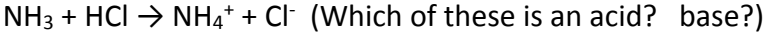
Acids and Bases: Chapter 19

I. Defining Acids and Bases

Property	Acids	Bases
Taste		
Touch		
pH ( )		
Litmus paper turns...		
Chemical formula		
What they do with H^+		
Electrical Conductivity		
When they react with metals		

A. The Bronsted-Lowry Definition (Shake and Take!)

1. Acid –
2. Base –
3. Determine this by finding out what the substance needs to do to become what it is on the other side.



(Which of these is an acid? base?)

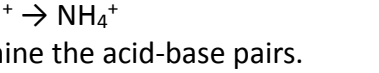
B. Water is

1. Amphoteric –
2. Example:

3. Example: 

C.

1. A that
2. Conjugate acids and bases are
3. An acid and it
   Example: 

4. A base and it
   Example: 

5. Example: Determine the acid-base pairs.

II. Strengths of Acids and Bases

A. Acid and base strength:

B. Acids and Bases

1. Will ( ) or
   a. :

   b. Examples: HCl, HBr, HNO_3, H_2SO_4, NaOH, LiOH, KOH, $Ca(OH)_2$
   c.

C. acids and bases.

1. Will
   a. : 

   b. Examples: $HC_2H_3O_2$ (vinegar),NH_3 (ammonia)
   c.

Acids and Bases: Chapter 19

D. Acid/base strength is measured by
1. pH is
2. It is (based on the)
a. The
b. The
3. More on this later...

E. Trends
1. The
2. The

F.
1. When mixed, acids and bases (meaning that).
2. Mixing a strong acid and base

G. Reactions of acids and bases (products are ALWAYS H_2O and a salt)
1. Strong acid with strong base:
2. Strong acid with weak base:
3. Weak acid with strong base:
4. Weak acid with weak base:

III. Acid Base Application

A. Titrations
1. A method used to experimentally
a. by
b. phenolphthalein is usually used (for acids/bases)
c. signals that
2. Equivalence point: where the
3. Equation: where and
a. A is for acid and B is for base.
b. When calculating, make sure that the (L or mL)
c. NOTE: , therefore:
i.
ii.
iii.
d. Example: When 42.5 mL of a 1.03 M solution of NaOH is added to 50.0mL of vinegar (acetic acid, CH_3COOH), the phenolphthalein turns pink. What is the concentration of the acetic acid in vinegar?

B. Buffer: solution that when acids and bases are added
1. How to make a buffer
a. Mix a:
i.
ii.
b. (reaction)
2. How does it work?
a. consider a buffer composed of sodium acetate, $NaC_2H_3O_2$,(dissociating into $C_2H_3O_2^-$) and acetic acid, $HC_2H_3O_2$
i.
ii.

Acids and Bases: Chapter 19

IV. K with Acids and Bases!

A. First, a little pHun (note: H^+)...EQUATIONS FOR pH!

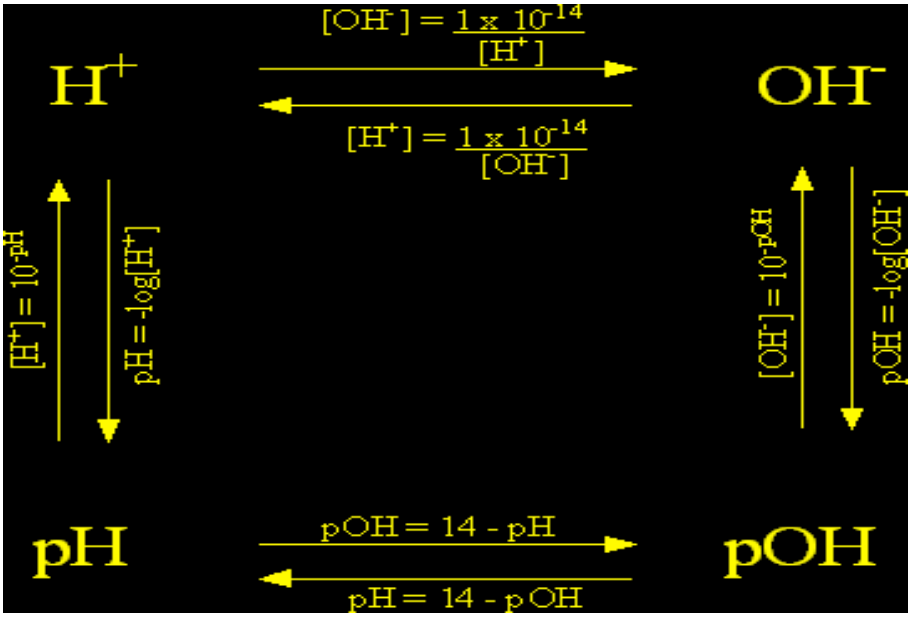
1.
   a. What is the pH of a 0.0100 M nitric acid solution, HNO_3? Nitric acid is a strong acid.
   b. pH=
2.
   a. What is the pOH of a 0.050 M solution of NaOH?
   b. pOH=
3. Therefore,
   a. What is the hydronium (H_3O^+) concentration of a solution with a pH of 3.4?
   b.
4. Relating pH and pOH
   a.
   b.
   c.
   d. What is the pH of a solution that has a pOH of 3.1?

   e. What is the pOH of a solution that has a pH of 5.6?

5. Relating $[H^+]$ and $[OH^-]$
   a. although very slightly
   b. H_2O <--> $H^+ + OH^-$
   c.
   d. , therefore:
      i.
      ii.
   e. What is the concentration of $[H_3O^+]$, if the NaOH is 0.0156 M?

6. Putting it all together:
7. Examples:
   a. What is the pH and pOH of a solution with an$[H^+]$ of 0.000345M?

   b. What is the $[H^+]$ and $[OH^-]$ of a solution with a pOH of 4.32?



Acids and Bases: Chapter 19

B.

1. How easily an acid/base dissociates.
2. The
3. This value is

Equation: $HF_{(aq)} \leftrightarrow H^{+}_{(aq)} + F^{-}_{(aq)}$

4. Example:Write the dissociation equation and the constant expression for $HC_2H_3O_2$.

C. What is really happening with weak acids/bases?

1. There are three steps to consider
   a. Initially, an acid is placed into solution
   b. Then, the acid dissociates slightly and the concentration changes
   c. The concentration changes until the reaction reaches equilibrium.
2. This is shown through an ICE chart
3. Create an ICE chart for a 0.100M sol'n of HF.

D. Solving with K_a and pH

1. Write the dissociation equation.
2. Write the acid dissociation constant expression.
3. Plug in what you know.
   a. Remember that
4. Ex: What is the K_a of a 0.100M solution of HCOOH when its pH is 2.38.

5. Shortcut:
   a.
   b.
   c.

6. Ex: What is the K_a of a 0.0100M solution of HF when its pH is 3.20.