

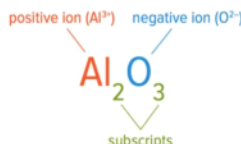
# 2.5 C2 Ionic Compound

November 27, 2023 10:11 AM

**Science 9 – Chemistry Topic 2.5 – Concept 2: You can determine the formula of an ionic compound from its name.**  
(Read p.158-161)

## Chemical Formula of Binary Ionic Compounds

- The chemical formula of a binary ionic compound is written with element symbols to identify each ion.
- Binary chemical compounds consist of 2 ions. The first is a positively charged metal ion while the second is a negatively charged non metal ion.
- In some cases, a small number called a subscript is written on the right of one or both symbols.
- If there is no subscript, assume the number to be 1.
  - E.g.  $\text{Ag}_2\text{O}$  means  $\text{Ag}_2\text{O}_1$ .



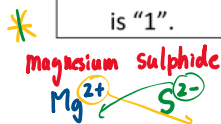
## Writing Formulas of Ionic Compounds

- Although ionic compounds are made up of ions, the compound as a whole is electrically neutral.
  - This means that **BOTH** charges (positive and negative) are balanced.
  - E.g.  $\text{Al}_2\text{O}_3$ ,  $\text{KI}$ ,  $\text{MgCl}_2$
- When writing the formula of a binary ionic compound, you need to first determine the charge on the ion. (This can be found on a periodic table!)
- Common charges:
  - Group 1 metals always have a charge of +1.
  - Group 2 metals always have a charge of +2.
  - Group 13 metals usually have a charge of +3.
  - Group 16 nonmetals usually have a charge of -2.
  - Group 17 nonmetals usually have a charge of -1.
- Some metals can form more than one ion.  $\rightarrow$  multivalent
  - E.g. Mn:  $\text{Mn}^{2+}$   $\text{Mn}^{3+}$   $\text{Mn}^{4+}$ , Fe:  $\text{Fe}^{2+}$   $\text{Fe}^{3+}$

## Examples

Steps	Calcium chloride	
1. Identify each <u>ion</u> and its <u>charge</u> .	$\text{Ca}^{2+}$	$\text{Cl}^-$
2. Determine the numbers of <u>ions</u> needed to <u>balance</u> positive charges with negative charges.	$\text{Ca}^{2+}$	$\text{Cl}^-$
3. Use <u>Subscripts</u> to write the formula. Remember to write the <u>Metal</u> ion first. *Do not include a subscript if the subscript is "1".	$\text{CaCl}_2$	$\boxed{\text{CaCl}_2}$ //

Steps	Aluminum sulfide	
1. Identify each ion and its charges		$\text{Al}^{3+}$
2. Determine the numbers of ions needed to balance positive charges with negative charges.	$\text{Al}^{3+}$	$\text{S}^{2-}$
3. Use subscripts to write the formula. Remember to write the metal ion first. *Do not include a subscript if the subscript is "1".	$\text{Al}_2\text{S}_3$	$\boxed{\text{Al}_2\text{S}_3}$



Reduce!



WB P.94 - 95 :HW

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Name of Compound	Ions	Formula
sodium bromide	$\text{Na}^+$ $\text{Br}^-$	$\text{NaBr}$
aluminum chloride	$\text{Al}^{3+}$ $\text{Cl}^-$	$\text{AlCl}_3$
magnesium oxide	$\text{Mg}^{2+}$ $\text{O}^{2-}$	$\text{Mg}_2\text{O}_2 \rightarrow \text{MgO}$
barium iodide		$\text{BaI}_2$
lithium phosphide	$\text{Li}^+$ $\text{P}^{3-}$	$\text{Li}_3\text{P}$
beryllium oxide	$\text{Be}^{2+}$ $\text{O}^{2-}$	$\text{BeO}$
calcium bromide	$\text{Ca}^{2+}$ $\text{Br}^-$	$\text{CaBr}_2$
potassium iodide	$\text{K}^+$ $\text{I}^-$	$\text{KI}$
radium nitride	$\text{Ra}^{2+}$ $\text{N}^{3-}$	$\text{Ra}_3\text{N}_2$
magnesium sulfide	$\text{Mg}^{2+}$ $\text{S}^{2-}$	$\text{MgS}$
aluminum nitride	$\text{Al}^{3+}$ $\text{N}^{3-}$	$\text{AlN}$
barium hydride	$\text{Ba}^{2+}$ $\text{H}^-$	$\text{BaH}_2$
potassium fluoride	$\text{K}^+$ $\text{F}^-$	$\text{KF}$
strontium phosphide	$\text{Sr}^{2+}$ $\text{P}^{3-}$	$\text{Sr}_3\text{P}_2$
cesium selenide	$\text{Cs}^+$ $\text{Se}^{2-}$	$\text{Cs}_2\text{Se}$
zinc oxide	$\text{Zn}^{2+}$ $\text{O}^{2-}$	$\text{ZnO}$
cesium phosphide	$\text{Cs}^+$ $\text{P}^{3-}$	$\text{Cs}_3\text{P}$
beryllium hydride	$\text{Be}^{2+}$ $\text{H}^-$	$\text{BeH}_2$
lithium chloride	$\text{Li}^+$ $\text{Cl}^-$	$\text{LiCl}$
magnesium iodide	$\text{Mg}^{2+}$ $\text{I}^-$	$\text{MgI}_2$
zinc fluoride	$\text{Zn}^{2+}$ $\text{F}^-$	$\text{ZnF}_2$
silver sulfide	$\text{Ag}^+$ $\text{S}^{2-}$	$\text{Ag}_2\text{S}$
beryllium selenide	$\text{Be}^{2+}$ $\text{Se}^{2-}$	$\text{BeSe}$
gallium carbide	$\text{Ga}^{3+}$ $\text{C}^{4-}$	$\text{Ga}_4\text{C}_3$
rubidium nitride	$\text{Rb}^+$ $\text{N}^{3-}$	$\text{Rb}_3\text{N}$
*calcium carbide	$\text{Ca}^{2+}$ $\text{C}^{4-}$	$\text{Ca}_4\text{C}_2 \rightarrow \text{Ca}_2\text{C}$



\*

metal  $\text{H}^+$   
non metal  $\text{H}^-$

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