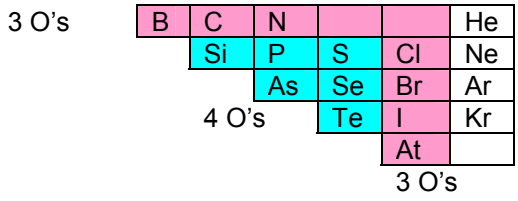
Acid Nomenclature

I. Oxy-acids: Compounds containing hydrogen, oxygen, and one other element.

A. The following is a table of some commonly occurring oxy-acids of nonmetals. The bold-faced formula is the principal member of each series.

$HClO$	$HBrO$	HIO	$(HNO)_2$	H_2SO_2	----	H_3PO_2
$HClO_2$	----	HIO_2	HNO_2	H_2SO_3	----	H_3PO_3
$HClO_3$	**$HBrO_3$**	**HIO_3**	**HNO_3**	**H_2SO_4**	**H_2CO_3**	**H_3PO_4**
$HClO_4$	$HBrO_4$	HIO_4	----	----	----	----

B. The number of oxygens contained in the principal member of a series of oxy-acids of a particular nonmetal is as follows:



C. The number of hydrogens is the same for all oxy-acids of the same element. The number can be obtained by counting backwards from 0 in the periodic table as follows:

B 3	C 2	N 1	O	F
	Si 4	P 3	S 2	Cl 1
		As 3	Se 2	Br 1
			Te 2	I 1
				At 1

D. A series of suffixes are used to indicate the formula of each oxy-acid.

1. The principal member of each group is named as follows: "stem name of non-metal + ic" "acid." Examples: $HBrO_3$ bromic acid; HNO_3 nitric acid

2. Other members of each series are named according to the number of oxygen atoms in the molecule.
   a. One more oxygen than the principal member = per(__) acid
   b. One less oxygen = (__)ous acid
   c. Two less oxygens = hypo(__) acid

   Examples:

   $HClO_3$ chloric acid

   $HClO$ hypochlorous acid
   $HClO_2$ chlorous acid
   $HClO_4$ perchloric acid

II. Salts of oxy-acids

A. 1. The anion remaining after removal of **all** hydrogens from the oxy-acid molecule is named as follows:
   a. Change suffix "-ic" to "-ate."
   b. Change suffic "-ous" to "-ite."

   Examples:

   BrO- hydrobromite anion
   BrO_2^- bromite anion
   BrO^- bromate anion
   BrO_4^- perbromate anion

2. The negative valence (charge) of the oxy-anion derived from removing all the hydrogens from an oxy-acid equals the number of hydrogens removed and can be obtained as in Part I C above.

Examples: BrO_3^- SO_3^{2-} SiO_4^{4-}
PO_4^{3-} AsO_4^{3-} IO_3^-

B. Salts of oxy-acids are named like binary compounds.

C. Diprotic oxy-acids (those containing two ionizable hydrogens) can also form an anion which contains one hydrogen atom (Example: HSO_4^-). Such anions are named in two ways as follows:

Examples	**Old System**	**Stock Notation**
HSO_4^-	Bisulfate anion	Hydrogen sulfate
HCO_3-	Bicarbonate anion	Hydrgon carbonate anion

(In this class, we will only use the Stock notation. However, the old nomenclature system is still commonly used on chemical labels, so familiarity with this system can be an advantage.)

D. Triprotic oxy-acids (those containing three ionizable hydrogens) can form additional anions containing one or two hydrogen atoms. Example: $H_3PO_4 \rightarrow H^+ + H_2PO_4^-$; $H_2PO_4^- \rightarrow H^+ + HPO_4^{2-}$
Such anions are named by placing the work "monohydrogen" or "dihydrogen" before the oxy-anion name. Examples: HPO_4^{2-} monohydrogen phosphate anion
$H_2PO_4^-$ dihydrogen phosphate anion

E. Salts of the anions describe in the two preceeding sections (C and D) are called acidic salts. They are named like binary compounds.
Examples: $KHSO_4$ potassium bisulfate OR potassium hydrogen sulfate (preferred)
$NaHCO_3$ sodium bicarbonate OR sodium hydrogen carbonate (preferred)
$Co(HSO_4)_2$ cobalt (II) hydrogen sulfate
NaH_2PO_4 sodium dihydrogen phosphate
Na_2HPO_4 sodium monohydrogen phosphate
Na_3PO_4 sodium phosphate

III. Other Oxy-anions

A. Other common oxy-anions include:
B. Other common polyatomic ions include:
C. Whenever one oxygen in a polyatomic ion is replaced by sulfur, the prefix "thio" is added to the anion name.