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## Ionic Compounds Class Notes

### Part A: Ionic Basics

General naming of ionic compounds

Ex. We are trying to name  $\text{CaF}_2$

- 1) Notice there are only 2 elements, so use the periodic table.
- 2) Find the metal on the periodic table.
- 3) It has one charge (no Roman Numerals) Write the metal's name down.

#### Calcium

- 4) Find the non-metal on the periodic table.
- 5) Change the ending to "ide" using list provided or memory. Write it down.

Calcium **Fluoride**

General formula writing of ionic compounds.

Ex. We are trying to write the formula of Magnesium Chloride

- 1) Find the metal on the periodic table and its charge.

$\text{Mg}^{2+}$

- 2) Notice the ending of the non-metal is "ide". This must be on the periodic table.
- 3) Find the non-metal and its charge.

$\text{Cl}^{1-}$

- 4) Multiply atoms by a number that will cause the charges to become equal, but opposite.

2 chlorines will give a charge of  $-2$ , equal but opposite to Magnesium's  $+2$ .

- 5) Write the symbols with the number of each element needed. The number of elements needed goes on the bottom right of the element symbol.

$\text{MgCl}_2$

In-class activity:

a) Name $\text{MgBr}_2$	b) Create a formula for Sodium Sulphide	c) Create a formula for Calcium Nitride
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### Part B Multivalent Elements.

Question: What if the metal element has multiple charges?

#### Roman Numerals!

Ex. Make a formula for Iron (II) Chloride

- 1) The question tells us Iron has a charge of +2 ( $\text{Fe}^{2+}$ )
- 2) Chlorine has a charge of  $-1$ . We need 2 chlorines to make the charge  $-2$ .

Formula:  $\text{FeCl}_2$

Ex. Name the compound:  $\text{Cu}_3\text{P}$

- 1) Copper has multiple charges. We do not know which was used at first.
- 2) Phosphorus has a charge of  $-3$ . The formula says there is 1 phosphorus, so the final negative charge is  $-3$ .
- 3) The formula says we need 3 copper atoms of unknown charge to balance the  $-3$  charge.

?  $\times 3 = +3$

- 4) The "?" Must be +1. So we are working with copper (I)
- 5) Change phosphorous to Phosphide

The name will be:  
Copper (I) Phosphide

**Important!** The Roman Numeral is only for the charge of the element used, **not the number of atoms used.**

In-class activity:

a) Create the formula for: Chromium (III) Bromide	b) Create a name for $\text{NiCl}_2$	c) Create a name for $\text{Mn}_2\text{S}_3$
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### Part C: Polyatomic Ions

Sometimes there are ionic compounds with lots of elements or the name of the non-metal ends in something other than "ide". What do we do?

Ex. Name  $\text{Mg}(\text{ClO}_3)_2$

- 1) We can recognize the metal. Mg is Magnesium. It only has 1 listed charge (2+), so no roman numerals.
- 2)  $\text{ClO}_3$  is a mixture of many elements. Find it on the polyatomic ions table.

$\text{ClO}_3$  is chlorate.

- 3) Name the chemical!  
Magnesium Chlorate

Ex. Beryllium Nitrate

- 1) We can recognize the metal. Beryllium is Be on the periodic table, with a charge of +2.
- 2) Nitrate use the ending "ate" instead of "ide". It is likely a polyatomic ion. Find it on the polyatomic ions list!

Nitrate is  $\text{NO}_3$  with a 1- charge.

- 3) We need 2 Nitrates to balance the charges, because Beryllium is +2 compared to Nitrate's -1.
- 4) Write the metal and polyatomic ion symbols

$\text{BeNO}_3$

- 5) Balance the formula by placing brackets around the nitrate and noting we need 2 of it.

$\text{Be}(\text{NO}_3)_2$

**Important!** Exceptions to the "ide" rule are that the polyatomic ions of hydroxide, peroxide, and cyanide all end with "ide".

In class activities

a) Name $\text{Ca}(\text{CN})_2$	b) Create a formula for Magnesium hypochlorite	c) Create a formula for Iron (II) Phosphate
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All the rules together!

Part	Name	Formula
A		NaCl
A	Magnesium Fluoride	
A		K <sub>3</sub> P
A	Aluminum Sulphide	
B	Iron (III) Chloride	
B		CoS
B		Ti <sub>2</sub> O <sub>3</sub>
C		Sr(NO <sub>3</sub> ) <sub>2</sub>
C	Calcium Permanganate	
C	Calcium Phosphate	
All		Cr(CN) <sub>2</sub>
All	Manganese (IV) Phosphate	