

## II. Binary Compounds containing Two Non-Metals

The name consists of the non-metal that is further toward the left and bottom of the periodic table, followed by the -ide form of the second non-metal.

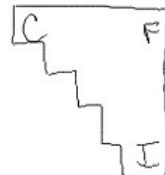
Compounds containing more than one of the non-metal elements can be distinguished by:

Mono – one  
Di – two  
Tri – three  
Tetra – four

Penta – five  
Hexa – six  
Hepta – seven

Octa – eight  
Nona – nine  
Deca – ten

Ex. CO Carbon monoxide  
 $\text{CO}_2$  Carbon dioxide



### Practice: Name the following compounds.

- |                            |                        |                           |                       |
|----------------------------|------------------------|---------------------------|-----------------------|
| 1. $\text{PBr}_3$          | phosphorous tribromide | 4. $\text{SiO}_2$         | silicon dioxide       |
| 2. $\text{CS}_2$           | carbon disulfide       | 5. $\text{N}_2\text{O}_5$ | di nitrogen pentoxide |
| 3. $\text{Cl}_2\text{O}_7$ | dichlorine heptoxide   | 6. $\text{XeF}_4$         | xenon tetrafluoride   |

### Practice: Write the formula for the following compounds.

- |                          |                         |                             |                        |
|--------------------------|-------------------------|-----------------------------|------------------------|
| 1. Dibromine tetraoxide  | $\text{Br}_2\text{O}_4$ | 4. Tetrasulfur tetranitride | $\text{S}_4\text{N}_4$ |
| 2. Diiodine tetraoxide   | $\text{I}_2\text{O}_4$  | 5. Sulfur hexafluoride      | $\text{SF}_6$          |
| 3. Phosphorous triiodide | $\text{PI}_3$           | 6. Oxygen dibromide         | $\text{OBr}_2$         |

## V. Binary Inorganic Compounds (Acids)

Containing a hydrogen and an non-metal. Start with hydrogen then the -ide form of the non-metal. When this type of compound is in an aqueous solution it will form an acid, then state hydro for the hydrogen and add the suffix -ic to the non-metal.

An acid is a molecular substance that when dissolved in water produces hydrogen ions ( $\text{H}^+$ ).

Ex.  $\text{HCl(aq)}$  hydrochloric acid  
 $\text{H}_2\text{S(aq)}$  hydrosulfuric acid

If the combination is hydrogen and a polyatomic ion change the -ate of the polyatomic ion to -ic.

Ex.  $\text{C}_2\text{H}_3\text{O}_2^-$  acetate  $\rightarrow \text{HC}_2\text{H}_3\text{O}_2$  acetic acid  
 $\text{PO}_4^{3-}$  phosphate  $\rightarrow \text{H}_3\text{PO}_4$  phosphoric acid

## VI. Ternary Compounds (Acids)

Chlorine, nitrogen, sulfur, phosphorus, and others form oxyacids. Oxyacids are ternary compounds with hydrogen and oxygen.

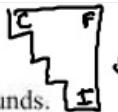
If the acid has the most oxygen then it has the suffix -ic.

If the acid has fewer oxygen then it has the suffix -ous.

If the acid has the greatest number of oxygen it has the prefix per-.

If the acid has the least number of oxygen it has the prefix hypo-.

Ex.  $\text{HClO}_4$  Perchloric acid  
 $\text{HClO}_3$  Chloric acid  
 $\text{HClO}_2$  Chlorous acid  
 $\text{HClO}$  Hypochlorous acid

 and w/ ide

n.m. + oxygen  
end -ide  
-ite

Write the name for the following ionic compounds.

- |   |                          |  |                           |
|---|--------------------------|--|---------------------------|
| 26. Mg <sub>3</sub> N <sub>2</sub>                  | <u>magnesium nitride</u> | 31. Ag <sub>2</sub> S                                | <u>Silver(II) sulfide</u> |
| 27. Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub> | <u>calcium phosphate</u> | 32. Fe(NO <sub>3</sub> ) <sub>3</sub>                | <u>iron(III) nitrate</u>  |
| 28. Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> | <u>aluminum sulfate</u>  | 33. Ba(CO <sub>3</sub> )                             | <u>barium carbonate</u>   |
| 29. (NH <sub>4</sub> )Cl                            | <u>ammonium chloride</u> | 34. Li <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) | <u>lithium oxalate</u>    |
| 30. K <sub>2</sub> O                                | <u>potassium oxide</u>   | 35. CuI <sub>2</sub>                                 | <u>copper(II) iodide</u>  |

Write the formula for the following ionic compounds.

- |                           |                                       |                            |   |
|---------------------------|---------------------------------------|----------------------------|---|
| 36. Calcium sulfide       | <u>CaS</u>                            | 41. Barium phosphate       | <u>Ba<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub></u> |
| 37. Magnesium phosphide   | <u>Mg<sub>3</sub>P<sub>2</sub></u>    | 42. Ammonium nitrite       | <u>(NH<sub>4</sub>)(NO<sub>2</sub>)</u>           |
| 38. Sodium sulfate        | <u>Na<sub>2</sub>(SO<sub>4</sub>)</u> | 43. Aluminium chloride     | <u>AlCl<sub>3</sub></u>                           |
| 39. Potassium bicarbonate | <u>K(HCO<sub>3</sub>)</u>             | 44. Cesium bromide         | <u>CsBr</u>                                       |
| 40. Zinc bromide          | <u>ZnBr<sub>2</sub></u>               | 45. Potassium permanganate | <u>K(MnO<sub>4</sub>)</u>                         |

Write the names for the following metallic compounds.

- |          |                            |                                    |                           |
|----------|----------------------------|------------------------------------|---------------------------|
| 46. CuCl | <u>copper(II) chloride</u> | 48. Fe <sub>2</sub> O <sub>3</sub> | <u>iron(III) oxide</u>    |
| 47. HgO  | <u>mercury(II) oxide</u>   | 49. Bi <sub>2</sub> O <sub>3</sub> | <u>bismuth(III) oxide</u> |

Write the formula for the following metallic compounds.

- |                          |                         |                          |                                       |
|--------------------------|-------------------------|--------------------------|---------------------------------------|
| 50. Tin(IV) chloride     | <u>SnCl<sub>4</sub></u> | 55. Mercury(I) nitride   | <u>Hg<sub>2</sub>N</u>                |
| 51. Cobalt(II) fluoride  | <u>CoF<sub>2</sub></u>  | 56. Iron(II) oxide       | <u>FeO</u>                            |
| 52. Chromium(II) sulfide | <u>CrS</u>              | 57. Copper(II) hydroxide | <u>Cu(OH)<sub>2</sub></u>             |
| 53. Lead(II) sulfide     | <u>PbS</u>              | 58. Iron(III) nitrate    | <u>Fe(NO<sub>3</sub>)<sub>3</sub></u> |
| 54. Tin(II) bromide      | <u>SnBr<sub>2</sub></u> | 59. Copper(II) iodide    | <u>CuI<sub>2</sub></u>                |

Write the name for the following covalent compounds.

- |                                   |  |                                    |  |
|-----------------------------------|--|------------------------------------|--|
| 60. NO                            |  | 65. N <sub>2</sub> O <sub>3</sub>  |  |
| 61. P <sub>2</sub> O <sub>5</sub> |  | 66. S <sub>2</sub> Br <sub>2</sub> |  |
| 62. PCl <sub>5</sub>              |  | 67. CS <sub>2</sub>                |  |
| 63. IF <sub>7</sub>               |  | 68. ClF <sub>5</sub>               |  |
| 64. CBr <sub>4</sub>              |  | 69. SO <sub>3</sub>                |  |

IA	IIA	GrpB imitate based on charge	IIIA	IVA	VIA	VIIA	VIIIA	VIIIC-A
X <sup>-</sup>	X <sup>-</sup>		X <sup>-</sup>	X <sup>-</sup>	X <sup>-</sup>	X <sup>-</sup>	X <sup>-</sup>	X <sup>-</sup>
I+	2+		3+	4+	3-	2-	1-	3-
—	linear		trigonal planar	tetra- hedral	pyra- midal	bent	—	none

### Type of Bonds

0 - 0.49 nonpolar covalent - NPC — non-polar molecule

0.5 - 1.9 polar covalent - PC

2.0 - 4.0 ionic - I

} will need arrows to determine  
molecular polarity

	Lewis Dot Structure	Bond Stick	Type of Bonds	Name of shape	Molecular Polarity
SeBr <sub>2</sub>	:Br:Se:Br:	Br-se   Br	2.8 2.4 1.4 NPC	bent	nonpolar molecule
GaCl <sub>3</sub>	:Cl:Ga:Cl:	Cl-Ga-Cl   Cl	Cl 3.0 Ga 1.6 1.4 PC	trigonal planar	↔ nonpolar mol.
PF <sub>3</sub>	P(F) <sub>3</sub>	P(F) <sub>3</sub>	F 4.0 P 2.1 1.9 PC	pyramidal	↙ ↘ Polar mol.
MgI <sub>2</sub>	I-Mg-I	I-Mg-I	I 2.5 Mg 1.2 1.3 PC	linear	←→ nonpolar mol.

Homework: Study for bonds + shapes Quiz, Study polyatomic ions.

