

Common Monoatomic Ions

Cations			Anions		
Charge	Formula	Name	Charge	Formula	Name
+1	H ⁺	hydrogen	-1	H ⁻	hydride
	Li ⁺	lithium		F ⁻	fluoride
	Na ⁺	sodium		Cl ⁻	chloride
	K ⁺	potassium		Br ⁻	bromide
	Cs ⁺	caesium		I ⁻	iodide
	Ag ⁺	silver			
+2	Mg ²⁺	magnesium	-2	O ²⁻	oxide
	Ca ²⁺	calcium		S ²⁻	sulfide
	Sr ²⁺	strontium			
	Ba ²⁺	barium			
	Zn ²⁺	zinc			
	Cd ²⁺	cadmium			
+3	Al ³⁺	aluminium	-3	N ³⁻	nitride

• Ionic Compounds

- often a metal + nonmetal
- anion (nonmetal), add “**ide**” to element name

BaCl ₂	barium chloride
K ₂ O	potassium oxide
Mg(OH) ₂	magnesium hydroxide
KNO ₃	potassium nitrate

oxoanions often end with **ate**

Some Common Polyatomic Ions			
Formula	Name	Formula	Name
Cations			
NH_4^+	ammonium	H_3O^+	hydronium
Common Anions			
CH_3COO^-	acetate	CO_3^{2-}	carbonate
CN^-	cyanide	CrO_4^{2-}	chromate
OH^-	hydroxide	$\text{Cr}_2\text{O}_7^{2-}$	dichromate
ClO_3^-	chlorate	O_2^{2-}	peroxide
NO_2^-	nitrite	SO_3^{2-}	sulfite
NO_3^-	nitrate	SO_4^{2-}	sulfate
MnO_4^-	permanganate	PO_4^{3-}	phosphate

Oxoanions

e.g. nitrogen forms 2 oxoanions

NO_2^-

"ite"

nitrite

NO_3^-

"ate"

nitrate

- Some elements can form more than 2 oxoanions e.g. chlorine

ClO^-	hypochlorite	(" hypo" – least)
ClO_2^-	chlorite	} order as before
ClO_3^-	chlorate	
ClO_4^-	perchlorate	("per" – most)
- Anions with hydrogen (add one positive charge i.e addition of H^+)

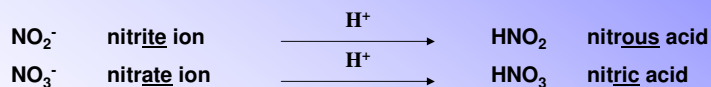
e.g. $\text{S}^{2-} + \text{H}^+$	→	HS^-	hydrogen sulfide
$\text{CO}_3^{2-} + \text{H}^+$	→	HCO_3^-	hydrogen carbonate
OH^-			hydroxide ion

Acids

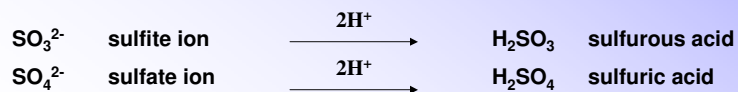
If formula begins with H and the compound is in aqueous solution, it's normally a binary acid. Add "hydro.....ic acid" to root of the element.

e.g. HCl Hydrogen chloride HCl(aq) Hydrochloric acid

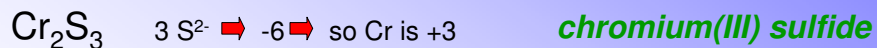
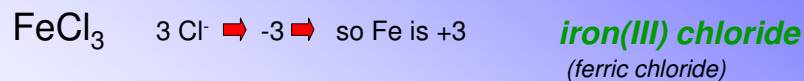
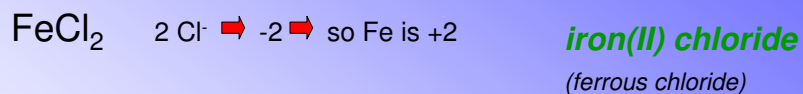
OXOACIDS (parents of oxoanions)



Generally "ous" in the parent acid comes from "ite" in the oxoanion and "ic" in the parent acid comes from "ate" in the oxoanion



- Transition metal ionic compounds
 - indicate charge on metal with Roman numerals



Molecular compounds

Guidelines

- nonmetals or nonmetals + metalloids
- common names \rightarrow H_2O , NH_3 , CH_4
- element further left in periodic table is 1st
- element closest to bottom of group is 1st
- if more than one compound can be formed from the same elements, use prefixes to indicate number of each kind of atom
- last element ends in **ide**

Examples:

HI \rightarrow hydrogen iodide

SO_2 \rightarrow sulfur dioxide

NF_3 \rightarrow nitrogen trifluoride

N_2Cl_4 \rightarrow dinitrogen tetrachloride

Sample Problem

Naming Binary Ionic Compounds

PROBLEM: Name the ionic compound formed from the following pairs of elements:

(a) magnesium and nitrogen (b) iodine and cadmium

(c) strontium and fluorine (d) sulfur and caesium

PLAN: Use the periodic table to decide which element is the metal and which the nonmetal. The metal (cation) is named first and we use the *-ide* suffix on the nonmetal name root.

SOLUTION: (a) magnesium nitride

(b) cadmium iodide

(c) strontium fluoride

(d) caesium sulfide

Sample Problem Determining Formulas of Binary Ionic Compounds

PROBLEM: Write empirical formula for the compounds named in the previous Sample Problem.

PLAN: Compounds are neutral. We find the smallest number of each ion which will produce a neutral formula. Use *subscripts* to the *right* of the element symbol.

SOLUTION:

(a) magnesium nitride (a) Mg^{2+} and N^{3-} ; three Mg^{2+} (6+) and two N^{3-} (6-); Mg_3N_2

(b) cadmium iodide (b) Cd^{2+} and I^- ; one Cd^{2+} and two I^- (2-); CdI_2

(c) strontium fluoride (c) Sr^{2+} and F^- ; one Sr^{2+} and two F^- (2-); SrF_2

(d) caesium sulfide (d) Cs^+ and S^{2-} ; two Cs^+ (2+) and one S^{2-} ; Cs_2S