

Ionic Compounds

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Chemical Bonds

- Atoms like to have their valence shells full.
- When two atoms combine, the valence electrons on each atom interact.
- A chemical bond forms between the atoms if their valence electrons make a new arrangement that has less energy than their previous arrangement.

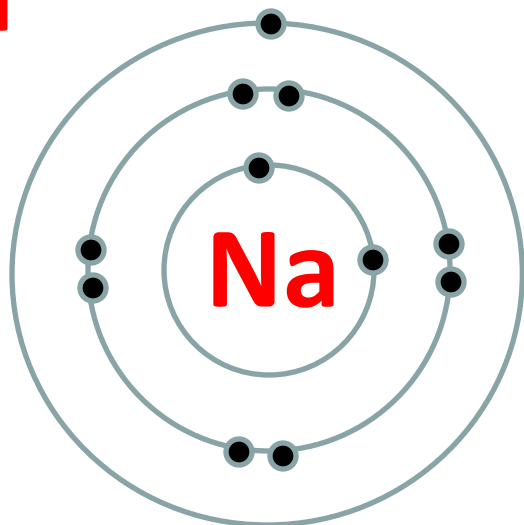
Ionic Compounds

- Made up of two or more ions
- Always formed from a cation and an anion (a metal and a non-metal)
- Overall charge on the compound is zero

How do Ionic Compounds Form?

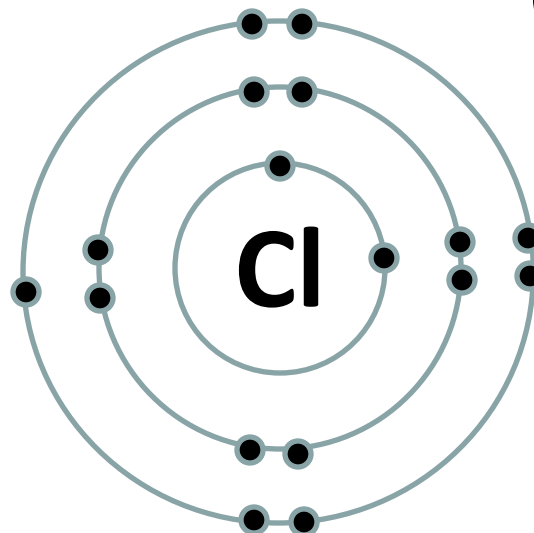
- Examples: sodium chloride

Na¹⁺



NaCl

Cl¹⁻



I'm HAPPY

I'm Also HAPPY

☺ And I am a

☺ AND

Cation

I am an anion

Practice Drawing Ionic Bonds

- Draw the electron-dot diagrams showing the bonding between the following pairs of atoms:
 - Lithium and Nitrogen
 - Magnesium and Fluorine

■ Sodium and Oxygen

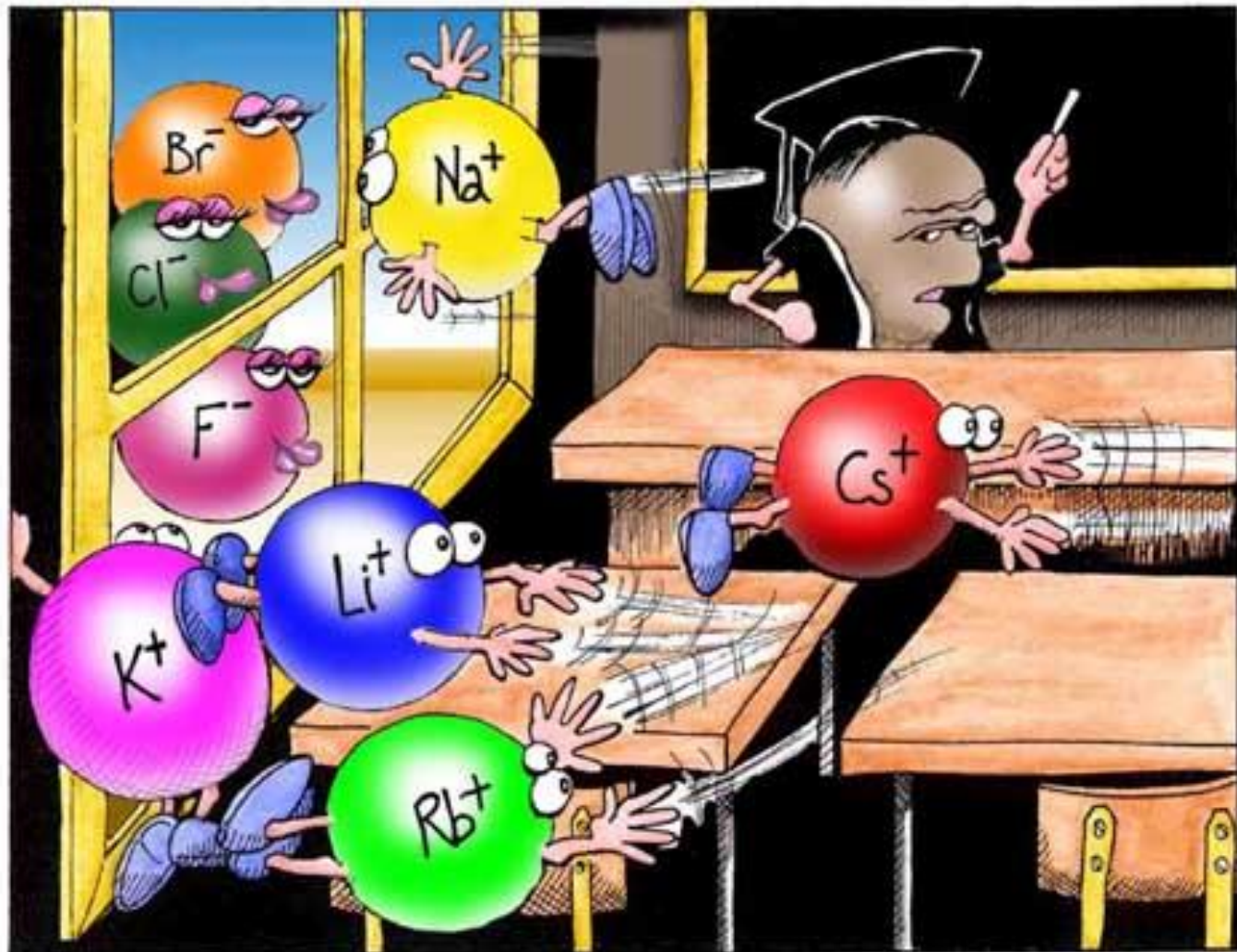
■ Calcium and Sulfur

-
- Aluminum and Oxygen

 - Beryllium and Fluorine

LAB INITIO

by Nick D Kim



"Perhaps one of you gentlemen would mind telling me just what it is outside the window that you find so attractive...?"

Names and Formulas for Ionic Compounds

Lesson 7

Naming Cations (usually a metal)

- simply write the name of the element followed by the word “ion”
- Examples:
 - Li^+
 - Be^{+2}
 - Al^{+3}

Naming Anions (usually a non-metal)

- Write the name of the element with the suffix “ide” at the end
 - F⁻
 - O⁻²
 - N⁻³

Binary Ionic Compounds

- Binary Compounds are made up of only TWO types of elements.

Eg. MgCl_2 , CaS , but not MgCO_3

Naming Binary Ionic Compounds

- -Name the cation first, followed by the anion with the “ide” ending.
- Examples:
 - K^+ and Cl^-
 - Na^+ and F^-
 - Zn^{+2} and Cl^-
 - Mg^{+2} and N^{-3}

Practice: Naming Binary Compounds

- Li^+ and F^-
- Ca^{2+} and O^{2-}
- Na^{1+} and S^{2-}

Balancing Ionic Charges

- Elements in each group have a “usual” ionic charge.
- The total charge in any ionic compound must always be zero.

Charges for each Group

Write these charges at the top of each group in your periodic table.

Group 1	+1
Group 2	+2
Group 13	+3
Group 14	+ -4
Group 15	-3
Group 16	-2
Group 17	-1
Group 18	0

Chemical Formulas

- Provide two important pieces of information:
 - The chemical symbols of the elements in the substance
 - The ratio of atoms (or ions) of each element in the substance

The Criss-Cross Method for determining the formulas of ionic compounds

Example: what is the chemical formula of magnesium chloride?

1. Write the symbols of the elements and their charges

The Criss-Cross Method for determining the formula of ionic compounds

2. Crisscross the numbers of the charges so that they become subscripts.

The Criss-Cross Method for determining the formulas of ionic compounds

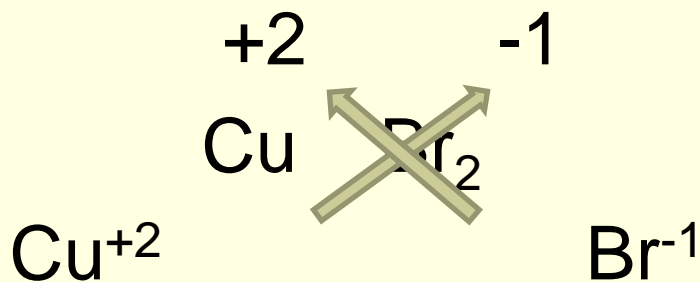
3. The chemical formula of magnesium chloride is MgCl_2
4. Do not use subscripts of 1
5. Always write the formula as the simplest ratio of elements.

Naming Compounds Involving Elements with Multiple Ionic Charges

Example: Write the chemical name of CuBr_2 .

Copper can have either a charge of +1 or +2. But Bromine always has a charge of -1.

If you reverse the criss-cross method,



Since Cu^{+2} is copper (II), the chemical name would be copper (II) bromide

Naming Compounds Involving Elements with Multiple Ionic Charges

Example: Write the chemical name of PbO_2 .

Practice makes perfect!

- Determine the chemical formula for the following ionic compounds:
 - Calcium oxide
 - Beryllium fluoride
 - Sodium nitride
 - Calcium sulfide
 - Aluminum chloride
 - Lithium oxide

■ Lithium oxide

■ Magnesium nitride

■ Gallium sulfide

■ Barium bromide

■ Magnesium nitride

And so to **compound** the problem,

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- Ionic Compounds

