

Ionic Compounds

Formula unit - of an ionic compound is the smallest amount of the compound that has the composition given by the chemical formula.

Ex. one Na^+ and one Cl^- form **NaCl**

one atom!

Monatomic ions - single atoms that have gained or lost electrons

Ex. Na^+ or F^-

Binary ionic compounds - are composed of monatomic ions.

Ex. $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$

many atoms!

Polyatomic ion - a cation or anion that is composed of a group of atoms with a net positive or negative charge.

Ex. NO_3^-

(back of periodic table)

Multivalent ion - some atoms (transition elements) can form more than one ion, each with its own particular charge.

Ex. Fe^{2+} and Fe^{3+}

Hydrate - compounds that decompose at relatively low temperatures to yield water and another associated compound (usually ionic)

- the water is loosely held to the ionic compound.

Ex. $\text{Cu}^{2+}\text{SO}_4^{2-} \cdot 5\text{H}_2\text{O}$
 $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Anhydrous - the form of a hydrate with the water removed.

Ex. $\text{CuSO}_{4(s)}$

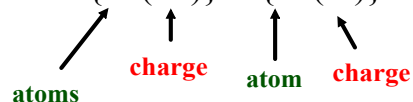
Ionic Formulas

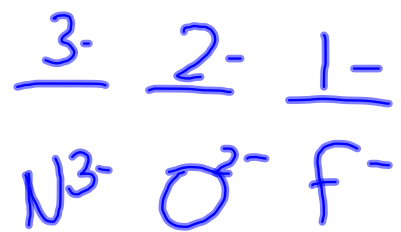
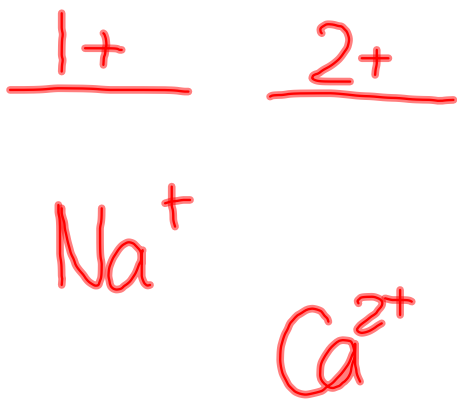
" The net electrical charge in a theoretical chemical formula is zero (see Table 3.3)

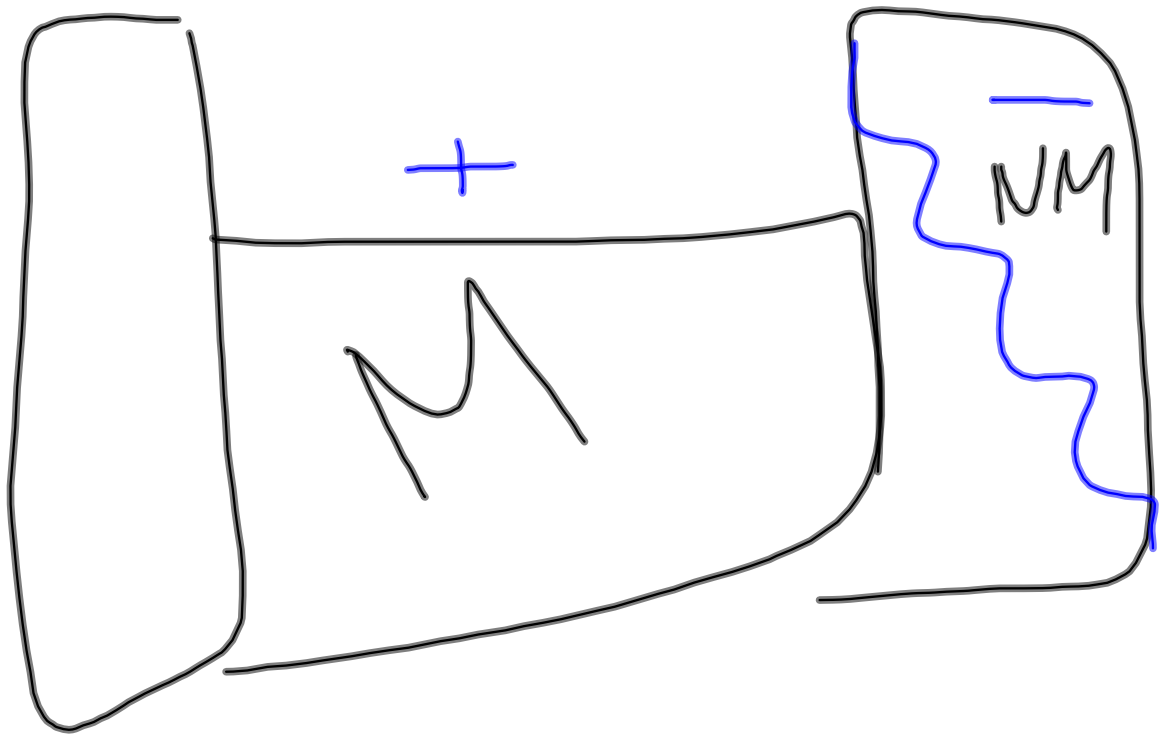
Therefore the sum of the charges on the positive ions (cations) must equal the sum of the electrical charges on the negative ions (anions)

Ex. Na_2O

$$\{2*(+1)\} + \{1*(-2)\} = 0$$





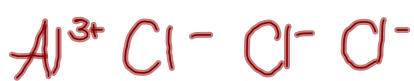


CHEMICAL NAMES AND FORMULA's

Type I Binary Ionic Compounds

Binary Compounds - are compounds containing only two elements. In naming binary compounds, place the name of the cation (metal) followed by the name of the anion (nonmetal) with the suffix -ide added.

Ex. AlCl_3



aluminum chloride

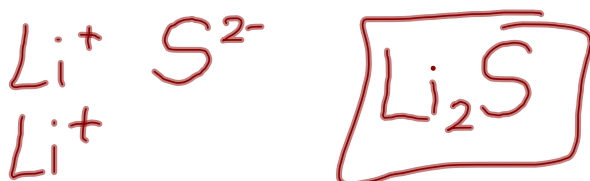
Writing the chemical symbol from the name

RULE:

[a] write the chemical symbol, with its charge, for each of the two ions in the name.

[b] predict the simplest whole number ratio of ions to obtain a net charge of zero.

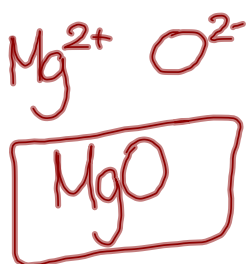
Ex. lithium sulfide



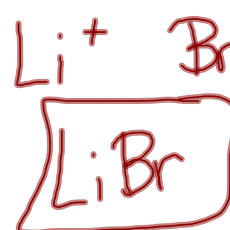
Open to periodic table
on inside cover

Write the chemical formula or name for the following ionic compounds:

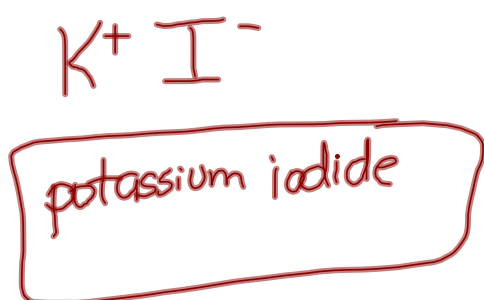
a) magnesium oxide



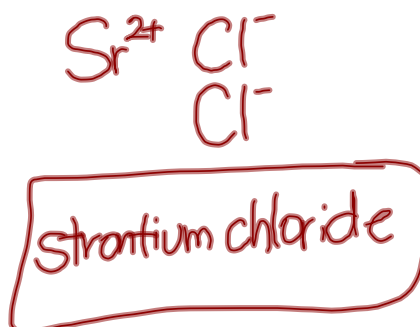
b) lithium bromide



c) KI



d) SrCl_2



Multi-Valent Metals

- can form more than one type of ion (always positive).
- include transition metals and some representative metals.

Ex. Fe^{3+} and Fe^{2+} Pb^{2+} and Pb^{4+}

In the periodic table the most common ion is usually listed in the key.

In naming multi-valent compounds (from a formula):

- [a] name the two ions
- [b] place the charge of the metal ion in roman numerals after the metal ion.
- [c] end the anion with an -ide suffix.

Ex. Name to Formula:

iron (III) oxide



Formula to Name :



Write the chemical formula for the following ionic compounds:

a) iron (II) chloride



b) tin (II) oxide



c) lead (II) oxide



d) iron (III) sulfide



Write the name for the following ionic compounds:

e) CuCl_2 copper(II) chloride

f) PbO_2 lead(IV) oxide

g) CuBr

copper(I) bromide

h) Ni_3P_2

nickel(II) phosphide