

## Types of Chemical Bonds

	Ionic	Covalent	Metallic
Elements Involved	Metals + nonmetals (Cations + Anions)	non metal + non metal (Anion + Anion)	Metals
Electron Distribution	Transferred	Shared Non polar = Unequal Sharing    Polar = Equal Sharing	Pooled
Example	Li Br, $\text{NH}_4\text{ClO}_3$ , MgCl, NaCl	$\text{H}_2\text{O}$ , $\text{SiH}_4$ , HF, $\text{CO}_2$ , $\text{CH}_4$	CopperWire

## Rules of naming:

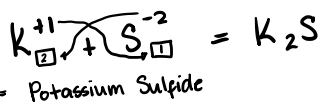
(Main Group) Ionic Compounds – no prefixes and no Roman Numerals

• Cation + Anion - ide

↳ Metals (Cations) from group 1, 2, or 13

↳ Nonmetals (Anions) from group 15-17

Example:



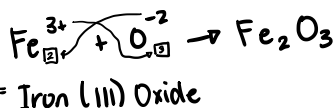
(Transition) Ionic Compounds – use Roman numerals for charge

• Cation - Roman Numeral + Anion - ide

↳ Cations from 3-12

↳ Anions from 15-17

Example:



(Molecular (Covalent) Compounds – use prefixes

Prefix - First Element + Prefix - Second Element - ide

• Use prefixes to indicate the number of atoms of each type in the molecule

• Do not use mono- with the first element in the name

Example:

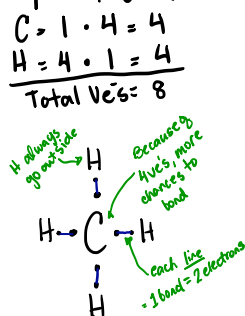
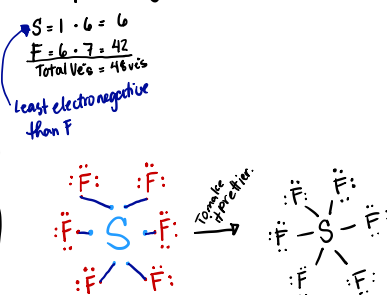


## Prefixes for Molecular Compound

one	mono-	six	hexa-
two	di-	seven	hepta-
three	tri-	eight	octa-
four	tetra-	nine	nona-
five	penta-	ten	deca-

## Rules of Drawing Lewis Dot Structure:

- Find the total number of valence electrons (ve's)
- Put the least electronegative atom in the center.
  - Hydrogen always goes outside.
- Complete octets on the outside atoms.
- If central atoms doesn't have an octet, move electrons from outer atoms to form double or triple bonds.

Example: Methane =  $\text{CH}_4$ Example:  $\text{SF}_6$  = Sulfur Hexafluoride

**Polyatomic Ion** – Fill in the missing formulas or names of the polyatomic ions.

<b>Cations</b>			
Ammonium	$\text{NH}_4^{+1}$	Hydronium	$\text{H}_3\text{O}^+$
<b>Miscellaneous Anions</b>			
Hydroxide	$\text{OH}^-$	Cyanide	$\text{CN}^{-1}$
Peroxide	$\text{O}_2^{-2}$	Azide	$\text{N}_3^-$
<b>Oxycarbon Anions</b>			
Carbonate	$\text{CO}_3^{-2}$		
<b>Oxynitrogen Anions</b>			
Nitrite	$\text{NO}_2^{-1}$	Nitrate	$\text{NO}_3^{-1}$
<b>Oxysulfur Anions</b>			
Sulfite	$\text{SO}_3^{-2}$	Sulfate	$\text{SO}_4^{-2}$
<b>Oxyphosphorus Anions</b>			
Phosphite	$\text{PO}_3^{-3}$	Phosphate	$\text{PO}_4^{-3}$
<b>Oxyhalide Anions</b>			
<i>hypo</i> Fluorite	$\text{FO}^{-1}$	Fluorite	$\text{FO}_2^{-1}$
Fluorate	$\text{FO}_3^{-1}$	<i>per</i> Fluorate	$\text{FO}_4^{-1}$
<i>hypo</i> chlorite	$\text{ClO}^{-1}$	Chlorite	$\text{ClO}_2^{-1}$
Chlorate	$\text{ClO}_3^{-1}$	<i>per</i> Chlorate	$\text{ClO}_4^{-1}$
<i>hypo</i> Bromite	$\text{BrO}^{-1}$	Bromite	$\text{BrO}_2^{-1}$
Bromate	$\text{BrO}_3^{-1}$	<i>per</i> Bromate	$\text{BrO}_4^{-1}$
<i>hypo</i> Iodite	$\text{IO}^{-1}$	Iodite	$\text{IO}_2^{-1}$
Iodate	$\text{IO}_3^{-1}$	<i>per</i> Iodate	$\text{IO}_4^{-1}$
<b>Transition Metal Containing Anions</b>			
Chromate	$\text{CrO}_4^{-2}$	Dischromate	$\text{Cr}_2\text{O}_7^{-2}$
<i>per</i> Manganate	$\text{MnO}_4^{-1}$		
<b>Organic Acid Derivatives</b>			
Acetate	$\text{CH}_3\text{COO}^{-1}$		

1. The formulas and common names for several substances are given below. Give the systematic names for these substances.

	Common Name	Chemical Formula	Systematic Name
a.	Sugar of lead	Pb(CH <sub>3</sub> COO) <sub>2</sub> Note: CH <sub>3</sub> COO is a polyatomic ion. See your polyatomic ion table for name and charge.	Lead (II) Acetate
b.	Blue vitrol	CuSO <sub>4</sub>	Copper (II) Sulfate
c.	Epsom salts	MgSO <sub>4</sub>	Magnesium Sulfate
d.	Milk of magnesia	Mg(OH) <sub>2</sub>	Magnesium Hydroxide
e.	Gypsum	CaSO <sub>4</sub>	Calcium Sulfate
f.	Laughing gas	N <sub>2</sub> O	Dinitrogen Monoxide

2. Write the formula for each of the following compounds:

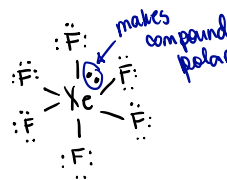
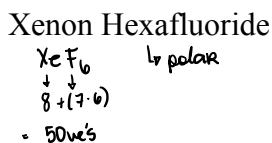
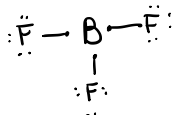
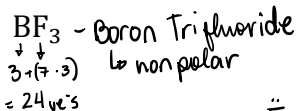
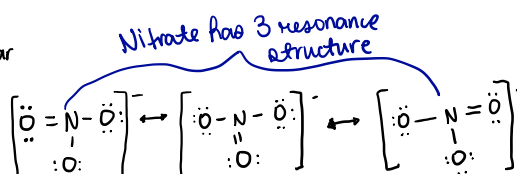
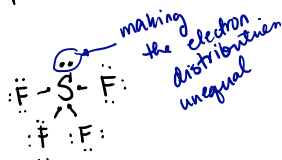
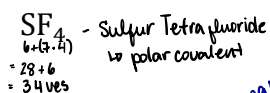
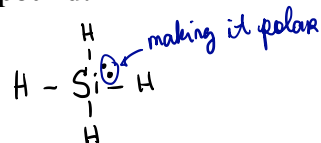
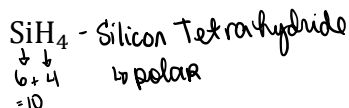
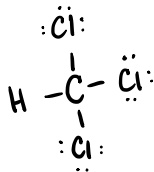
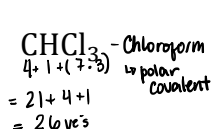
- |                             |   |                                |   |
|-----------------------------|---|--------------------------------|---|
| a. Sulfur difluoride        | SF <sub>2</sub>                                 | g. Ammonium acetate            | NH <sub>4</sub> CH <sub>3</sub> COO             |
| b. Sulfur hexafluoride      | SF <sub>6</sub>                                 | h. Ammonium hydrogen carbonate | (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> |
| c. Sodium phosphate         | Na <sub>3</sub> PO <sub>4</sub>                 | i. Cobalt (III) nitrate        | Co(NO <sub>3</sub> ) <sub>3</sub>               |
| d. Lithium nitride          | Li <sub>3</sub> N                               | j. Copper (II) chloride        | CuCl <sub>2</sub>                               |
| e. Chromium (III) carbonate | Cr <sub>2</sub> (CO <sub>3</sub> ) <sub>3</sub> | k. Potassium sulfite           | K <sub>2</sub> SO <sub>3</sub>                  |
| f. Tin (II) fluoride        | SnF <sub>2</sub>                                | l. Sodium hydroxide            | NaOH  |

3. Name each of the following compounds.

- |    |                                |  |
|----|--------------------------------|--|
| a. | CuF                            | Copper (I) Fluoride                    |
| b. | CdI <sub>2</sub>               | Cadmium Iodide                         |
| c. | HI                             | Hydrogen Monoiodide OR Hydroiodic Acid |
| d. | NO                             | Nitrogen Monoxide                      |
| e. | NF <sub>3</sub>                | Nitrogen Trifluoride                   |
| f. | N <sub>2</sub> Cl <sub>2</sub> | Dinitrogen Dichloride                  |
| g. | CF <sub>4</sub>                | Carbon Tetrafluoride                   |
| h. | KCl                            | Potassium Chloride                     |
| i. | NaNO <sub>3</sub>              | Sodium Nitrate                         |

- j.  $\text{Ca}(\text{NO}_2)_2$  Calcium Nitrite  
 k.  $\text{Mg}_3(\text{PO}_4)_2$  Magnesium Phosphate  
 l.  $\text{H}_3\text{P}$  Trihydrogen Monophosphide  
 m.  $\text{Na}_2\text{SO}_4$  Sodium Sulfate  
 n.  $\text{Ca}(\text{HCO}_3)_2$  Calcium Bicarbonate

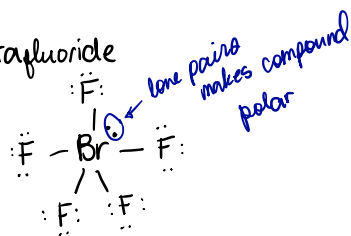
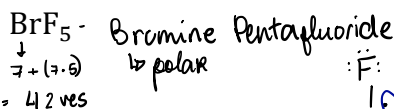
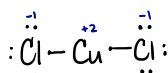
4. Draw the Lewis dot structure of the following compounds, determine whether compounds are ionic, polar or non-polar. Also, provide the name or the formula of the compound.



Copper (II) Chloride



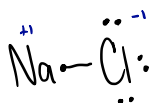
↳ ionic



$\text{NaCl}$

Sodium Chloride

↳ ionic



Hydrogen Fluoride

