

Nomenclature names & formulas

- We use IUPAC rules for writing names & formulas

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International Union of Pure & Applied Chemistry

- Type I Binary Ionic Nomenclature

↓ ↓ ↓
2 elements a metal + a nonmetal
regular, not
Transition Metals

1. Writing Names

- write the name of the metal cation (from P.T.)
- write the name of the nonmetal anion (from P.T.) &
change the ending to -ide

Ex. NaCl
sodium
chloride

K_2S
potassium
sulfide

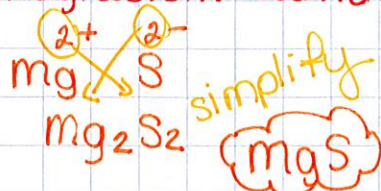
CaBr_2
calcium
bromide

Al_2O_3
aluminum
oxide

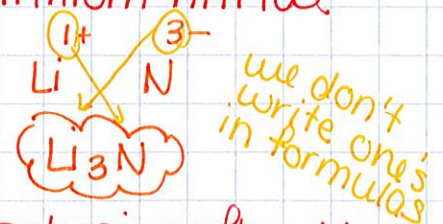
2. Writing Formulas

- write symbol & charge of metal cation (from P.T.)
- do the same for the nonmetal anion (from P.T.)
- criss-cross the charges (drop the +/- sign) &
simplify if possible.

Ex) magnesium sulfide



lithium nitride



gallium selenide



potassium fluoride



• Type I Tertiary Ionic Nomenclature

↓
has a polyatomic ion

1. Writing Names

- write the name of the metal cation (from P.T.)
- write the name of the polyatomic ion

Ex. NaNO_3
sodium
nitrate

$\text{Ca}_3(\text{PO}_4)_2$
calcium
phosphate

MgCO_3
magnesium
carbonate

$(\text{NH}_4)_2\text{CrO}_4$
ammonium
chromate

2. Writing Formulas

- write the symbol and charge of the metal cation (from P.T.)
- write the symbol & charge of the polyatomic anion
- criss-cross charges. Simplify if possible. Place parentheses around the polyatomic ion before writing a number after it.

Ex) magnesium
acetate
 Mg^{2+} $\text{C}_2\text{H}_3\text{O}_2^{-1}$
 $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$

aluminum
hydroxide
 Al^{3+} OH^{-1}
 $\text{Al}(\text{OH})_3$

lithium
sulfite
 Li^{1+} SO_3^{2-}
 Li_2SO_3

barium
oxalate
 Ba^{2+} $\text{C}_2\text{O}_4^{2-}$
 $\text{Ba}_2(\text{C}_2\text{O}_4)_2$
simplify
 BaC_2O_4

• Type II Binary Ionic Nomenclature

↓
transition metals

→ For example: Co^{1+} Co^{2+} Co^{3+} Co^{4+}

Transition metals can have more than one charge!

In order to know which charge you are dealing with, you must be told by using Roman Numerals

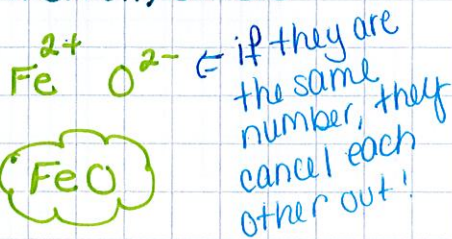
Roman Numerals

1	<u>I</u>	6	<u>VI</u>
2	<u>II</u>	7	<u>VII</u>
3	<u>III</u>	8	<u>VIII</u>
4	<u>IV</u>	9	<u>IX</u>
5	<u>V</u>	10	<u>X</u>

b. Writing Formulas

- write the symbol & charge for the metal cation
- write the symbol & charge for the nonmetal anion
- criss-cross charges. Simplify if necessary

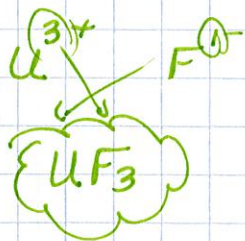
Ex) iron(II) oxide



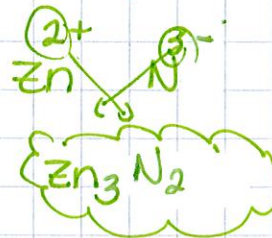
iron(III) oxide



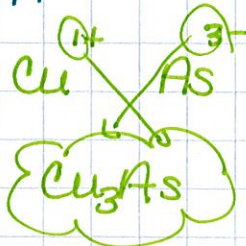
uranium(III) fluoride



zinc(II) nitride



copper(I) arsenide

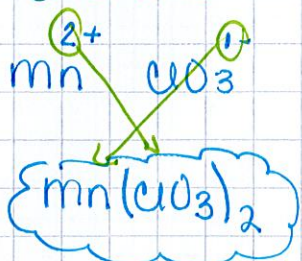


Type II Tertiary Ionic Nomenclature

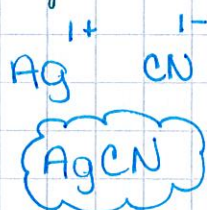
1. Writing formulas

- write the symbol & charge of the metal cation
- write the symbol & charge of the polyatomic anion.
- criss-cross charges. Write parentheses around the polyatomic ion if you write a number after it.
- simplify if necessary

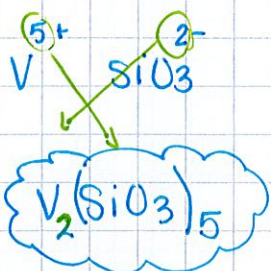
Ex) manganese (III)
chlorate



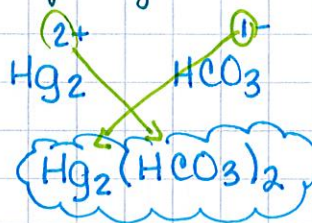
silver (I)
cyanide



vanadium (V)
silicate



mercury (I)
hydrogen carbonate



2. Writing names

- write the name of the metal cation
- write the original charge of metal as a Roman Numeral
- write the name of the polyatomic ion

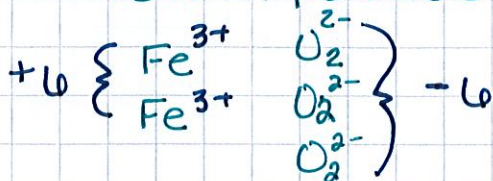
Ex) CoCO_3
cobalt (II) carbonate



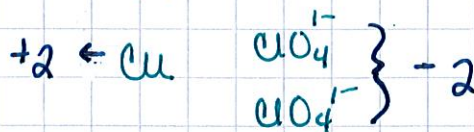
$\text{Zn}(\text{NO}_3)_2$
zinc (II) nitrate



$\text{Fe}_2(\text{O}_2)_3$
iron (III) peroxide

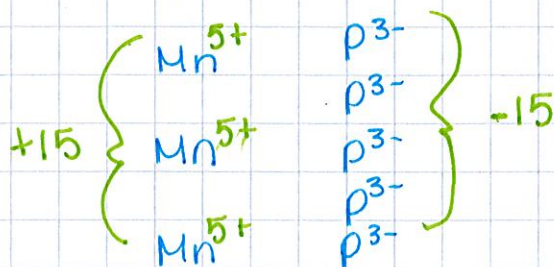
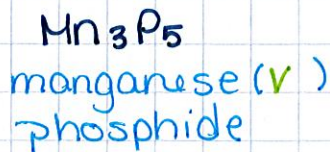
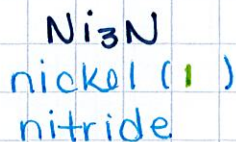
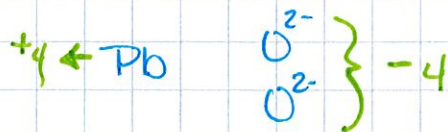
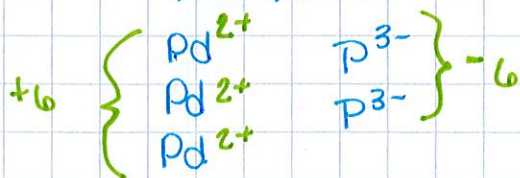
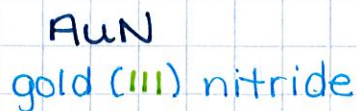
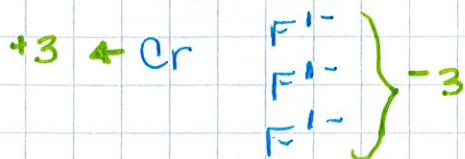


$\text{Cu}(\text{ClO}_4)_2$
copper (II) perchlorate



2. Writing Names

- write the name of the metal cation.
- write the original charge of metal as a Roman numeral.
- write the name of the nonmetal anion, change the ending to ide.



• Acidic Nomenclatures

Acids are ionic compounds whose cation is always H^{1+}

• Binary Acids

↓
anion does NOT have oxygen in it!

1. Writing Names

- write the prefix: hydro-, then the name of the nonmetal, change the ending to -ic acid
- hydro + nonmetal + ic acid

Ex) HCl
hydrochloric
acid

H_2S
hydrosulfuric
acid

H_3P
hydrophosphoric
acid

HCN
hydrocyanic
acid

2. Writing Formulas

- write H^{1+}
- write symbol and charge on nonmetal anion
- criss-cross charges

Ex) hydroiodic acid



hydroselenic acid



hydrofluoric acid



hydronitric acid



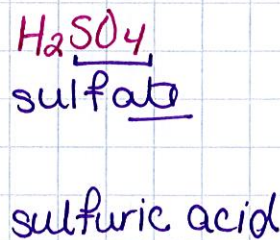
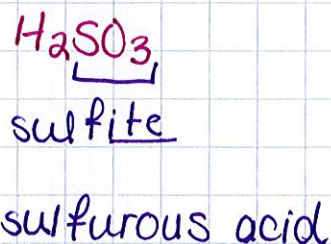
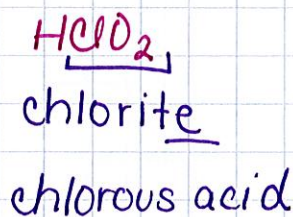
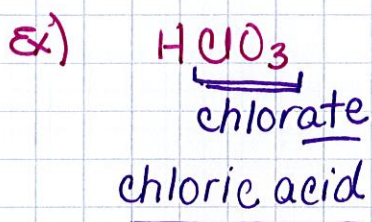
• Oxyacids

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anion is a polyatomic ion containing oxygen!

1. Writing Names

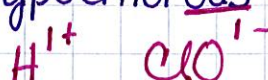
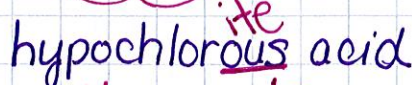
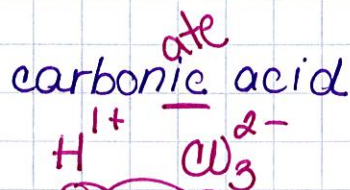
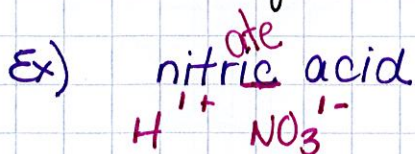
- Look at the polyatomic ion
- If the polyatomic ion's name ends in:
 - ite or - ate
 - change -ite to -ous acid
 - change -ate to -ic acid

No hydro- in the name!



2. Writing Formulas

- write H^{1+}
- look at ending of name
 - ie acid or -ous acid
 - means ate means ite
- write the appropriate anion & criss-cross charges.



Type III Covalent Nomenclature

no criss-crossing
use prefixes 2 nonmetals

Prefixes

- * 1 - mono-
- 2 - di-
- 3 - tri-
- 4 - tetra-
- 5 - penta-

- 6 - hexa-
- 7 - hepta-
- 8 - octa-
- 9 - nona-
- 10 - deca-

* only use mono-
for the 2nd element
never the 1st!

1. Writing Names

- write the prefix (represents the number of atoms) for the 1st nonmetal, then write its name.
- Do the exact same thing for the 2nd element, change the ending to -ide

Ex) H_2O
dihydrogen
monoxide

N_2O_5
dinitrogen
pentoxide

SO_3
sulfur
trioxide

SF_6
sulfur
hexafluoride

2. Writing Formulas

- write the symbol of the element, make the prefix a subscript
- do the same w/ the 2nd element **NO criss-crossing**

Ex) iodine
heptafluoride



carbon
monoxide



tetraphosphorous
decoxide



dinitrogen
monoxide

