Cations

Monoatomic

Only one possible ion

Rule:
Name of Element + “ion”

Examples:
Na⁺ Sodium Ion
Mg²⁺ Magnesium Ion
H⁺ Hydrogen Ion

Comment:
The number of positive charges is not indicated in the name because it is not necessary.

More than one possible ion

Rule:
(a) Newer Rule: positive charge indicated by Roman numeral

Examples:
Fe³⁺ Iron (III) Ion
Fe²⁺ Iron (II) Ion
Cu²⁺ Copper (II) Ion

(b) Older Rule: Latin stem for the element + “ous” for the lesser charge and “ic” for the greater charge.

Examples:
Fe³⁺ Ferric Ion
Fe²⁺ Ferrous Ion
Cu²⁺ Cupric Ion

Polyatomic

Rule:
You have to learn them! See Table 5.8.

Examples:
NH₄⁺ Ammonium Ion
H₃O⁺ Hydronium Ion
Anions

Monoatomic

- **Rule:** Stem of Element name + “ide”
- **Examples:**
  - $\text{Cl}^-$: Chloride
  - $\text{P}^3-$: Phosphide
  - $\text{O}^2-$: Oxide
  - $\text{F}^-$: Fluoride
  - $\text{Se}^{2-}$: Selenide

Polyatomic

Oxyanions

- **Rule:** Least oxygen: hypo____ite
- **Rule:** Less oxygen: _____ite
- **Rule:** More oxygen: _____ate
- **Rule:** Most oxygen: per____ate
- **Examples:**
  - $\text{ClO}^-$: hypochlorite ion
  - $\text{ClO}_2^-$: chlorite ion
  - $\text{ClO}_3^-$: chlorate ion
  - $\text{ClO}_4^-$: perchlorate ion
  - $\text{SO}_3^{2-}$: sulfite ion
  - $\text{SO}_4^{2-}$: sulfate ion

- **Comment:** Halogens (except F) form all four ions. When only two of the four exist (N, S, P), they are the –ite and –ate ions. When only one exists (C) it is the –ate ion.

Oxyanions plus Hydrogen

- **Rule:** “Hydrogen” + oxyanion name OR “bi” + oxyanion name
- **Examples:**
  - $\text{HCO}_3^-$: Hydrogen Carbonate or Bicarbonate
  - $\text{HSO}_4^-$: Hydrogen Sulfate or Bisulfate
  - $\text{H}_2\text{PO}_4^-$: Dihydrogen phosphate

Others

- **Rule:** You have to learn them! See Table 5.8.
- **Examples:**
  - $\text{CO}_3^{2-}$: Carbonate
  - $\text{MnO}_4^-$: Permanganate
  - $\text{OH}^-$: Hydroxide
  - $\text{CN}^-$: Cyanide
  - $\text{CH}_3\text{CO}_2^-$: Acetate
Inorganic Compounds

Ionic

H – Metal

Rule:
Name of the cation then the name of the anion. Drop the word “ion” from the names.

Examples:
NaCl Sodium chloride
AuBr₂ Gold (II) bromide
FeOH Iron (I) hydroxide
BaH₂ Barium hydride

H – Nonmetal

Rule 1:
Non-aqueous compounds:
Hydrogen ____ide

Examples:
HF Hydrogen fluoride
H₃N Hydrogen nitride
HCl Hydrogen chloride

Rule 2 (Acids):
Aqueous compounds:
Hydro____ic Acid

Examples:
HF (aq) Hydrofluoric Acid
H₃N (aq) Hydronitric Acid
HCl (aq) Hydrochloric Acid

H – Oxyanion

Rule 1:
Non-aqueous compounds:
Hydrogen hypo_____ite
Hydrogen _____ite
Hydrogen _____ate
Hydrogen per______ate

Rule 2 (Acids):
Aqueous compounds:
Hypo_____ous Acid
____ous Acid
____ic Acid
Per______ic Acid

Examples:
H₂SO₃ (aq) Sulfurous Acid
H₃PO₄ (aq) Phosphoric Acid
HBrO₄ (aq) Perbromic Acid

H – Metal

Rule 1:
The more cation-like element is named first. Second element ends in –ide.

Rule 2:
Number of atoms of each element is specified by prefixes

Rule 3:
Prefix “mono” is never used for the first element

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

Examples:
CO₂ Carbon dioxide
N₂O Dinitrogen monoxide
S₃I₅ Trisulfur pentaiodide

Binary Covalent

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Number of atoms of each element is specified by prefixes

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