

Name: _____
 Blk: _____ Date: _____

Chemistry 11
 Naming Compounds Package

An Ionic compound is one that contains one metal and one (or more) non-metals.

Steps for **NAMING MONATOMIC IONIC** compounds:

Steps	Example: CaF ₂
1. Name the metal ion	Ca²⁺ → Calcium
2. Name the non-metal ion and change the ending to " ide "	F¹⁻ → Fluorine → Fluoride
3. Put it all together	Calcium fluoride

Example 1: Na₂S

- 1.
- 2.
- 3.

Example 2: LiBr

- 1.
- 2.
- 3.

Steps for Naming **MULTIVALENT metal IONIC** compounds:

Steps	Example 1. Cu ₃ P
1. Identify the metal and list the possible ion charges	Cu¹⁺ or Cu²⁺
2. Identify the ratio of the ions in the formula	3 Cu for every 1 P
3. Identify the charge on the non-metal ion	P³⁻
4. The positive and negative charges must balance! Determine what the charge on the metal ion must be to balance the non-metal	Cu¹⁺ : +1 +1 +1 = +3 ← Cu²⁺ : +2 +2 +2 = +6 P³⁻ : -3 = -3 ←
5. Write out the compound name with the appropriate metal ion charge written as a roman numeral	Copper (I) phosphide

Example 1. MnO

- 1.
- 2.
- 3.
- 4.
- 5.

Example 2. SnO₂

- 1.
- 2.
- 3.
- 4.
- 5.

Steps for writing FORMULAS of **Ionic compounds using the Criss-Cross Method:**

Steps	Example 1: Calcium chloride
1. Identify each ion (be sure to write down the charge) Always write down the metal first and the non-metal second	Ca²⁺ Cl¹⁻
2. Drop the (+) and (-) signs from the ion charge, then CRISS-CROSS them writing them as subscripts	Ca² Cl¹ Ca₁Cl₂
3. Drop any 1's from the formula	CaCl₂
4. Reduce subscripts (if possible): divide BOTH subscripts by the greatest common factor	N/A
5. Write the final formula	CaCl₂

Example 1: Lithium Fluoride

- 1.
- 2.
- 3.
- 4.

Example 2: Iron (III) nitride

- 1.
- 2.
- 3.
- 4.

If you recall from Junior Science, some ions have more than one element in their formula and are therefore called "**POLYATOMIC**" (meaning many atoms) IONS. Here is a list of a few that you might consider coming to memory:

Carbonate=CO ₃ ²⁻	Chromate=CrO ₄ ²⁻	Acetate=CH ₃ COO ¹⁻	Phosphate=PO ₄ ³⁻
hydroxide OH ¹⁻	Nitrate= NO ₃ ¹⁻	Permanganate=MnO ₄ ¹⁻	Ammonium=NH ₄ ¹⁺
Sulphate= SO ₄ ²⁻	Dichromate=Cr ₂ O ₇ ²⁻	Phosphite= PO ₃ ³⁻	Sulphite= SO ₃ ²⁻

Steps for writing formulas of **ionic compounds with POLYATOMIC ions:**

Steps	Example 1: Iron (III) hydroxide
1. Identify each ion and its appropriate charge	Iron (III) = Fe³⁺ Hydroxide = OH¹⁻
2. Drop the (+) and (-) signs from the ion charge and add brackets around the polyatomic ion, then CRISS-CROSS the charges and place writing them as subscripts	Fe³ (OH)¹ Fe₁ (OH)₃
3. Drop any 1's from the formula	Fe(OH)₃
4. If the polyatomic has a 1 as a subscript then eliminate the brackets	N/A

Example 2: Ammonium carbonate

- 1.
- 2.
- 3.
- 4.

Example 3: Iron (III) nitrate

- 1.
- 2.
- 3.
- 4.

Steps for Naming **IONIC compounds with POLYATOMIC ions:**

Steps	Example 1. Cu ₃ (PO ₄) ₂
1. Identify the metal and list the possible ion charges	Cu¹⁺ or Cu²⁺
2. Identify the ratio of the ions in the formula	3 Cu for every 2 PO₄
3. Identify the charge on the non-metal ion	PO₄ = 3-
4. The positive and negative charges must balance! Determine what the charge on the metal ion must be to balance the non-metal	Cu¹⁺ : +1 +1 +1 = +3 Cu²⁺ : +2 +2 +2 = +6 ← PO₄³⁻ : -3-3 = -6 ←
5. Write out the compound name with the appropriate metal ion charge written as a roman numeral	Copper (II) phosphate

Example 2. Mn₂(CO₃)₃

- 1.
- 2.
- 3.
- 4.
- 5.

Example 3. NH₄OH

- 1.
- 2.
- 3.
- 4.
- 5.

Naming Hydrates:

Ionic compounds that include water molecules in their crystal structure are called hydrates (hydra=water). To name hydrates we use a prefix to tell how many water molecules are present.

Ex. 1 CuSO₄·5H₂O → Copper (II) sulphate **pentahydrate**

Ex. 2 Zn₃(PO₃)₂· 2H₂O → Zinc phosphate **dihydrate**

Prefix used	# of H ₂ O present	Prefix used	# of H ₂ O present
mono	1	hexa	6
di	2	hepta	7
tri	3	octa	8
tetra	4	nona	9
penta	5	deca	10

You must **memorize** the above prefixes!

Name the following:

1. NaNO₃·8H₂O _____
2. H₂SO₄·3H₂O _____
3. Ca(OH)₂·6H₂O _____
4. Mn(HSO₄)₂·7H₂O _____
5. Li₂SO₃·9H₂O _____
6. Co(CN)₃·4H₂O _____

Write the **formula** for the following:

1. Nickel (II) chloride hexahydrate _____
2. Sodium phosphate pentahydrate _____
3. Barium nitrate heptahydrate _____
4. Potassium chloride monohydrate _____
5. Aluminum hydroxide trihydrate _____
6. Silver sulphite decahydrate _____

Naming Molecular Compounds

A molecular compound is one that contains two (or more) non-metals.
(no metals are present)

1. Each compound name is made of two words, each with a suitable prefix:

Prefix used	# of atoms	Prefix used	# of atoms
mono	1	hexa	6
di	2	hepta	7
tri	3	octa	8
tetra	4	nona	9
penta	5	deca	10

2. The first name is simply the name of the first element, with a prefix to indicate how many of these atoms exist in each molecule:

Ex. $P_2S_3 \rightarrow$ the first name is diphosphorous

3. The second name is the name of the second element, with an "ide" ending on the elements name and a prefix to indicate how many of these atoms exist in each molecule.

Ex. $P_2S_3 \rightarrow$ the second name is trisulphide

The complete name is diphosphorous trisulphide

4. EXCEPTION: if there is only ONE of the **first** atom, do NOT use the prefix **MONO**.

Ex. CO \rightarrow carbon monoxide, NOT monocarbon monoxide!

Name the following:

1. CO_3 _____
2. NO_2 _____
3. ClF_3 _____
4. S_4N_2 _____
5. P_2O_6 _____
6. S_3O_3 _____

Write the **formula** for the following:

1. Sulphur trioxide _____
2. Phosphorous pentachloride _____
3. Dinitrogen pentasulphide _____
4. Trisilicon tetranitride _____
5. Bromine hexafluoride _____
6. Carbon dioxide _____

Name: _____

Pd: _____ Date: _____

Chemistry 11 Quiz Review of Chemistry from Science 10

A. IONIC COMPOUNDS

Name the following:

- a. $MnCO_3$ _____
- b. NaCl _____
- c. $Ba_3(PO_3)_2$ _____
- d. $Co(MnO_4)_3$ _____

Write the formula for the following:

- a. Iron (II) phosphate _____
- b. Barium hydroxide _____
- c. Manganese (III) cyanide _____
- d. Zinc phosphide _____

B. MOLECULAR COMPOUNDS

Name the following:

- a. NO _____
- b. C_2S_7 _____
- c. P_5Br_2 _____
- d. CCl_4 _____

Write the formula for the following:

- a. Carbon dioxide _____
- b. Dinitrogen hexasulphide _____
- c. Trioxygen monofluoride _____
- d. Tetraphosphorus octachloride _____

C. HYDRATES

Name the following:

- a. $\text{NaHCO}_3 \cdot 6\text{H}_2\text{O}$ _____
- b. $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ _____
- c. $\text{Fe}_2(\text{Cr}_2\text{O}_7)_3 \cdot 5\text{H}_2\text{O}$ _____
- d. $\text{KMnO}_4 \cdot 9\text{H}_2\text{O}$ _____

Write the formula for the following:

- e. Iron (III) nitrate dihydrate _____
- f. Tin(IV)hydroxide monohydrate _____
- g. Calcium bromide tetrahydrate _____
- h. Lithium sulphide trihydrate _____

D. ACIDS

Name the following :

- a. HCl _____
- b. H_2SO_4 _____
- c. H_2SO_3 _____
- d. H_2S _____

Write the formula for the following :

- a. Hydrobromic acid _____
- b. Phosphorous acid _____
- c. Permanganic acid _____
- d. Hydrofluoric acid _____

BALANCE THIS:

