

## INTRODUCTION TO NOMENCLATURE

1. **Binary ionic compounds** - one metal element & one non-metal. i.e. NaCl & TiH<sub>2</sub> Separate the compound into ions before naming it. i.e



The sum of the positive and negative charges must = 0. Some elements like Ti may have different positive charges which may be calculated from the negative charges which are fixed. (Refer to table, next page). The cation is named first, then the anion, i.e. sodium chloride and titanium (II) hydride. The Roman numeral on the name of the cation is necessary to specify the charge if the element is one that can have different charges. Na can only have a +1 charge so it needs no Roman numerals. Ti can have charges of 2+ or 3+ or 4+ so Roman numerals are needed.

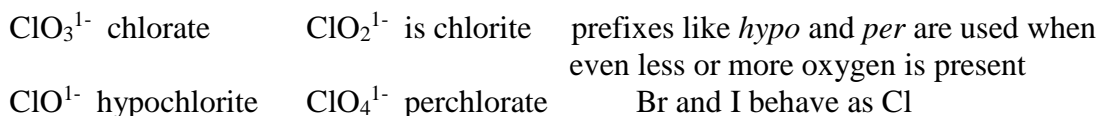
2. **Binary molecular compounds** are composed of two non-metals and no ions are present. i.e. CO CO<sub>2</sub> N<sub>2</sub>O<sub>4</sub> PCl<sub>3</sub> CF<sub>4</sub> IF<sub>7</sub>

Use Greek numerical prefixes to designate the number of atoms in the molecule: i.e carbon monoxide, carbon dioxide, dinitrogen tetroxide, etc.

Note – if the first atom written is singular then the mono prefix is not used – but if the second atom is singular – then the mono prefix **MUST** be used in the name. The second atom written has the -ide suffix, even though it is not a “true” anion.

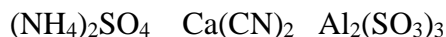
1-mono, 2-di, 3-tri, 4-tetra, 5-penta, 6-hexa, 7-hepta, 8-octa, 9-nona, 10-deca

3. Compounds with **oxyanions** are named, with the cation first, then the anion. The suffix: *ate* means the compound contains oxygen. The suffix *ite* means it contains one less oxygen.



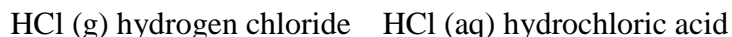
Oxyanions of different elements may have different number of oxygens and charges. Even though many compounds have similar names, like NO<sub>3</sub><sup>-</sup> is nitrate, ClO<sub>3</sub><sup>-</sup> is chlorate, PO<sub>4</sub><sup>3-</sup> is phosphate, and SO<sub>4</sub><sup>2-</sup> sulfate, their charges may differ.

Brackets are needed to enclose molecules if more than one is present in a formula

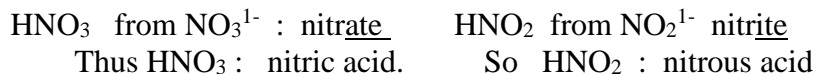


4. **Acids** have hydrogen (though, not all compounds with hydrogen are acids)

a) Binary acids – can be named like binary molecular compounds, but when in aqueous solution, they have the distinctive *hydro* prefix and *ic* suffix.



b) Oxyacids are derived from oxyanions and are only named as acids, since they tend to be unstable on their own without water.



Prefixes are retained thus HClO : hypochlorous acid

$\text{H}_3\text{O}^+$  hydronium ion

### B. Cation - Variable Charge

<u>Symbol</u>	<u>Systematic Name</u>	<u>Common Name</u>	<u>Symbol</u>	<u>Systematic Name</u>	<u>Common Name</u>
$\text{Cu}^+$	copper(I) ion	cuprous ion	$\text{Hg}_2^{2+}$	mercury(I) ion	mercurous ion
$\text{Cu}^{2+}$	copper(II) ion	cupric ion	$\text{Hg}^{2+}$	mercury(II) ion	mercuric ion
$\text{Fe}^{2+}$	iron(II) ion	ferrous ion	$\text{Pb}^{2+}$	lead(II) ion	plumbous ion
$\text{Fe}^{3+}$	iron(III) ion	ferric ion	$\text{Pb}^{4+}$	lead(IV) ion	plumbic ion
$\text{Sn}^{2+}$	tin(II) ion	stannous ion	$\text{Co}^{2+}$	cobalt(II) ion	cobaltous ion
$\text{Sn}^{4+}$	tin(IV) ion	stannic ion	$\text{Co}^{3+}$	cobalt(III) ion	cobaltic ion
$\text{Cr}^{2+}$	chromium(II) ion	chromous ion	$\text{Ni}^{2+}$	nickel(II) ion	nickelous ion
$\text{Cr}^{3+}$	chromium(III) ion	chromic ion	$\text{Ni}^{4+}$	nickel(IV) ion	nickelic ion
$\text{Mn}^{2+}$	manganese(II) ion	manganous ion	$\text{Ti}^{2+}$	titanium(II) ion	titanous ion
$\text{Mn}^{3+}$	manganese(III) ion	manganic ion	$\text{Ti}^{4+}$	titanium(IV) ion	titanic ion

### C. Monatomic Anions

<u>Symbol</u>	<u>Name</u>	<u>Symbol</u>	<u>Name</u>
$\text{H}^-$	hydride ion	$\text{O}^{2-}$	oxide ion
$\text{F}^-$	fluoride ion	$\text{S}^{2-}$	sulfide ion
$\text{Cl}^-$	chloride ion	$\text{N}^{3-}$	nitride ion
$\text{Br}^-$	bromide ion	$\text{P}^{3-}$	phosphide ion
$\text{I}^-$	iodide ion	$\text{C}^{4-}$	carbide ion

### D. Polyatomic Anions

<u>Formula</u>	<u>Name</u>	<u>Formula</u>	<u>Name</u>	<u>Formula</u>	<u>Name</u>
$\text{C}_2\text{H}_3\text{O}_2^-$	acetate ion*	$\text{BrO}_4^-$	perbromate ion	$\text{PO}_4^{3-}$	phosphate ion
$\text{OH}^-$	hydroxide ion	$\text{BrO}_3^-$	bromate ion	$\text{PO}_3^{3-}$	phosphite ion
$\text{MnO}_4^-$	permanganate ion	$\text{BrO}_2^-$	bromite ion	$\text{AsO}_4^{3-}$	arsenate ion
$\text{CN}^-$	cyanide ion	$\text{BrO}^-$	hypobromite ion	$\text{BO}_3^{3-}$	borate ion
$\text{HS}^-$	hydrogen sulfide ion (bisulfide ion)	$\text{IO}_4^-$	periodate ion		
$\text{HCO}_3^-$	hydrogen carbonate ion (bicarbonate ion)	$\text{IO}_3^-$	iodate ion		
$\text{HSO}_4^-$	hydrogen sulfate ion (bisulfate ion)	$\text{IO}_2^-$	iodite ion		
$\text{HSO}_3^-$	hydrogen sulfite ion (bisulfite ion)	$\text{IO}^-$	hypoiodite ion		
$\text{HPO}_4^{2-}$	hydrogen phosphate ion				
$\text{H}_2\text{PO}_4^-$	dihydrogen phosphate ion	$\text{CrO}_4^{2-}$	chromate ion		
$\text{NO}_3^-$	nitrate ion	$\text{Cr}_2\text{O}_7^{2-}$	dichromate ion		
$\text{NO}_2^-$	nitrite ion	$\text{CO}_3^{2-}$	carbonate ion		
$\text{ClO}_4^-$	perchlorate ion	$\text{SO}_4^{2-}$	sulfate ion		
$\text{ClO}_3^-$	chlorate ion	$\text{SO}_3^{2-}$	sulfite ion		
$\text{ClO}_2^-$	chlorite ion	$\text{C}_2\text{O}_4^{2-}$	oxalate ion		
$\text{ClO}^-$	hypochlorite ion	$\text{SiO}_3^{2-}$	silicate ion		
		$\text{O}_2^{2-}$	peroxide ion		