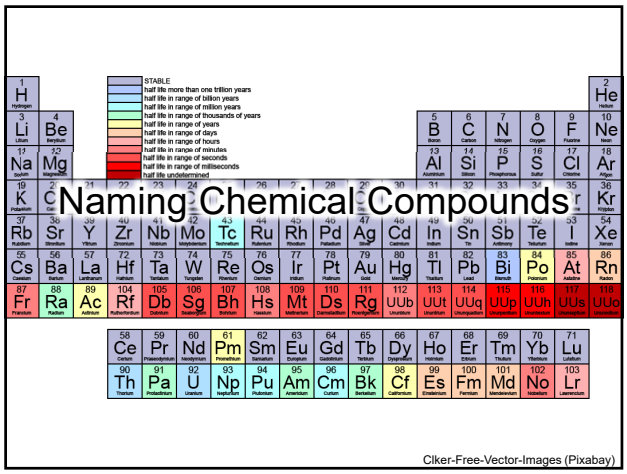

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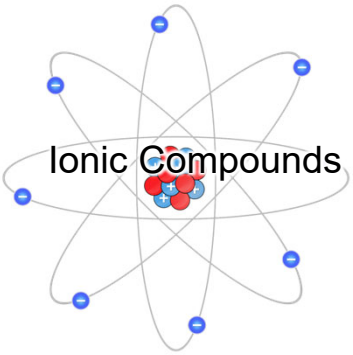


burlesonmatthew (Pixabay)

Simple Compounds

- The name of a binary compound containing monatomic ions consists of the name of the **cation** (the name of the metal) followed by the name of the **anion** (the name of the nonmetallic element with its ending replaced by the suffix –*ide*).

Examples

- NaCl
  - Sodium chloride
- MgF_2
  - Magnesium fluoride
- Al_2O_3
  - Aluminum oxide
- Na_2O
  - Sodium oxide

Compounds Containing Polyatomic Ions

- Compounds containing polyatomic ions are named by naming the cation and then the anion.

Examples

- $CaSO_4$
  - Calcium sulfate
- KNO_3
  - Potassium nitrate
- NaOH
  - Sodium hydroxide
- $Al_2(CO_3)_3$
  - Aluminum carbonate

Compounds Containing a Metal Ion with a Variable Charge

- All the transition metals and many main group metals can form cations with different charges.
- In the name, the charge of the metal ion is specified by a Roman numeral in parentheses after the name of the metal.
- The charge of the metal ion is determined from the formula of the compound and the charge of the anion.

- For example, consider the compound $FeCl_2$.
- Iron can have a charge of 2+ or 3+.
- Chlorine has a charge of 1-.
- There are two chlorine atoms, so the total charge from chlorine is 2-.
- Since the number of charges must be equal, the charge on iron must be 2+.
- Therefore, the name of iron must be iron(II).
- The compound is therefore iron(II) chloride.

Examples

- $FeCl_3$
  - Iron(III) chloride
- SnF_2
  - Tin(II) fluoride
- SnF_4
  - Tin(IV) fluoride
- HgO
  - Mercury(II) oxide

Writing Formulas

- Write the chemical symbol for both ions, including the charge.
- “Criss-cross” the charges of each ion.
- Like charges cancel out.

Examples

calcium chloride

$Ca^{2+}\ Cl^{-} \longrightarrow CaCl_2$

aluminum oxide

$Al^{3+}\ O^{2-} \longrightarrow Al_2O_3$

magnesium oxide

$Mg^{2+}\ O^{2-} \longrightarrow MgO$

potassium hydroxide

$K^{+}OH^{-} \longrightarrow KOH$

sodium sulfate

$Na^{+}SO_4^{2-} \longrightarrow Na_2SO_4$

calcium nitrate

$Ca^{2+}\ NO_3^{-} \longrightarrow Ca(NO_3)_2$

iron(III) oxide

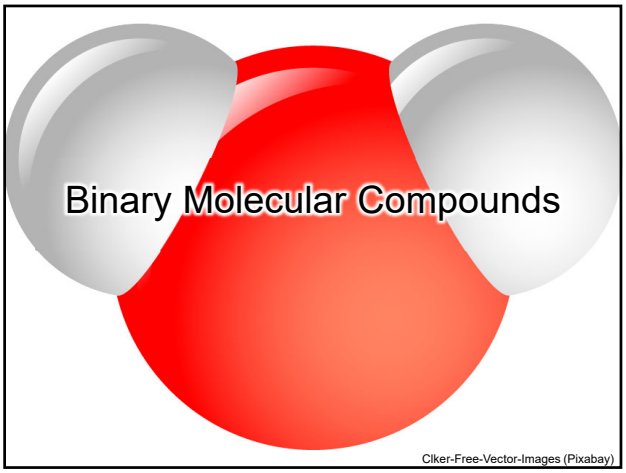
$Fe^{3+}O^{2-} \longrightarrow Fe_2O_3$

copper(II) chloride

$Cu^{2+}Cl^{-} \longrightarrow CuCl_2$

cobalt(III) nitrate

$Co^{3+}NO_3^{-} \longrightarrow Co(NO_3)_3$



- When two non-metallic elements form a molecular compound, several combination ratios are often possible.
- For example, carbon and oxygen can form the compounds CO and CO_2.
- Since these are different substances with different properties, they cannot both have the same name.
- To deal with this situation, we add prefixes to specify the numbers of atoms of each element.

- The name of a binary molecular compound consists of the name of the first element followed by the name of the second element with the suffix “ide.”
- A prefix representing the number of atoms is placed in front of each name.
- If there is only one of the first element, the prefix is normally omitted.

Prefixes

- 1 = mono
- 2 = di
- 3 = tri
- 4 = tetra
- 5 = penta
- 6 = hexa
- 7 = hepta
- 8 = octa
- 9 = nona
- 10 = deca

Examples

CO_2	carbon dioxide
N_2O_5	dinitrogen pentoxide
C_4H_8	tetracarbon octahydride

Writing Formulas

- Write the chemical symbol for both elements.
- The number of each element is given by the prefix.

Examples

tricarbon tetrahydride	C_3H_4
sulfur dioxide	SO_2
nitrogen monoxide	NO