Mrs. Nielsen Honors Chemistry

Name _____ Date _____ Period _____

Acids and Bases Part II

Warm Up:

1. What is the name for H_3O^+ ion?

2. What do brackets represent, for example, $[H_3O^+]$?

3. What is an aqueous solution?

4. What does molarity, M, measure?

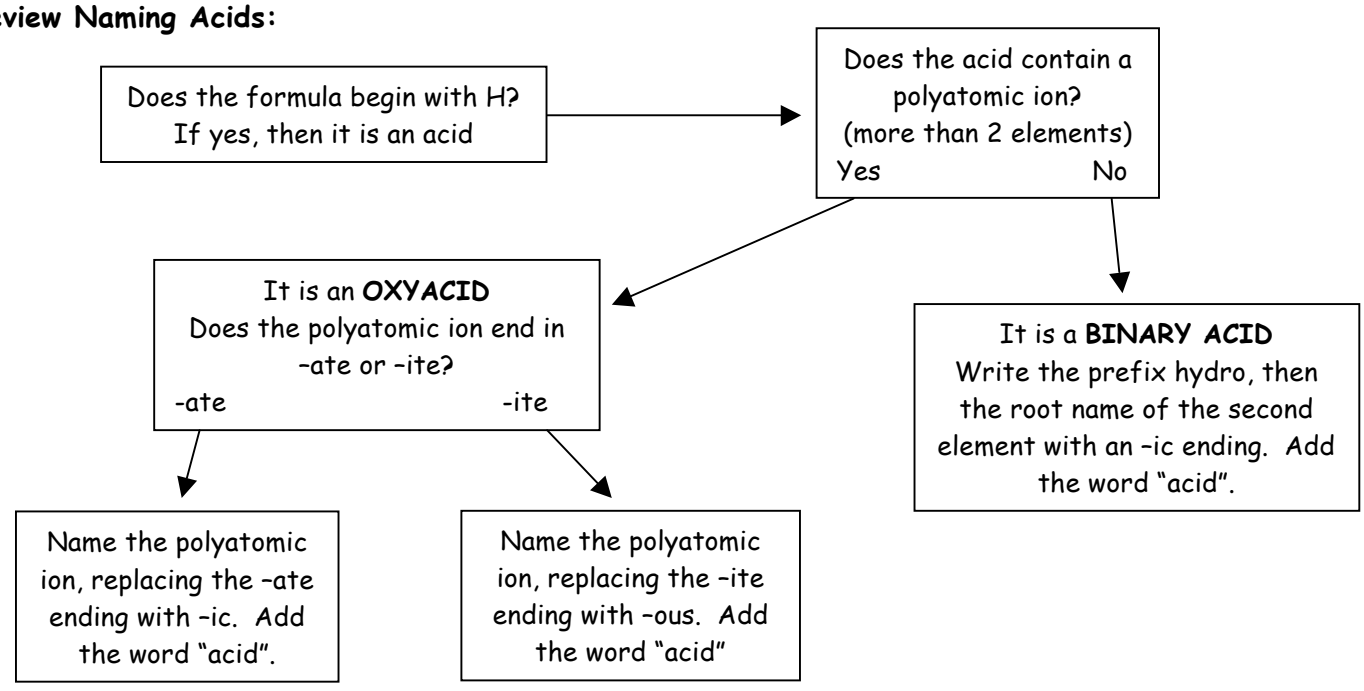
5. Predict the products of the following neutralization reactions:

   a. $HNO_{3(aq)} + KOH_{(aq)} \longrightarrow$

   b. $Ca(OH)_{2(aq)} + HCl_{(aq)} \longrightarrow$

   c. $Mg(OH)_{2(aq)} + H_2SO_{4(aq)} \longrightarrow$

Review Naming Acids:



*Some exceptions:

HCN = hydrocyanic acid

H_2SO_4 = sulfuric acid

H_2SO_3 = sulfurous acid

H_3PO_4 = phosphoric acid

H_3PO_3 = phosphorous acid

Practice: Name the following acids

1. HF _____
2. HNO_3 _____
3. H_2SO_4 _____
4. HI _____
5. HBr _____
6. $HClO_4$ _____
7. HNO_2 _____
8. HCl _____

Acids

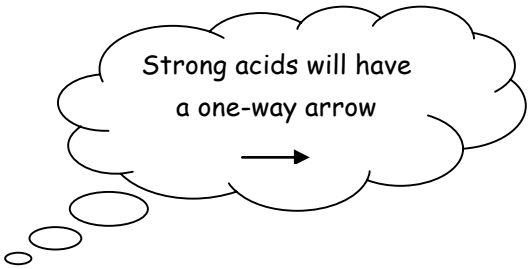
Define **Acid**:

How does one determine the strength of an acid?

*

*

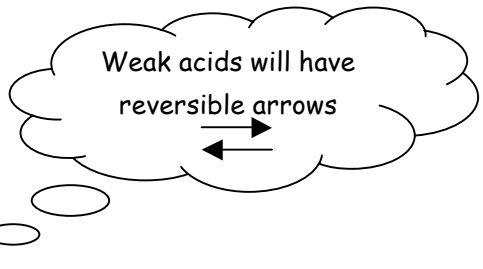
Strong Acid:



ex)

$$HNO_{3(aq)} + H_2O_{(l)} \longrightarrow H_2O_{(l)} + H^+_{(aq)} + NO_3^-{}_{(aq)}$$

Weak Acid:



ex) HCN

$$HCN_{(aq)} + H_2O_{(aq)} \rightleftharpoons H_3O^+_{(aq)} + CN^-_{(aq)}$$

ex) CH_3COOH

* only 1 H is acidic!

There are 3 categories of acids:

Monoprotic acids:

ex)

Diprotic acids:

ex) step 1: $H_2SO_{4(aq)} + H_2O_{(l)} \longrightarrow HSO_4^-{}_{(aq)} + H_3O^+_{(aq)}$

step 2: $HSO_4^-{}_{(aq)} + H_2O_{(l)} \rightleftharpoons SO_4^{2-}{}_{(aq)} + H_3O^+_{(aq)}$

Triprotic acids:

ex) step 1: $H_3PO_{4(aq)} + H_2O_{(l)} \rightleftharpoons H_2PO_4^-{}_{(aq)} + H_3O^+_{(aq)}$

step 2:

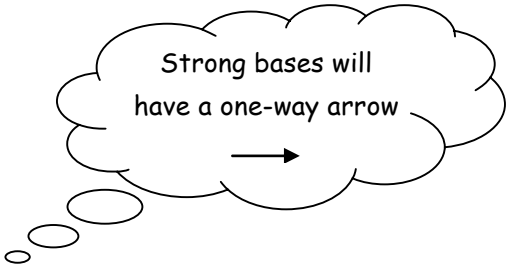
step 3:

Bases

Define **Base**:

Alkaline Solution:

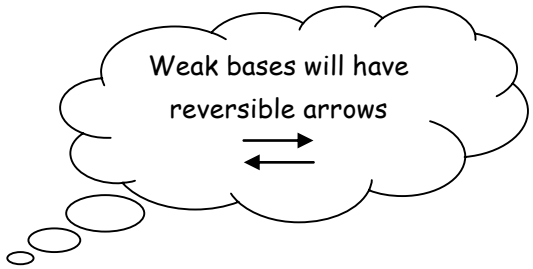
Strong Base:



ex)

$$NaOH_{(aq)} \longrightarrow Na^{+}_{(aq)} + OH^{-}_{(aq)}$$

Weak Base:



ex) ammonia

Amphoteric:

ex) H_2O

as an acid:

as a base:

pH and pOH

	Acids	Neutral	Bases
pH			
pOH			
$[H_3O^+]$ vs. $[OH^-]$			
pH vs. pOH			

Equations you need to know:

- **$pH = -\log [H_3O^+]$**
- **$pH + pOH = 14$**
- **$pOH = -\log [OH^-]$**
- **$[H_3O^+]\,[OH^-] = 1 \times 10^{-14}$**

Road Map to Acid-Base Calculations:

Calculations Involving pH and pOH

Example: A solution has a $[H_3O^+] = 1x10^{-7}M$. Calculate the pH of the solution.

Example: A solution of HBr has a pH=4.

a) Is this solution acidic or alkaline?

b) Determine the $[H_3O^+]$ of this solution.

c) What is the pOH of this solution?

Example: You have a $1x10^{-2}M$ NaOH solution.

a) Is NaOH an acid or a base? How do you know?

b) Write the equation for the dissociation of NaOH in H_2O.

c) Calculate the $[OH^-]$ in this solution.

d) Calculate the $[H_3O^+]$ in this solution.

e) Calculate the pH and the pOH of the solution.