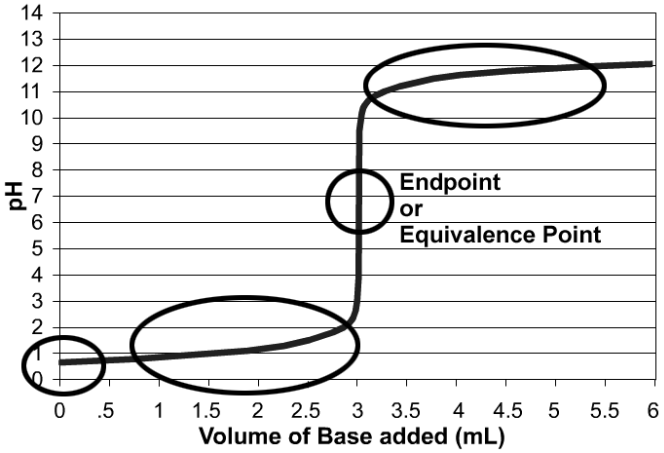
18 • Acid-Base Reactions

STUDY LIST From Paul Groves

STRONG ACID-STRONG BASE NEUTRALIZATION

I can:

- ☐ write the equation for the neutralization of a strong acid and strong base.
- ☐ state that the pH at the equivalence point = 7.
- ☐ calculate the pH of the initial acid or base solution.
- ☐ calculate the pH of any combination of acid and base before and after the equivalence point.
- ☐ state that a titration is the volumetric analysis of an acid of unknown concentration by adding a base of known concentration.
- ☐ sketch the shape of a strong acid-strong base titration curve.



ACID-BASE NEUTRALIZATIONS INVOLVING WEAK ACIDS & BASES

- ☐ write the equation for the neutralization of any acid and any base.
- ☐ predict the general pH of a strong or weak acid neutralized by a strong or weak base:
  - strong acid + strong base _____
  - weak acid + strong base _____
  - strong acid + weak base _____
- ☐ explain that the pH at the equivalence point depends on the conjugate base or the conjugate acid formed from the reactants.
- ☐ identify the conjugate acid of a weak base or the conjugate base of a weak acid in a neutralization.
- ☐ calculate the volume of acid needed to neutralize a base and the volume of base needed to neutralize an acid using the formula: $V_{H+}\ \underline{M}_{H+} = V_{OH-}\ \underline{M}_{OH-}$ or a line equation.
- ☐ calculate the concentration of the conjugate base or conjugate acid and the pH at the endpoint of a titration.
- ☐ explain that weak acids and strong acids require the same amount of base to be neutralized because the weak acids will dissociate during neutralization.

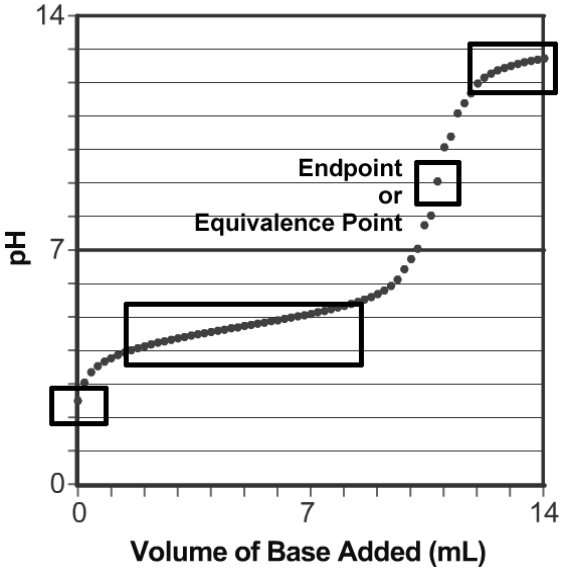
BUFFERS

I can:

- ☐ describe how a pH buffer behaves when small amounts of acid or base are added.
- ☐ explain why a buffer works (buffering capacity) based on the presence of the weak acid (H^+ donor) and conjugate base (H^+ acceptor). I can show mathematically that diluting the buffer does not change the pH of the buffer; but it reduces its buffering capacity.
- ☐ calculate the pH of the best buffer you can make from a given acid and its conjugate base given K_a's of weak acids (or K_b's of weak bases)
- ☐ choose the acid / conjugate base needed to get a buffer of specified pH. (Given K_a's of acids.)
- ☐ choose pairs of substances that will make a buffer:
  --weak acid & its conjugate base
  --weak base & its conjugate acid
  or
  --weak base & ***some*** strong acid
  --weak acid & ***some*** strong base
- ☐ calculate the pH of a buffer using the ICE box or the Henderson-Hasselbach equation.

TITRATION CURVES

- ☐ determine the equivalence point (end point) of the titration by looking at a titration curve.
- ☐ determine the pK_a of the weak acid being titrated by looking at a titration curve.
- ☐ do the eight calculations that will allow me to sketch the pH curve for a weak acid or weak base.



- pH of the weak acid solution initially
- amount of based needed for titration
- concentration of conjugate base at endpoint
- pH of the solution at the endpoint
- pH halfway to the equivalence point (e.p.)
- pH a little *before* halfway to the e.p.
- pH a little *after* halfway to the e.p.
- pH after all of the acid has been neutralized

- ☐ translate all of my knowledge and skills from a weak acid titration to a weak base titration.

DIPROTIC ACIDS

ACID-BASE INDICATORS

LAB: TITRATIONS