

**MINISTRY OF EDUCATION**  
**SECONDARY ENGAGEMENT PROGRAMME**  
**GRADE 10**  
**CHEMISTRY**

**WEEK 9**

**LESSON 1**

**Topic:** Structure and Bonding

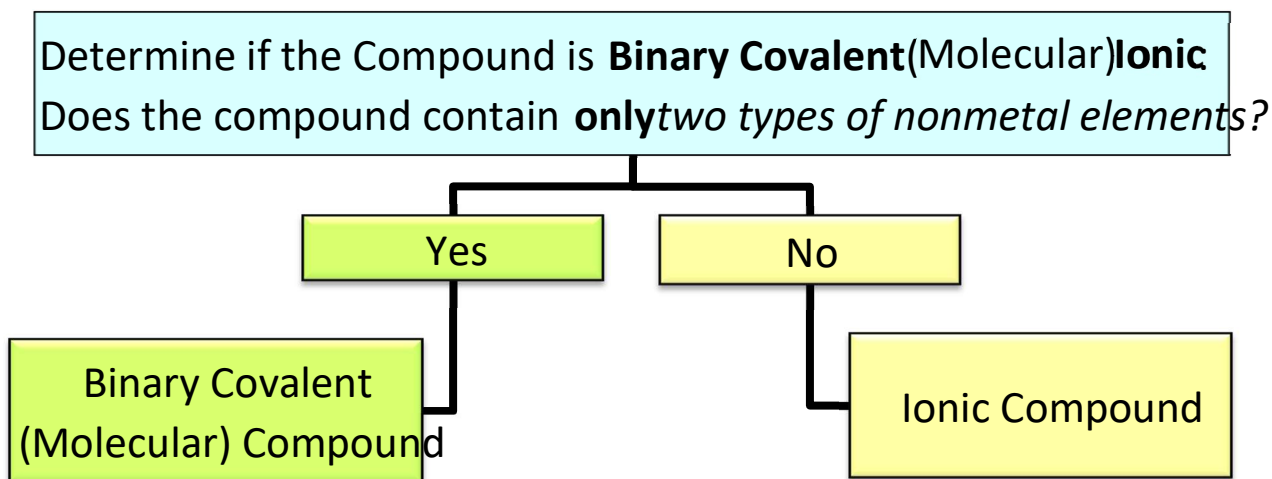
**Sub-topic:** Writing Formula of Compounds

**Objective:** After reading and looking at related diagrams students will write the formulae to represent ions, molecules and formula units.

**Content:**

**Naming Compounds**

There are different methods used to name binary covalent (molecular) compounds and ionic compounds. The first step in naming or writing the formula of a compound is to determine which of the 2 compound classes it belongs. This can be done as follows:



Binary covalent compounds will contain **only two types of non-metal elements**. There may be more than one type of each element. For example, CO<sub>2</sub> contains just two types of elements, carbon and oxygen.

Once it is determined that the compound is **ionic** or **covalent**, you can be asked to do either of the following:

1) Given the **name** of the compound, write the **formula**.

**Or**

2) Given the **formula** of the compound, write the **name**.

### **Binary Covalent (Molecular) Compound**

1. Write the symbol of the first element in the compound's name, then the symbol of the second element in the compound's name.
2. Indicate how many atoms of each element the molecule contains using subscripts after the atomic symbol.
  - The numbers of atoms are given in the molecule's name in Greek prefixes
  - If there is no Greek prefix in front of the first element in the name that implies the number is 1

**Example:** Write the formula of dinitrogen tetrafluoride.

- 1) Write the symbol/formula of the first element in the compound's name, then the symbol/formula of the second element in the compound's name.

**N F**

- 2) Indicate how many atoms of each element the molecule contains using subscripts after the atomic symbol.

**N  F**

- The numbers of atoms are given in the molecule's name in Greek prefixes.
- **dinitrogen tetrafluoride**

**N<sub>2</sub>F<sub>4</sub>**


- **NOTE:** If there is no Greek prefix in front of the first element in the name, then the number is 1.
- Example carbon tetrachloride = CCl<sub>4</sub>

## Ionic Compounds

If you know the name of a binary ionic compound, you can write its chemical formula. Start by writing the metal ion with its charge, followed by the nonmetal ion with its charge. Because the overall compound must be electrically neutral, decide how many of each ion is needed for the positive and negative charge to cancel each other out.

STEPS	E.g. Aluminum Nitride
1. Write the symbol and charge of the cation (metal) first and the anion (nonmetal) second.	$\text{Al}^{3+} \text{N}^{3-}$
2. Use a multiplier to make the total charge of the cations and anions equal to each other.	total charge of cations = total charge of anions $1(3+) = 1(3-)$ $+3 = -3$
3. Use the multipliers as the subscript for each ion.	$\text{Al}_1\text{N}_1$
4. Write the final formula. Leave out all charges and all subscripts that are 1.	$\text{AlN}$

An alternative way to writing a correct formula for an ionic compound is to use the crisscross method. In this method, the numerical value of each of the ion charges is crossed over to become the subscript of the other ion. Signs of the charges are dropped.

Crisscross Method	Write the formula for lead (IV) oxide
1. Write the symbol and charge of the cation (metal) first and the anion (nonmetal) second.	$\text{Pb}^{4+}\text{O}^{2-}$
2. Transpose only the number of the positive charge to become the subscript of the anion and the number only of the negative charge to become the subscript of the cation.	
3. Reduce to the lowest ratio.	$\text{Pb}_2\text{O}_4$
4. Write the final formula. Leave out all subscripts that are 1.	$\text{PbO}_2$

### References:

[https://chem.libretexts.org/Bookshelves/Introductory\\_Chemistry/Map%3A\\_Introductory\\_Chemistry\\_\(Tro\)/05%3A\\_Molecules\\_and\\_Compounds/5.05%3A\\_Writing\\_Formulas\\_for\\_Ionic\\_Compounds](https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Map%3A_Introductory_Chemistry_(Tro)/05%3A_Molecules_and_Compounds/5.05%3A_Writing_Formulas_for_Ionic_Compounds)

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