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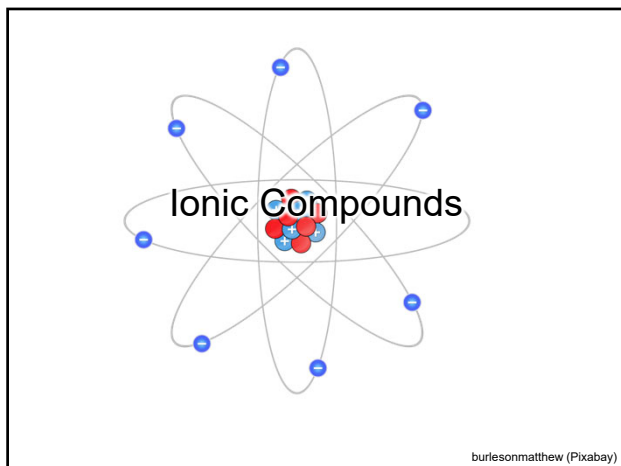
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## Simple Compounds

- 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*).

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### Examples

- NaCl
  - Sodium chloride
- MgF<sub>2</sub>
  - Magnesium fluoride
- Al<sub>2</sub>O<sub>3</sub>
  - Aluminum oxide
- Na<sub>2</sub>O
  - Sodium oxide

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### Compounds Containing Polyatomic Ions

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

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### Examples

- CaSO<sub>4</sub>
  - Calcium sulfate
- KNO<sub>3</sub>
  - Potassium nitrate
- NaOH
  - Sodium hydroxide
- Al<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub>
  - Aluminum carbonate

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## Compounds Containing a Metal Ion with a Variable Charge

- Most of the transition metals (and some main group metals) can form two or more 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.

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- For example, consider the compound  $\text{FeCl}_2$ .
- 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.

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### Examples

- $\text{FeCl}_3$ 
  - Iron(III) chloride
- $\text{SnF}_2$ 
  - Tin(II) fluoride
- $\text{SnF}_4$ 
  - Tin(IV) fluoride
- $\text{HgO}$ 
  - Mercury(II) oxide

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## Writing Formulas

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

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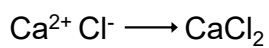
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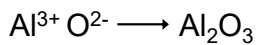
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### Examples

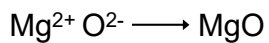
calcium chloride



aluminum oxide



magnesium oxide



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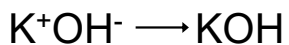
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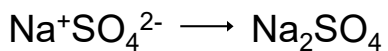
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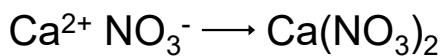
potassium hydroxide



sodium sulfate



calcium nitrate



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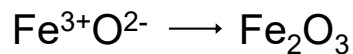
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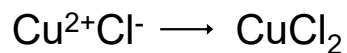
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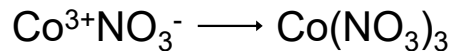
iron(III) oxide



copper(II) chloride



cobalt(III) nitrate



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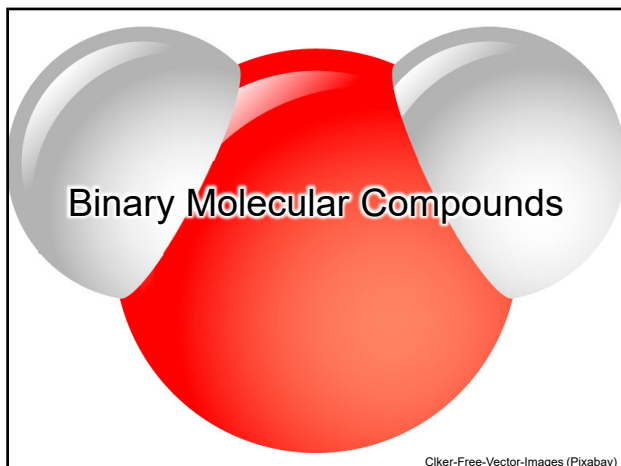
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- When two non-metallic elements form a molecular compound, several combination ratios are often possible.
- For example, carbon and oxygen can form the compounds CO and CO<sub>2</sub>.
- Since these are different substances with different properties, they cannot both have the same name.
- To deal with this situation, we add prefixes to specify the numbers of atoms of each element.

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- 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.

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### Prefixes

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

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### Examples

- $\text{CO}_2$  carbon dioxide
- $\text{N}_2\text{O}_5$  dinitrogen pentoxide
- $\text{C}_4\text{H}_8$  tetracarbon octahydride

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## Writing Formulas

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

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### Examples

tricarbon tetrahydride       $C_3 H_4$

sulfur dioxide                 $SO_2$

nitrogen monoxide          $NO$

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