CHEMISTRY

NAMING ACIDS AND CALCULATING pH

Naming Acids and Their Anions

There are two main kinds of acids: binary acids and oxoacids. A **Binary Acid** is composed of two elements: hydrogen and a nonmetal. The names of binary acids are made up of the following parts:

- The prefix "hydro-"
- A root that is formed from the name of the non-metal
- The suffix "-ic"

Binary Acid	Prefix	Non-metal root	Suffix
HF	Hydro-	-fluor-	-ic
HCl	Hydro-	-chlor-	-ic
H_2S	Hydro-	-sulfur-	-ic

An **Oxoacid (**also called *oxyacids***)** is an acid formed from a polyatomic ion that contains oxygen, hydrogen, and another element. The naming of these polyatomic ions follow specific rules based on the number of oxygen atoms they have:

Anion	Normal Prefix/Suffix	Acid Prefix/Suffix
ClO_3^- (x)	chlor**ATE**	chlor**IC**
ClO_4^- $(x + 1)$	**PER**chlor**ATE**	**PER**chlor**IC**
ClO_2^- $(x - 1)$	chlor**ITE**	chlor**OUS**
ClO^- $(x - 2)$	**HYPO**chlor**ITE**	**HYPO**chlor**OUS**

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Ex: *Name the following acids:*

1. $HClO_2$

2. $HClO_4$

3. H_2SO_3

4. H_3PO_5

Ex: *Write the formula of the following acids:*

1. Carbonic Acid

2. Nitrous Acid

3. Hypochlorous Acid

4. Hypophosphorous Acid

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Calculating pH

The term pH represents the ***"presence of hydrogen"***.

The concentration of hydrogen ions ranges from about 10 M for a strong acid to about 10^{-15} M for a strong base.

Using the concentration of hydrogen, Soren Sorensen (*I did not make this name up*) developed the pH scale using the following calculation:

$$pH = -\log[H^+]$$

… where [H+] is the concentration of hydrogen ions in solution.

Ex: *It is determined that a solution has a hydrogen concentration of 1.0 x 10^{-7} M. What is the pH of the solution?*

Ex: 0.00125 mol of hydrogen ions are found in 5 L of aqueous solution. What is the pH?

Ex: 0.0000125 M of sulfurous acid solution. What is the pH?

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Calculating Concentration from pH

As we have seen, one can calculate pH by using the concentration of hydrogen ions in solution. The reverse can be accomplished as well. That is, the concentration of hydrogen ions can be achieved by using the known pH. The formula is as follows:

$$[H^+] = 10^{-pH}$$

Ex: What is the concentration of $[H^+]$ in a basic solution with a pH of 12?

Watch out for polyprotic acids!!!

Ex: What is the concentration of H_2SO_4 if it has a pH of 1?

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pOH???????????

The pOH is the concentration of hydroxide in solution. The pOH value is opposite to the pH value.

Example: If you have a pH of 12 ... you have a pOH of 2

$$pH = 14 - pOH$$

$$pOH = -\log[OH^-]$$

Example: What is the pH of a solution of 0.005 M LiOH?

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Example: What will be the resulting pH when 50mL of 0.025M H_2CO_3 is mixed with 50mL of 0.06M NaOH?

Example: What is the pH of a solution of 0.005 M LiOH?

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ACIDIC COMPOUNDS:
Names and Formulas

1. Write the formulas for the following compounds.

a. Carbonic acid _____
b. Nitric acid _____
c. Sulphurous acid _____
d. Perchloric acid _____
e. Hydrosulfuric acid _____
f. Hydrocarbonic _____
g. Hypophosphorous acid _____
h. Hypochlorous acid _____
i. Pernitric acid _____
j. Hydroiodic acid _____
k. hypochlorous acid _____
l. nitrous acid _____
m. carbonous acid _____
n. hydrochloric acid _____
o. hydronitric acid _____
p. chloric acid _____
q. phosphorous acid _____
r. hydrogen hydroxide _____
s. hydrophosphoric acid _____
t. sulphuric acid _____

2. Write the names for the following compounds.

a. H_2SO_4 _____
b. $HClO_2$ _____
c. H_2SO_2 _____
d. H_2CO_4 _____
e. H_2SO_2 _____
f. HNO_3 _____
g. H_3PO_4 _____
h. $HClO_2$ _____
i. H_2S _____
j. $HClO_4$ _____
k. H_2SO_3 _____
l. HOH _____
m. H_3PO_2 _____
n. HNO_4 _____
o. $HClO_3$ _____
p. HClO _____
q. H_2CO_2 _____
r. HCl _____
s. HBr _____
t. H_2SO_5 _____