**Case 1: Ionic compounds containing monatomic ions** (i.e. ions that can only have one charge)

- Name of Compound = name of metal + name of non-metal w/ide suffix *or* name of polyatomic ion. No prefixes are used!
- e.g. NaF = sodium fluoride; Na<sub>3</sub>PO<sub>4</sub> = sodium phosphate; (NH<sub>4</sub>)<sub>3</sub>PO<sub>4</sub> = ammonium phosphate

**Case 2: Ionic compounds containing a metal that can form more than one ion**

- Name of Compound = name of metal, followed by charge of metal in *Roman numerals in parentheses*, followed by name of non-metal w/ -ide suffix *or* name of polyatomic ion. No prefixes are used!
- e.g. PbCl<sub>2</sub> = Lead (II) chloride; Cu(NO<sub>3</sub>)<sub>2</sub> = copper (II) nitrate

**Case 3: Binary molecular compounds:**

- Name of Compound = name of first element + name of second element with -ide suffix.
- Use prefixes (mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, nona-, deca-) to indicate the number of atoms. The mono prefix is not used with the first element.
- e.g. CO = carbon monoxide; NO<sub>2</sub> = nitrogen dioxide; N<sub>2</sub>O = dinitrogen monoxide; P<sub>2</sub>O<sub>5</sub> = diphosphorus pentoxide

**Case 4: Binary acid solutions** (i.e. binary acids dissolved in water = binary acids in aqueous solution)

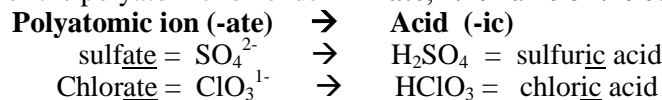
- Name of Compound = hydro + name of halogen w/ -ic suffix e.g. HF<sub>(aq)</sub> = hydrofluoric acid; HCl<sub>(aq)</sub> = hydrochloric acid
- Unless stated otherwise assume the formula of a binary acid is for the acid dissolved in water. E.g. assume HCl = HCl<sub>(aq)</sub>

**Naming Oxoacids** (i.e. compound with the general formula H<sub>x</sub>MO<sub>y</sub>, where M = nonmetal)

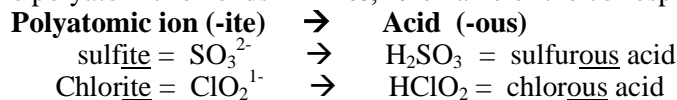
The name of an oxoacid is based on the name of the polyatomic ion from which the acid is derived.

**Case 5: -ate ↔ -ic**

If the name of the polyatomic ion ends in “-ate,” the name of the corresponding acid ends in “-ic acid.”

**Case 6: -ite ↔ -ous**

If the name of the polyatomic ion ends in “-ite,” the name of the corresponding acid ends in “-ous acid.”



## List of Elemental Symbols

Chem 161 - K. Marr

---

It is expected that you know the symbols and names (spelling too!) for the following elements from your study in a previous chemistry class. You will be tested on these symbols on the first [Chemistry 161](#) exam.

Element	Symbol
Aluminum	Al
Antimony	Sb
Argon	Ar
Arsenic	As
Barium	Ba
Beryllium	Be
Bismuth	Bi
Boron	B
Bromine	Br
Cadmium	Cd
Calcium	Ca
Carbon	C
Chlorine	Cl
Chromium	Cr
Cobalt	Co
Copper	Cu
Fluorine	F
Gold	Au
Helium	He
Hydrogen	H
Iodine	I
Iron	Fe
Krypton	Kr
Lead	Pb
Lithium	Li
Magnesium	Mg
Manganese	Mn
Mercury	Hg

Element	Symbol
Molybdenum	Mo
Neon	Ne
Nickel	Ni
Nitrogen	N
Oxygen	O
Phosphorus	P
Platinum	Pt
Plutonium	Pu
Potassium	K
Radium	Ra
Radon	Rn
Selenium	Se
Silicon	Si
Silver	Ag
Sodium	Na
Strontium	Sr
Sulfur	S
Tin	Sn
Titanium	Ti
Tungsten	W
Uranium	U
Vanadium	V
Xenon	Xe
Zinc	Zn

## *Short List of Common Ions and Their Charges*

*Chem 161 - K. Marr*

It is expected that you know the names (spelling too!), formulas and charges for the following ions from your study in a previous chemistry class. You will be tested on these ions on the first [Chemistry 161](#) exam.

<b>Positive Ions (Cations)</b>		<b>Negative Ions (Anions)</b>	
<b>1+</b>		<b>1-</b>	
Group IA Elements	Li <sup>+</sup> , Na <sup>+</sup> , K <sup>+</sup> , Rb <sup>+</sup> , Cs <sup>+</sup>	Group VIIA Elements	F <sup>-</sup> , Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup>
Ammonium	NH <sub>4</sub> <sup>+</sup>	Acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>1-</sup> or CH <sub>3</sub> COO <sup>1-</sup>
Hydrogen Hydronium	H <sup>+</sup> H <sub>3</sub> O <sup>+</sup>	Hydroxide	OH <sup>1-</sup>
Silver	Ag <sup>+</sup>	Perchlorate Chlorate Chlorite Hypochlorite	ClO <sub>4</sub> <sup>1-</sup> ClO <sub>3</sub> <sup>1-</sup> ClO <sub>2</sub> <sup>1-</sup> ClO <sup>1-</sup>
Copper (I)	Cu <sup>+</sup>	Cyanide	CN <sup>1-</sup>
Mercury (I)	Hg <sub>2</sub> <sup>2+</sup> (Note that two Hg <sup>1+</sup> ions pair together!)	Hydrogen carbonate (or Bicarbonate) Hydrogen sulfate (or Bisulfate) Dihydrogen phosphate	HCO <sub>3</sub> <sup>1-</sup> HSO <sub>4</sub> <sup>1-</sup> H <sub>2</sub> PO <sub>4</sub> <sup>1-</sup>
Hydronium	H <sub>3</sub> O <sup>+</sup>	Nitrate Nitrite	NO <sub>3</sub> <sup>1-</sup> NO <sub>2</sub> <sup>1-</sup>
<b>2+</b>		<b>2-</b>	
Group IIA Elements	Mg <sup>2+</sup> , Ca <sup>2+</sup> , Ba <sup>+2+</sup>	Group VIA Elements	O <sup>2-</sup> , S <sup>2-</sup>
Copper (II)	Cu <sup>2+</sup>	Carbonate	CO <sub>3</sub> <sup>2-</sup>
Iron (II)	Fe <sup>2+</sup>	Sulfate	SO <sub>4</sub> <sup>2-</sup>
Lead (II)	Pb <sup>2+</sup>	Sulfite	SO <sub>3</sub> <sup>2-</sup>
Mercury (II)	Hg <sup>2+</sup>	Hydrogen phosphate	HPO <sub>4</sub> <sup>2-</sup>
Zinc	Zn <sup>2+</sup>	Peroxide	O <sub>2</sub> <sup>2-</sup>
<b>3+</b>		<b>3-</b>	
Aluminum	Al <sup>3+</sup>	Phosphate	PO <sub>4</sub> <sup>3-</sup>
Iron (III)	Fe <sup>3+</sup>		

The following questions are for practice and will not be collected or graded. See [pages 5 - 7](#) for answers!

- Write the formula for the following polyatomic ions.
 

a. Ammonium	b. Hydroxide
c. Nitrite	d. Nitrate
e. Acetate	f. Cyanide
g. Carbonate	h. Sulfite
i. Sulfate	j. Phosphate
- Write the formula of the ionic compound that forms when the following ions combine:
 

a. $\text{Na}^+$ and $\text{Cl}^-$	d. $\text{Ca}^{2+}$ and $\text{CO}_3^{2-}$
b. $\text{Na}^+$ and $\text{O}^{2-}$	e. $\text{Sr}^{2+}$ and $\text{PO}_4^{3-}$
c. $\text{Cu}^{2+}$ and $\text{OH}^-$	f. $\text{Al}^{3+}$ and $\text{NO}_3^-$
- Name the following ionic compounds.
 

a. $\text{MgCl}_2$	f. $\text{NH}_4\text{Cl}$
b. $\text{CaO}$	g. $\text{ZnSO}_4$
c. $\text{Cu}_3\text{N}_2$	h. $\text{Fe}_2(\text{SO}_3)_3$
d. $\text{AuF}_3$	i. $\text{KC}_2\text{H}_3\text{O}_2$
e. $\text{Ag}_3\text{PO}_4$	j. $\text{NaI}$
- Write the formula for the following ionic compounds.
 

a. Lithium bromide	f. Gold (I) phosphate
b. Calcium carbonate	g. Cobalt (III) oxide
c. Beryllium nitride	h. Calcium acetate
d. Potassium nitrate	i. Iron (III) cyanide
e. Copper (II) sulfite	j. Aluminum hydroxide
- Name the following ionic compounds:
 

a. $\text{Fe}(\text{NO}_3)_3$	f. $\text{ZnCl}_2$
b. $\text{MgBr}_2$	g. $\text{Co}_2(\text{SO}_4)_3$
c. $\text{Au}_2\text{S}$	h. $\text{Al}_2\text{S}_3$
d. $\text{Na}_3\text{PO}_4$	i. $\text{CaS}$
e. $\text{K}_4\text{C}$	j. $\text{NiO}_2$
- Write the formula for the following ionic compounds:
 

a. Iron (II) acetate	f. Ruthenium (II) nitrate
b. Copper (I) oxide	g. Sodium chloride
c. Gold (III) nitride	h. Lithium sulfate
d. Calcium phosphate	i. Beryllium sulfite
e. Potassium sulfate	j. Aluminum carbonate
- Write the name of the following covalent compounds:
 

a. $\text{N}_2\text{O}$	e. $\text{P}_2\text{S}$	i. $\text{P}_2\text{F}_6$
b. $\text{CO}_2$	f. $\text{NBr}_3$	j. $\text{C}_2\text{S}_4$
c. $\text{CO}$	g. $\text{IBr}$	
d. $\text{N}$	h. $\text{CF}_4$	
- Write the formula for the following covalent compounds:
 

a. Nitrogen trisulfide	f. Disulfur tetrachloride
b. Oxygen difluoride	g. Dicarbon hexabromide
c. Diphosphorus pentoxide	h. Tricarbon octafluoride
d. Sulfur dichloride	i. Dihydrogen monoxide
e. Nitrogen triiodide	j. Tetrahydrogen monocarbide (more commonly called methane!)
- Write the name for the following acids:
 

a. $\text{H}_2\text{SO}_4$	f. $\text{H}_3\text{PO}_4$
b. $\text{HCl}$	g. $\text{H}_2\text{SO}_3$
c. $\text{HBr}$	h. $\text{HNO}_2$
d. $\text{HNO}_3$	i. $\text{HI}$
e. $\text{HF}$	

10. Write the formula for the following acids:
- |                      |                    |
|----------------------|--------------------|
| a. Nitrous acid      | e. Sulfurous acid  |
| b. Hydrochloric acid | f. Acetic acid     |
| c. Hydrobromic acid  | g. Carbonic acid   |
| d. Sulfuric acid     | h. Perchloric acid |
11. Mixed bag. Name the following compounds:
- |              |              |         |
|--------------|--------------|---------|
| a. $MgI_2$   | d. $CO_2S_3$ | g. HBr  |
| b. $HClO_4$  | e. $AgNO_3$  | h. NaCl |
| c. $C_3Cl_8$ | f. $CuSO_4$  | i. ZnS  |
12. Mixed bag. Give the formula for the following compounds:
- |                       |                          |
|-----------------------|--------------------------|
| a. Gold (III) sulfide | f. Iron (III) acetate    |
| b. Hydrofluoric acid  | g. Silver nitrate        |
| c. Aluminum oxide     | h. Potassium phosphate   |
| d. Magnesium sulfate  | i. Dicarbon hexafluoride |
| e. Nitric acid        |                          |
13. Hydrates. Please name the following compounds
- |                         |                           |
|-------------------------|---------------------------|
| a. $AlCl_3 \cdot 6H_2O$ | d. $MgSO_4 \cdot 7H_2O$   |
| b. $CaSO_4 \cdot 2H_2O$ | e. $Ba(OH)_2 \cdot 8H_2O$ |
| c. $CuSO_4 \cdot 5H_2O$ |                           |
14. Hydrates. Please give the formula for the names.
- Copper (III) nitrate trihydrate
  - Barium chloride dihydrate
  - Cobalt (II) nitrate hexahydrate
  - Cobalt (II) sulfate heptahydrate
  - Iron (III) sulfate pentahydrate

### Answer Key: Nomenclature Practice

---

1. Write the formula for the following polyatomic ions.
- |              |               |              |             |
|--------------|---------------|--------------|-------------|
| a. Ammonium  | $NH_4^+$      | b. Hydroxide | $OH^-$      |
| c. Nitrite   | $NO_2^-$      | d. Nitrate   | $NO_3^-$    |
| e. Acetate   | $C_2H_3O_2^-$ | f. Cyanide   | $CN^-$      |
| g. Carbonate | $CO_3^{2-}$   | h. Sulfite   | $SO_3^{2-}$ |
| i. Sulfate   | $SO_4^{2-}$   | j. Phosphate | $PO_4^{3-}$ |
2. Write the formula of the ionic compound that forms when the following ions combine:
- |                              |                |
|------------------------------|----------------|
| a. $Na^+$ and $Cl^-$         | NaCl           |
| b. $Na^+$ and $O^{2-}$       | $Na_2O$        |
| c. $Cu^{2+}$ and $OH^-$      | $Cu(OH)_2$     |
| d. $Ca^{2+}$ and $CO_3^{2-}$ | $CaCO_3$       |
| e. $Sr^{2+}$ and $PO_4^{3-}$ | $Sr_3(PO_4)_2$ |
| f. $Al^{3+}$ and $NO_3^-$    | $Al(NO_3)_3$   |
3. Name the following ionic compounds.
- |                   |                     |
|-------------------|---------------------|
| a. $MgCl_2$       | magnesium chloride  |
| b. CaO            | calcium oxide       |
| c. $Cu_3N_2$      | copper (II) nitride |
| d. $AuF_3$        | gold (III) fluoride |
| e. $Ag_3PO_4$     | silver phosphate    |
| f. $NH_4Cl$       | ammonium chloride   |
| g. $ZnSO_4$       | zinc sulfate        |
| h. $Fe_2(SO_3)_3$ | iron (III) sulfite  |
| i. $KC_2H_3O_2$   | potassium acetate   |
| j. NaI            | sodium iodide       |

4. Write the formula for the following ionic compounds.
- |                        |  |
|------------------------|--|
| a. Lithium bromide     | LiBr   |
| b. Calcium carbonate   | CaCO <sub>3</sub>  |
| c. Beryllium nitride   | Be <sub>3</sub> N <sub>2</sub>                                 |
| d. Potassium nitrate   | KNO <sub>3</sub>   |
| e. Copper (II) sulfite | CuSO <sub>3</sub>  |
| f. Gold (I) phosphate  | Au <sub>3</sub> PO <sub>4</sub>                                |
| g. Cobalt (III) oxide  | Co <sub>2</sub> O <sub>3</sub>                                 |
| h. Calcium acetate     | Ca(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> |
| i. Iron (III) cyanide  | Fe(CN) <sub>3</sub>  |
| j. Aluminum hydroxide  | Al(OH) <sub>3</sub>  |
5. Name the following ionic (metal:non-metal) compounds:
- |  |                      |
|--|----------------------|
| a. Fe(NO <sub>3</sub> ) <sub>3</sub>               | Iron (III) nitrate   |
| b. MgBr <sub>2</sub>                               | Magnesium bromide    |
| c. Au <sub>2</sub> S                               | Gold (I) sulfide     |
| d. Na <sub>3</sub> PO <sub>4</sub>                 | Sodium phosphate     |
| e. K <sub>4</sub> C                                | Potassium carbide    |
| f. ZnCl <sub>2</sub>                               | Zinc (II) Chloride   |
| g. Co <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> | Cobalt (III) sulfate |
| h. Al <sub>2</sub> S <sub>3</sub>                  | Aluminum sulfide     |
| i. CaS   | Calcium sulfide      |
| j. NiO <sub>2</sub>                                | Nickel (IV) oxide    |
6. Write the formula for the following ionic compounds:
- |                           |  |
|---------------------------|--|
| a. Iron (II) acetate      | Fe(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> |
| b. Copper (I) oxide       | Cu <sub>2</sub> O  |
| c. Gold (III) nitride     | AuN  |
| d. Calcium phosphate      | Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>                |
| e. Potassium sulfate      | K <sub>2</sub> SO <sub>4</sub>                                 |
| f. Ruthenium (II) nitrate | Ru(NO <sub>3</sub> ) <sub>2</sub>                              |
| g. Sodium chloride        | NaCl   |
| h. Lithium sulfate        | Li <sub>2</sub> SO <sub>4</sub>                                |
| i. Beryllium sulfite      | BeSO <sub>3</sub>  |
| j. Aluminum carbonate     | Al <sub>2</sub> (CO <sub>3</sub> ) <sub>3</sub>                |
7. Write the name of the following covalent (non-metal:non-metal) compounds:
- |                                  |                           |
|----------------------------------|---------------------------|
| a. N <sub>2</sub> O              | dinitrogen monoxide       |
| b. CO <sub>2</sub>               | carbon dioxide            |
| c. CO                            | carbon monoxide           |
| d. NO                            | nitrogen monoxide         |
| e. P <sub>2</sub> S              | diphosphorus monosulfide  |
| f. NBr <sub>3</sub>              | nitrogen tribromide       |
| g. IBr                           | iodine monobromide        |
| h. CF <sub>4</sub>               | carbon tetrafluoride      |
| i. P <sub>2</sub> F <sub>6</sub> | diphosphorus hexafluoride |
| j. C <sub>2</sub> S <sub>4</sub> | dicarbon tetrasulfide     |
8. Write the formula for the following covalent compounds:
- |                              |   |
|------------------------------|---|
| a. Nitrogen trisulfide       | NS <sub>3</sub>                                   |
| b. Oxygen difluoride         | F <sub>2</sub> O                                  |
| c. Diphosphorus pentoxide    | P <sub>2</sub> O <sub>5</sub>                     |
| d. Sulfur dichloride         | SCl <sub>2</sub>                                  |
| e. Nitrogen triiodide        | NI <sub>3</sub>                                   |
| f. Disulfur tetrachloride    | S <sub>2</sub> Cl <sub>4</sub>                    |
| g. Dicarbon hexabromide      | C <sub>2</sub> Br <sub>6</sub>                    |
| h. Tricarbon octafluoride    | C <sub>3</sub> F <sub>8</sub>                     |
| i. Dihydrogen monoxide       | H <sub>2</sub> O                                  |
| j. Tetrahydrogen monocarbide | H <sub>4</sub> C (i.e. methane, CH <sub>4</sub> ) |

9. Write the name for the following acids:

- |    |                         |                   |
|----|-------------------------|-------------------|
| a. | $\text{H}_2\text{SO}_4$ | Sulfuric acid     |
| b. | $\text{HCl}$            | Hydrochloric acid |
| c. | $\text{HBr}$            | Hydrobromic acid  |
| d. | $\text{HNO}_3$          | Nitric acid       |
| e. | $\text{HF}$             | Hydrofluoric acid |
| f. | $\text{H}_3\text{PO}_4$ | Phosphoric acid   |
| g. | $\text{H}_2\text{SO}_3$ | Sulfurous acid    |
| h. | $\text{HNO}_2$          | Nitrous acid      |
| i. | $\text{HI}$             | Hydroiodic acid   |

10. Write the formula for the following acids:

- |    |                   |                                   |
|----|-------------------|-----------------------------------|
| a. | Nitrous acid      | $\text{HNO}_2$                    |
| b. | Hydrochloric acid | $\text{HCl}$                      |
| c. | Hydrobromic acid  | $\text{HBr}$                      |
| d. | Sulfuric acid     | $\text{H}_2\text{SO}_4$           |
| e. | Sulfurous acid    | $\text{H}_2\text{SO}_3$           |
| f. | Acetic acid       | $\text{HC}_2\text{H}_3\text{O}_2$ |
| g. | Carbonic acid     | $\text{H}_2\text{CO}_3$           |
| h. | Perchloric acid   | $\text{HClO}_4$                   |

11. Mixed bag. Name the following compounds:

- |    |                         |                        |
|----|-------------------------|------------------------|
| a. | $\text{MgI}_2$          | Magnesium iodide       |
| b. | $\text{HClO}_4$         | Perchloric acid        |
| c. | $\text{C}_3\text{Cl}_8$ | Tricarbon octachloride |
| d. | $\text{Co}_2\text{S}_3$ | Cobalt (III) sulfide   |
| e. | $\text{AgNO}_3$         | Silver nitrate         |
| f. | $\text{CuSO}_4$         | Copper (II) sulfate    |
| g. | $\text{HBr}$            | Hydrobromic acid       |
| h. | $\text{NaCl}$           | Sodium chloride        |
| i. | $\text{ZnS}$            | Zinc (II) sulfide      |

12. Mixed bag. Give the formula for the following compounds:

- |    |                       |   |
|----|-----------------------|---|
| a. | Gold (III) sulfide    | $\text{Au}_2\text{S}_3$                       |
| b. | Hydrofluoric acid     | $\text{HF}$                                   |
| c. | Aluminum oxide        | $\text{Al}_2\text{O}_3$                       |
| d. | Magnesium sulfate     | $\text{MgSO}_4$                               |
| e. | Nitric acid           | $\text{HNO}_3$                                |
| f. | Iron (III) acetate    | $\text{Fe}(\text{C}_2\text{H}_3\text{O}_2)_3$ |
| g. | Silver (I) nitrate    | $\text{AgNO}_3$                               |
| h. | Potassium phosphate   | $\text{K}_3\text{PO}_4$                       |
| i. | Dicarbon hexafluoride | $\text{C}_2\text{F}_6$                        |

15. Hydrates. Please name the following compounds

- |    |  |                                  |
|----|--|----------------------------------|
| a. | $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$          | Aluminum chloride hexahydrate    |
| b. | $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$          | Calcium sulfate dihydrate        |
| c. | $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$          | Copper (II) sulfate pentahydrate |
| d. | $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$          | Magnesium sulfate heptahydrate   |
| e. | $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ | Barium hydroxide octahydrate     |

16. Hydrates. Please give the formula for the names.

- |    |                                  |  |
|----|----------------------------------|--|
| a. | Copper (III) nitrate trihydrate  | $\text{Cu}(\text{NO}_3)_3 \cdot 3\text{H}_2\text{O}$   |
| b. | Barium chloride dihydrate        | $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$              |
| c. | Cobalt (II) nitrate hexahydrate  | $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$   |
| d. | Cobalt (II) sulfate heptahydrate | $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$              |
| e. | Iron (III) sulfate pentahydrate  | $\text{Fe}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$ |