**Ionic Nomenclature for Binary Compounds**

1. Give the name of the cation (the positive ion – either the metal or the polyatomic ion ammonium).
2. If the anion (the negative ion- the non-metal), is a single element (not a polyatomic), give the name of the anion with an “ide” ending.

Examples:

chlor**ine** becomes chlor**ide**

ox**ygen** becomes ox**ide**

phosph**orous** becomes phosph**ide**

fluor**ine** becomes fluor**ide**

nitr**ogen** becomes nitr**ide**

iod**ine** becomes iod**ide**

**Examples:**

**MgO – would become magnesium oxide**

**Li2O- would become lithium oxide**

**BeO- would become beryllium oxide**

**Nomenclature for Metals with Variable Oxidation Numbers (Stock Naming System)**

Roman numerals are used to indicate the elements charge if it can form more than one cation; these elements include Cr-Cu, Au, Hg, Sn, & Pb.

|  |  |
| --- | --- |
| Roman Numeral | Oxidation Number |
| I | 1+ |
| II | 2+ |
| III | 3+ |
| IV | 4+ |

Steps for Finding the Oxidation Number for Elements with Variable Oxidation Numbers:

1. Find the oxidation numbers for the transition metal.

Example: Fe2(SO4)3

1. Trace the subscripts across the compound creating an X.

\*\* If there are no subscripts, check the oxidation number of the anion.

Fe2(SO4)3

1. The metal ion has a positive oxidation & the second (either element or polyatomic) has a negative oxidation.

Fe 3+ SO42-

1. Write the name following ionic compound rules placing the Roman numeral in parantheses.

iron (III) sulfate

**Ionic Nomenclature for Polyatomic Compounds**

1. Give the name of the cation (the positive ion- either the metal or the polyatomic ion ammonium).
2. If the anion is (the negative ion) is a polyatomic ion (more than one single element), use the name of the polyatomic ion.

**Examples:**

**MgSO4 would become magnesium sulfate**

**(NH4)2CO3 would become ammonium carbonate**

**Ca3(PO4)2 would become calcium phosphate**

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**Nomenclature for Covalent Compounds**

Covalent compounds are two or more nonmetals

**Steps for Naming Binary Molecular Compounds**

1. Name the elements in the order of their appearance.

**H2O**

**Example: hydrogen oxygen**

1. The name of the second element is written with an “ide” ending.

**Example: hydrogen oxide**

1. Add prefixes to show the number of atoms of each element in the compound.

\*\*Exception: the prefix mono is omitted for the first element in the molecule

|  |  |  |  |
| --- | --- | --- | --- |
| **Prefix** | **Meaning** | **Prefix** | **Meaning** |
| Mono | 1 | Hexa | 6 |
| Di | 2 | Hepta | 7 |
| Tri | 3 | Octa | 8 |
| Tetra | 4 | Nona | 9 |
| Penta | 5 | Deca | 10 |

**Example: dihydrogen monoxide (water)**

**Example: By using the steps given, NH3 becomes:**

1. nitrogen hydrogen
2. nitrogen hydride
3. ~~mono~~nitrogen trihydride
4. **nitrogen trihydride**

**Nomenclature for Binary Acids**

Binary acids contain hydrogen and one other nonmetallic element.

Their names follow the pattern of “hydro*element*ic acid” where *element* is replaced by the root of the name of the element.

**Steps for Naming Binary Acids**

1. Write the prefix –hydro
2. Name the second element with the suffix –ic
3. Then add the word acid

**These acids contain no oxygen. Here are some examples:**

**HF becomes hydrofluoric acid**

**HCl becomes hydrochloric acid**

**HBr becomes hydrobromic acid**

**Nomenclature for Ternary Acids**

**(Also known as oxy-acids)**

Ternary acids are those acids that are made of more than two elements; usually contain a polyatomic ion.

When anions (negative ion) contain oxygen, the acid name is formed from the root name of the central element of the anion or the anion name with suffix of-ic or –ous.

**Steps for naming Ternary acids**

1. Look at acid formula and deterimine if the anion (negative ion) has a “-ITE” or “-ATE” ending
2. If the anion ends in –ITE, the acid name is “stem”—ous acid
3. If the anion ends in –ATE, the acid name is “stem”—ic acid

**Examples:**

Acid Anion Acid Name

H2SO4 SO42- [sulfate] 🡪 sulfuric acid

HNO3 NO31- [nitrate] 🡪 nitric acid

H2SO3 SO32- [sulfite] 🡪 sulfurous acid

HNO2 NO21- [nitrite] 🡪 nitrous acid

**Nomenclature for Bases**

Bases are simply named as ionic compounds containing the hydroxide ion.

1. Give the name of the cation (the positive ion- either the metal or the polyatomic ion ammonium)
2. Then write the anion name- polyatomic ion hydroxide [OH1-]

**Examples of Bases:**

* **NaOH sodium hydroxide**
* **Ca(OH)2 calcium hydroxide**
* **NH4OH ammonium hydroxide**

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1. Give the name of the cation (the positive ion- either the metal or the polyatomic ion ammonium [NH41+])
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**Examples of Bases:**

* **NaOH sodium hydroxide**
* **Ca(OH)2 calcium hydroxide**
* **NH4OH ammonium hydroxide**