CHEMISTRY ♦ FALL 2015 ♦ DR. BRESLYN

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Name:
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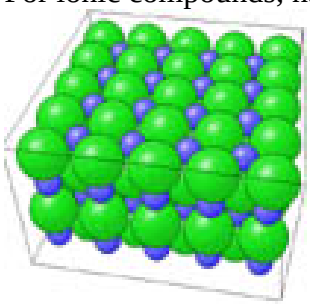
Chemical Names and Formulas help scientists communicate ideas and data. Classification and nomenclature (naming) are important parts of all sciences.

Compounds

Ionic	Molecular
metal + non-metal	non-metal + non-metal
very strong bonds	moderately strong bonds
solid	solid, liquid, or gas
high melting point	low melting point
usually dissolves in water	usually does not dissolve in water

For ionic compounds, name by **formula unit** (lowest whole # ratio of ions).



Sample of NaCl ⓘ NaCl Formula Unit Molecule (NH_3)

Know these:

NaCl = sodium chloride

$CaCl_2$ = calcium chloride

$FeCl_2$ = iron (II) chloride

$FeCl_3$ = iron (III) chloride

$CuSO_4$ =copper (II) sulfate

Polyatomic ions are groups of atoms that act like a single unit and carry a charge.

ⓘ SO_4^{2-} ion CO_3^{2-} ion NH_4^+ ion

Seven elements exist as diatomic molecules

H_2 = hydrogen
F_2 = fluorine
O_2 = oxygen
N_2 = nitrogen
Cl_2 = chlorine
Br_2 = bromine
I_2 = iodine

Binary Ionic Compounds are made of two elements – a metal and non-metal.

Their overall charge (**net ionic charge**) must be zero. We must balance the charges.

Formula → Name: e.g. $CaCl_2$ = calcium chloride

- make sure it is a binary ionic compound (metal and nonmetal).
- check to see if the first element is a transition metal*.
- the name will be the cation (first element) and anion (element with *–ide*)

If a transition metal is present, you must name the cation followed by its charge using Roman numerals.

*For example, $FeCl_3$ = iron (III) chloride, $FeCl_2$ = iron (II) chloride

Common Transition Metals

Co -- Co^{2+}, Co^{3+}
Cu -- Cu^{1+}, Cu^{2+}
Fe -- Fe^{2+}, Fe^{3+}
Mn -- Mn^{2+}, Mn^{3+}
Pb -- Pb^{2+}, Pb^{4+}
Sn -- Sn^{2+}, Sn^{4+}

Zn -- always Zn^{2+}
Ag -- always Ag^{1+}

Name → ***Formula*** : E.g. iron (II) chloride = $FeCl_2$

- make sure it is a binary ionic compound.
- look at periodic table to determine charges.
- net ionic charge must be zero.

ⓘ sodium bromide magnesium iodide iron (II) oxide

Ternary Ionic Compounds have three or more different elements.

- identify the compound as a ternary ionic compound.
- name the cation and the polyatomic ion.
- balance charges.
- don't forget to use Roman numerals with transition elements.

ⓘ $CaCO_3$ calcium nitrate sodium sulfate

Binary Molecular Compounds are made up of two non-metals. We don't need to worry about ionic charges.

- use the prefixes to show numbers of atoms for each element.
- the first element is the element name. The second element ends in *–ide*.

Also, CO is carbon mon**o**xide, not **mono**carbon mon**oo**xide .

ⓘ CO_2 boron trichloride SO_3

Names of Common Acids

hydrochloric acid – HCl
sulfuric acid – H_2SO_4
nitric acid – HNO_3
acetic acid – $HC_2H_3O_2$
phosphoric acid – H_3PO_4
carbonic acid – H_2CO_3

$CaOH_2$ vs. $Ca(OH)_2$

Note: compounds ending in *–ate*, *-ite*, usually indicate ternary ionic compounds. Use the polyatomic ions chart!

Prefixes for Binary Molecular Compounds

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

You must have these names memorized!