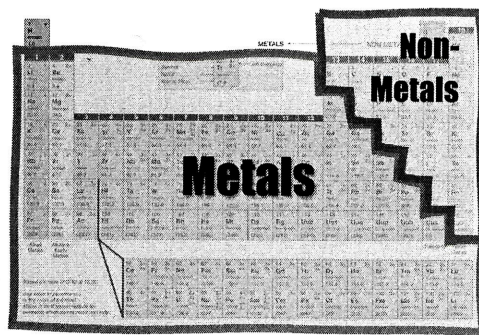
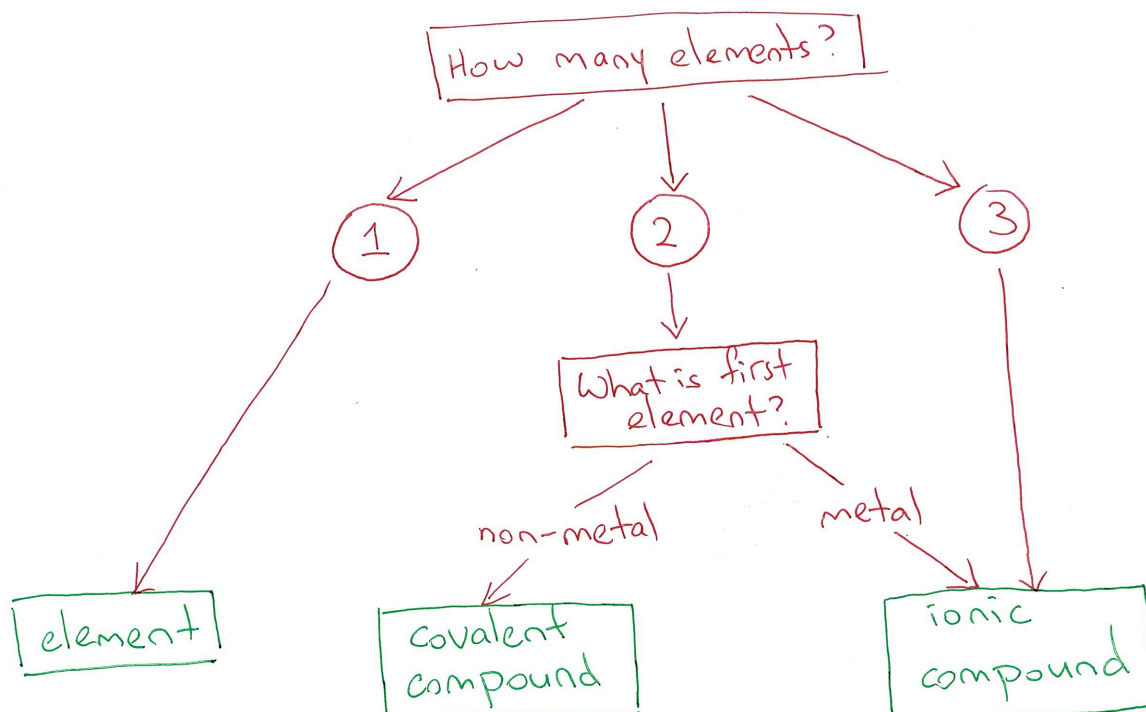


Ionic vs Covalent Compounds

- Ionic compounds form when **electrons are transferred** and ions are formed. Usually involves a **metal** and a **non-metal**.
- Covalent compounds form when two (or more) **non-metal** atoms **share** electrons.



Draw a diagram to help you identify elements, ionic compounds, and covalent compounds.



Practice: Identify the following as elements, ionic compounds, or covalent compounds.

Chemical	What is it?	Chemical	What is it?
PF ₃	covalent compound	NO ₂	covalent compound
CaCl ₂	ionic compound	Br ₂	element
Cl ₂	element	NaOH	ionic compound
TiO	ionic compound	CCl ₄	covalent compound
Mg	element	MgBr ₂	ionic compound

Naming Elements

An element is a pure substance containing only one type of atom.

Examples: Mg (magnesium), Ca (calcium), H₂ (hydrogen), Cl₂ (chlorine).

Names of elements are found on the periodic table. Ignore subscripts when naming.

Different Types of Ions

	What is it?	Naming	Examples	
			Ion Name	Ion Symbol
Monovalent Ion	Can only make one ion (see periodic table)	Cations: write name of element	sodium	Na ⁺
		Anions: write name of element with "-ide" ending	yttrium	Y ³⁺
Multivalent Metal Ion	Can make multiple ions (see periodic table)	Must specify charge with Roman numerals	bromide	Br ⁻
			oxide	O ²⁻
			manganese(III)	Mn ³⁺
			manganese(IV)	Mn ⁴⁺
Polyatomic Ion	Group of non-metal atoms covalently bonded with an ionic charge	Spelling counts!!!! (Copy from table)	copper(I)	Cu ⁺
			vanadium(V)	V ⁵⁺
			ammonium	NH ₄ ⁺
			phosphate	PO ₄ ³⁻
			phosphite	PO ₃ ³⁻

Practice: Complete the table with the names and chemical formulas (including charges) of the following ions. Identify as monovalent, multivalent, or polyatomic.

Ion Formula	Ion Name	Type
Mn ⁴⁺	manganese (IV)	multivalent metal
K ⁺	potassium	monovalent metal
CO ₃ ²⁻	carbonate	polyatomic
HSO ₄ ⁻	bisulfate or hydrogen sulfate	polyatomic
Se ²⁻	selenide	monovalent non-metal
NO ₃ ⁻	nitrate	polyatomic
Br ⁻	bromide	monovalent non-metal
OH ⁻	hydroxide	polyatomic
Ti ³⁺	titanium(III)	multivalent metal
NH ₄ ⁺	ammonium	polyatomic
Mg ²⁺	magnesium	monovalent metal
ClO ⁻	hypochlorite	polyatomic
S ²⁻	sulfide	monovalent non-metal
I ⁻	iodide	monovalent non-metal
ClO ₄ ⁻	perchlorate	polyatomic
Ni ²⁺	nickel(II)	multivalent metal
Cr ³⁺	chromium(III)	multivalent metal
H ⁻	hydride	monovalent non-metal
MnO ₄ ⁻	permanganate	polyatomic
CN ⁻	cyanide	polyatomic
Au ⁺	gold(I)	monovalent metal
CO ₃ ²⁻	carbonate	polyatomic

Naming Ionic Compounds

- Write the cation, first.
 - For monovalent ions, do not write the ion charge.
 - For multivalent metals, determine the ion charge through charge balancing. Then, put the ion charge in Roman numerals, in brackets.
 - If the cation is polyatomic, write it exactly the way it is written in the table.
- Write the anion with "-ide" ending (unless it is polyatomic.)

Charge Balancing (to find the charge of a

- multivalent metal ion)
- Write out all the ions you have. Leave the charge blank on the multivalent metal.
 - Rule: The total number of positive charges in an ionic compound must equal the total number of negative charges. Determine the charge on the metal ion.
 - Write the compound name. Specify the ion charge on the multivalent metal using brackets and Roman numerals.

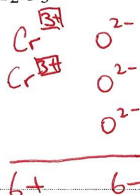
NaCl

sodium chloride

Mg(OH)₂

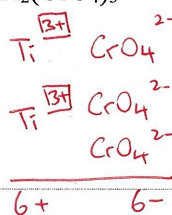
magnesium hydroxide

Cr₂O₃



chromium(III) oxide

Ti₂(CrO₄)₃



titanium(III) chromate

Writing

Formulas of Ionic Compounds

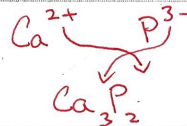
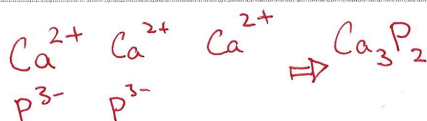
Version 1

- Write down each ion with its charge.
- Add more of the ions to balance the charges: the total number of positive and negative charges must be equal.
- Write your formula with subscripts.

Version 2

- Write down each ion with its charge.
- Write the chemical formula by writing the cation first and the anion second. Then, "criss-cross" the charges to become the subscripts.
- Reduce the subscripts if both divisible by the same number.

calcium phosphide



chromium(II) hydroxide



Naming Covalent Compounds

- Write the first element.
- Write the second element with "-ide" ending.
- Add **prefixes** to show how many of each element there is.
 - Do not add "mono-" to first element.
 - If adding "mono-" to "-oxide", write "monoxide" instead.

Covalent Compounds with Special Names (memorize):

NH₃ = ammonia
H₂O = water
CH₄ = methane

O₂F₂

dioxygen difluoride

PF₃

phosphorus trifluoride

N₂O

dinitrogen monoxide

Chemical Formulas of Binary Covalent Compounds

- Identify the elements involved. Write their symbols.
- Use the prefixes to determine the number of each element in the compound. Write as subscripts.

tetraphosphorus pentaoxide

P₄O₅

nitrogen triiodide

NI₃

xenon hexafluoride

XeF₆

