# Nomenclature – A Summary

## Ionic Compounds

- **Metal Cations + Non-Metal Anions, or, Polyatomic Ions**
  - Names and formulas always start with the positively charged cation.
  - Ions are combined in ratios so that the final ionic compound is neutral.
  - Never use prefixes in the names of ionic compounds. The cation name is simply combined with the anion name only.
  - If a metal can form more than one cation, the cation charge is included in the name as a Roman numeral in brackets.
  - Several ion names, charges and formulas are provided here (on second page). They must be memorized.

### Examples

- $K_2S$
  - 2 $K^{+1}$ cations and 1 $S^{-2}$ anion
  - Potassium sulfide
- $FeCl_3$
  - 1 $Fe^{+3}$ cation and 3 $Cl^{-1}$ anions
  - Iron(III) chloride
- $Mg_3(PO_4)_2$
  - 3 $Mg^{+2}$ cations and 2 $PO_4^{-3}$ anions
  - Magnesium phosphate

## Covalent Compounds

- **Non-Metal Atoms only**
  - The more metallic non-metal is written first.
  - Prefixes are used in the name to indicate the number of each atom present. A list of prefixes 1-10 (and 12) is provided here (on reverse side). They must be memorized.
  - The prefix “mono” is dropped if there is only one of the first element.
  - The name of the second element always ends in __ide.

### Examples

- $P_4S_3$
  - 4 P atoms and 3 S atoms
  - Tetraphosphorus trisulfide
- $N_2O$
  - 2 N atoms and 1 O atom
  - Dinitrogen monoxide
- $BrCl_5$
  - 1 Br atom and 5 Cl atoms
  - Bromine pentachloride

## Acids

- **Hydrogen Cations + Non-Metal Anions, or, Polyatomic Anions**
  - H always leads the formula.
  - Acids are in the aqueous state.
  - Ions are combined in ratios so that the final acid is neutral.
  - The acid name depends on the name of the anion involved:
    
    \[
    H^{+1} + \text{Anion} \rightarrow \text{Acid} \\
    \_\_\_\_\_ide \quad h\_ydro\_ic \ acid \\
    \_\_\_ate \quad \_\_\_ic \ acid \\
    \_\_\_ite \quad \_\_\_ous \ acid
    \]

### Examples

- $HBr (aq)$
  - 1 $H^{+1}$ cation and 1 $Br^{-1}$ anion (bromide)
  - Hydrobromic acid
- $HNO_3 (aq)$
  - 1 $H^{+1}$ cation and 1 $NO_3^{-1}$ anion (nitrate)
  - Nitric acid
- $H_2SO_3 (aq)$
  - 2 $H^{+1}$ cations and 1 $SO_3^{-2}$ anion (sulfite)
  - Sulfurous acid
### Common Monatomic Metal Cations and Non-Metal Anions

<table>
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<tr>
<th>1A</th>
<th>2A</th>
<th>3A 4A</th>
<th>5A 6A</th>
<th>7A 8A</th>
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<td>H⁺¹</td>
<td>in acids</td>
<td>C⁺⁴</td>
<td>N⁻³</td>
<td>O⁻²</td>
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<td>Be⁺²</td>
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<td>Mg⁺²</td>
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</tr>
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<td>Ca⁺² Ti⁺⁴ Ti⁺⁶</td>
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<td>Co⁺² Ni⁺³</td>
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<tr>
<td>Cs⁺¹ Ba⁺²</td>
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**Polyatomic Ions**

| OH⁻¹ | Hydride | O₃⁻² | Peroxide |
| CN⁻¹ | Cyanide | CO₃⁻² | Carbonate |
| SCN⁻¹ | Thiocyanate | SO₃⁻² | Sulfite |
| HCO₃⁻¹ | Bicarbonate (Hydrogen Carbonate) | SO₄⁻² | Sulfate |
| HSO₃⁻¹ | Bisulfite (Hydrogen Sulfite) | S₂O₃⁻² | Thiosulfate |
| HSO₄⁻¹ | Bisulfate (Hydrogen Sulfate) | C₅O₄⁻² | Oxalate |
| C₂H₃O₂⁻¹ Acetate | Cr₂O₇⁻² | Chromate |
| NO₂⁻¹ Nitrite | Cr₂O₅⁻² | Dichromate |
| NO₃⁻¹ Nitrate | MnO₄⁻¹ Permanganate |
| ClO⁻¹ HyPOCHlorite | PO₃⁻³ | Phosphite |
| ClO₂⁻¹ Chlorite | PO₄⁻³ | Phosphate |
| ClO₃⁻¹ Chlorate | NH₄⁺¹ Ammonium |
| ClO₄⁻¹ Perchlorate | Hg₂⁺² Mercury (I) |

**Prefixes for Covalent Compounds**

| 1 mono | 2 di | 3 tri | 4 tetra | 5 penta | 6 hexa | 7 hepta | 8 octa | 9 nona | 10 deca | 11 undeca | 12 dodeca |