

Lesson 5: Binary Ionic Compounds

Notes:

Binary Ionic compounds – Crystals made of two kinds of elements only (metal bonded to non-metal). The ions in these compounds are referred to as simple ions. (Provide students with a list of ions and identify which are considered simple)

e.g., 's of Binary Ionic compounds: NaCl, MgBr₂, CaO, Li₂S

Ion Charge – is often referred to as the valence or combining capacity. Charge is used to predict how elements combine to form ionic compounds.

e.g., the valence or charge of Ca⁺² is positive 2 while P⁻³ is negative 3.

Oral Review:

Rules for forming ionic compounds:

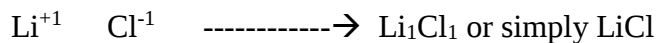
- 1. The total number of electrons given by metal atoms must be the same number accepted by non-metal atoms.*
- 2. The resulting positive charges from metal ions (i.e., cations) must balance the negative charges from the non-metal ions (i.e, anions).*
- 3. We used Bohr models to show this process, but it is a laborious one. We can use a “cheater” method called “crossing-over” or the “crisscross method”.*

Rules For Crossing over:

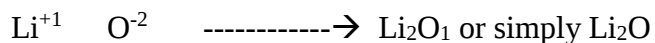
- Determine the charge of both the metal and non-metal ion. (**Orally:** You can use an ion sheet, rules for ion determination in groups of the periodic table or Bohr models to determine charge.)
- Write the metal first and the non-metal second.
- Cross the charges over and drop the signs.
- Reduce the formula to “simplest terms” (i.e., like factoring a fraction).
 - When charges are equal and opposite the elements will combine 1:1.

Practice Exercises: Predict the binary ionic formulas for the following elements.

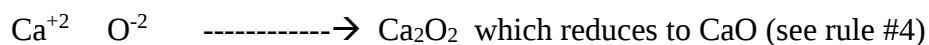
1. Lithium and Chlorine. (i.e., Lithium Chloride)



2. Lithium and Oxygen. (i.e., Lithium Oxide)



3. Calcium and Oxygen. (i.e., Calcium Oxide)

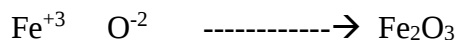


4. Iron and Oxygen (i.e., Iron (III) oxide)

Orally:

Q: There are two Iron ions listed on the ion sheet. How do you know which to use?

A: The roman numeral in the ionic name indicates the charge on the metal. (i.e., the roman numeral (III) means the Iron has a +3.



5. Tin and Oxygen (i.e., Tin (IV) oxide)



Assignment: Worksheet on Binary Ionic Compounds.