

Nomenclature 2.1

Naming Ionic Compounds
Writing Ionic Formulas
Naming Hydrates

Naming Binary Ionic Compounds

- The positive ion (cation) is written first.
 - Takes the same name as the element.
 - The negative ion (anion) is written last.
 - Takes the first part of its elements name, and **-ide** is added to the end.
- Ex) Bromine is changed to Bromide.

Naming Binary Ionic Compounds

- You need to know if an element forms cations with different charges.
- If it does, you need to specify the charge in Roman numerals.
- Ex) CuS is written as Copper(II) Sulfide
- Sulfide has to be S²⁻
- Copper must be Cu²⁺ to make the compound neutral

Naming Binary Ionic Compounds

Ex) CuBr is written as Copper (I) Bromide.

- Bromide has to be Br⁻
- Copper must be Cu¹⁺ to make the compound neutral.

Ex) Fe₂O₃ is written as Iron (III) Oxide.

- Oxide has to be O²⁻
- As there are three of them, they make up a charge of 6-
- The two irons must combine to form a charge of 6+
- Thus, each iron must carry a charge of 3+

Naming Binary Ionic Compounds

- 1) LiF
- 2) CaBr₂
- 3) K₂S
- 4) FeS
- 5) MgO
- 6) MnO
- 7) CoI₃

Naming Compounds with Polyatomic Ions

- For polyatomic ions, always use the name assigned to it.

– Do not add an additional suffix (such as **-ide**).

e.g.) CO₃²⁻ is the carbonate ion.

CaCO₃ is calcium carbonate

Naming Compounds with Polyatomic Ions

- Ammonium, NH_4^+ , is the only polyatomic cation that you need to know.

e.g.) NH_4Cl is ammonium chloride

e.g.) NO_3^- is the nitrate ion
 NH_4NO_3 is ammonium nitrate

Hints for Learning the Names of Polyatomic Ions

- Only three polyatomic ions end in -ide.
 - CN^- *Cyanide*
 - OH^- *Hydroxide*
 - O_2^{2-} *Peroxide*

Everything else ending in -ide is a monoatomic anion.

Hints for Learning the Names of Polyatomic Ions

- A system for oxoanions.
 - **Hypo-___-ite** (2 less oxygens than ___-ate)
 - **___-ite** (1 less oxygen than ___-ate)
 - **___-ate**
 - **Per-___-ate** (1 more oxygen than ___-ate)
- All polyatomic ions in such a series carry the same charge.

Hints for Learning the Names of Polyatomic Ions

- A system for oxoanions.
- The example of Chlorate, ClO_3^-
 - **Hypochlorite** ClO^- (2 less oxygens than ___-ate)
 - **Chlorite** ClO_2^- (1 less oxygen than ___-ate)
 - **Chlorate** ClO_3^-
 - **Perchlorate** ClO_4^- (1 more oxygen than ___-ate)

Hints for Learning the Names of Polyatomic Ions

- A system for oxoanions.
- The example of Sulfate (SO_4^{2-})
 - **Sulfite** SO_3^{2-} (1 less oxygen than ___-ate)
 - **Sulfate** SO_4^{2-}
- There is no **hypo-___-ite** or **per-___-ate** for sulfate.

Naming Compounds with Polyatomic Ions

- 1) CuCO_3
- 2) K_2SO_3
- 3) $\text{Ca}(\text{ClO})_2$
- 4) KClO_4
- 5) NaClO_3
- 6) LiNO_2
- 7) LiNO_3
- 8) NaCH_3COO

Recognizing Ionic Compounds

- Ionic compounds contain either a metal and a non-metal, or polyatomic ions.
- If the first word in the compound is a metal or ammonium, it is an ionic compound.

Writing Ionic Formulas

- Ionic compounds are neutral.
 - Thus, all charges must sum up to zero.
- Charges come from the associated group in the periodic table, or a list.
- Parenthesis must be used when there is some multiple of a certain polyatomic ion.

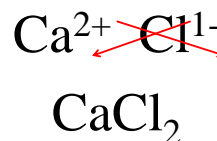
Ex1) Writing Ionic Formulas

Ex1) Calcium Chloride

- Calcium is always 2+ (Group 2A periodic table)
- -ide in chloride tells you it is monoatomic
- Chloride is always 1- (Group 7A periodic table)

Ex1) Writing Ionic Formulas

Criss-Cross Method



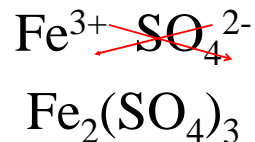
Ex2) Writing Ionic Formulas

Ex 2) Iron (III) Sulfate

- The Iron ion carries a charge of 3+, as the Roman numeral is (III).
- You know that Sulfate is SO_4^{2-} because you memorized the table of polyatomic ions.

Ex2) Writing Ionic Formulas

Criss-Cross Method



Writing Ionic Formulas

- 1) Aluminum hydrogen sulfate
- 2) Iron (II) oxide
- 3) Iron (III) oxide
- 4) Strontium chromate
- 5) Potassium chloride
- 6) Ammonium Nitrate
- 7) Lithium Sulfite

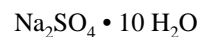
Hydrates

- Hydrates are ionic compounds that trap water within their structures.
- Both the name and the chemical formula specify how much water is contained within the structure.

Writing Formulas for Hydrates

- Write the formula for the ionic compound using the rules you learned earlier.
- Add a dot and the correct number of waters taken from the prefix.

e.g.) Sodium sulfate decahydrate



Writing Formulas for Hydrates

- 1) Barium Chloride Dihydrate
- 2) $\text{FeCl}_3 \cdot 6 \text{H}_2\text{O}$