,

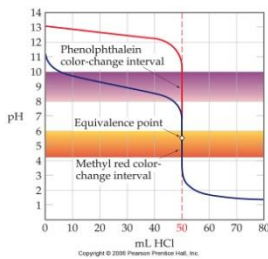
$$pH = \quad + \log \text{————} = \quad + 0.06 = 4.80$$

- Titrations

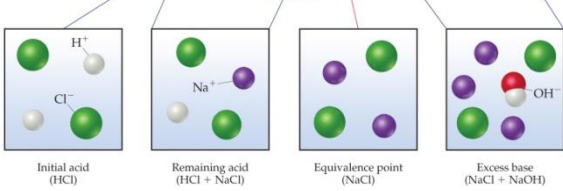
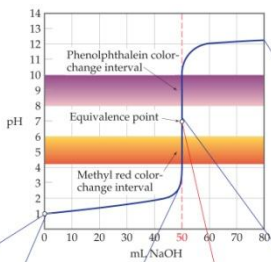
- Definition:
- Equivalence point:
- End point:
- Three cases:
  1. Strong acid- Strong base
    - a. Initial pH
    - b. Between initial pH and equivalence point
    - c. Equivalence point
    - d. After equivalence point

2. Weak Acid- Strong base

- a. Initial pH
- b. Between initial pH and equivalence point

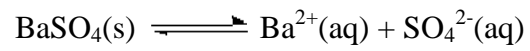


- c. Equivalence point
- d. After equivalence point



- For weaker Acids, the initial pH is \_\_\_\_\_ and the pH change near the equivalence point is \_\_\_\_\_.
- Shape of the weak base-strong acid titration curve is reverse of that of the weak acid-strong base titration curve.
- Polyprotic acids have multiple equivalence points corresponding to the number of protons being released.

- Solubility Product  
Definition:



- Denoted as  $K_{sp}$ ,  $K_{sp} = [\text{Ba}^{2+}][\text{SO}_4^{2-}]$
  - Units:
- 
- Solubility
    - Definition:
    - Units: