Chapter 6 Structure of Matter: Guided Notes

Section 6.1: Compounds and Molecules

Compounds

- Result from way _____or _____ are _____
  - Similarities & differences of _____
- When _____, the resulting compound has _____very _____ from those of _____that make it
- Always have same _____

What are bonds?

- A _____is an attractive _____ that holds _____ or _____.
- Atoms bond when their _____ interact.
  - This way, the _____ of the atom is _____.

Bonds are Flexible…

- Bonds are _____ like toothpicks, they ARE like _____ ☺
- There are many _____, but the atoms are not _____.
  - Atoms move _____.

Chemical Structure

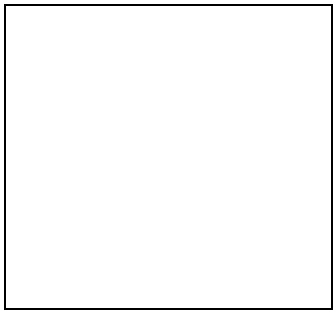
- Chemical Structure is the way the _____ are _____to make the _____.
- _____ is the _____between the _____ of two _____. You can see this in the _____ model.
- Compounds with _____or more atoms have _____.

Models	
Ball-and-stick:	
Space-filling:	
Structural	

Electron Dot Diagram

- A way of keeping track of _____.
- How to write them -_____
- Write the _____.
- Put one _____ for each valence electron
- Don't pair up until they have to

Example: Nitrogen 5e-



Write the electron dot diagram for the following elements.

- Cation
  - _____lose electrons to fill their outer levels
  - They make _____.
- Anion
  - _____ gain electrons to fill their outer levels
  - They make _____.

What are 3 ways that atoms can form bonds?	
1. Ionic Bonds	
2. Covalent Bonds	
3. Metallic Bonds	

Ionic Bonds

- bond formed between _____ by the _____ of _____
- Ionic compounds result when _____
- Valence electrons from one atom are _____to another atom.
- **Properties of Ionic Compounds**
  - Stronger _____
  - _____ points
  - Conduct _____when in solution or in a _____
  - Generally _____
  - Generally _____ at room temp.
- Ionic Compounds
  - _____: NaCl, or _____ for every _____ ion.
  - _____: CaF2, or _____ for every _____ ions.

For each elements on your notes, predict the charge of its most common ion using the periodic table.

P _____	Ne _____	Ca _____	Be _____	I _____	He _____
Na _____	Mg _____	Br _____	O _____	Li _____	F _____
S _____	K _____	N _____	Cs _____	Cl _____	Xe _____

- **Transition metals**
  - Transition metals are _____.
  - Form _____ because they are _____.
  - The _____ are important in determining the _____ of an ionic compound.

    Iron (II) _____ **Iron (III) _____**
    Copper (II) _____ **Copper (I) _____**
    Tin (IV) _____ **Tin (II) _____**
    Lead (II) _____ **Lead (IV) _____**
  - Example: iron (III) oxide _____

- **<u>Writing Ionic Formulas</u>**

  1. Write the chemical symbols for the _____(first) and_____ (second).
  2. Write the _____number on top of the Chemical Symbols for the cation and anion.
  3. _____ the oxidation numbers writing each number as a _____ for the other _____or _____ ion.
  4. Reduce subscripts if they can be _____. Ex. _____

Example

1. sodium chloride	2. magnesium oxide	3. magnesium sulfide

- **<u>Write the formula (transition metals)</u>**
  1. Copper (I) chloride _____
  2. Lead (IV) Oxide _____
  3. Chromium (I) Sulfide _____
  4. Nickel (II) Oxide _____
  5. Silver (II) Fluoride _____
  6. Manganese (II) Nitride _____

- **Rules for Naming Ions**

1. The names of metals _____
2. Changing the name of _____:
   - Root of element name + _____ = name of ion
   - Examples: The name of chlorine's ion: _____
     The name of nitrogen's ion: _____

Sulfur _____ **Lithium** _____
Nitrogen _____ **Bromine** _____
Potassium _____ **Chlorine** _____
Oxygen _____ **Hydrogen** _____

- **Name the following Ions Practice**

1. NaF _____ 2. MgO _____
3. $SrCl_2$ _____ 4. Li_2S _____
5. CaO _____ 6. KI _____

- **Name the following Ions (transition metals)**

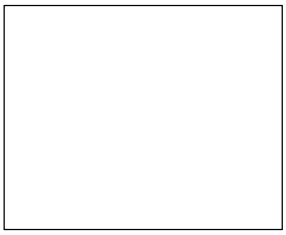
1. CuCl _____ 2. PbO_2 _____
3. ZnS _____ 4. Ni_2O_3 _____
5. NiO _____ 6. $MnBr_4$ _____

- **Polyatomic Ions**
  - Ions that form after elements have _____ electrons.
  - Each polyatomic ion already has a name.
  - Ends in _____ or _____.

Common Polyatomic Ions			
NH_4^+	ammonium	CrO_4^{-2}	chromate
$C_2H_3O_2^-$	acetate	$Cr_2O_7^{-2}$	dichromate
CN^-	cyanide	MnO_4^-	permanganate
CO_3^{-2}	carbonate	NO_2^-	nitrite
HCO_3^-	bicarbonate	NO_3^-	nitrate
$C_2O_4^{-2}$	oxalate	OH^-	hydroxide
ClO^-	hypochlorite	PO_4^{-3}	phosphate
ClO_2^-	chlorite	SO_3^{-2}	sulfite
ClO_3^-	chlorate	SO_4^{-2}	sulfate
ClO_4^-	perchlorate	$S_2O_3^{-2}$	thiosulfate

- **Rules for Naming Polyatomic Ions**

Step 1: Write the symbol of the _____.
Step 2: Write the formula of the _____.
Step 3: Determine the _____ using the periodic table and the _____of polyatomic ions.
Step 4: Determine the formula from the ions.
  - The atoms in _____ reminds us they are a single ion.



  - **Figure out the polyatomic ion formula.**
    1. Potassium hydroxide _____ 2. Sodium carbonate _____
    3. Hydrogen carbonate _____ 4. Calcium chlorate _____

  - **Figure out the polyatomic ion name.**
    1. NH_4F_____ 2. $CaSO_4$ _____
    3. $Mg(NO_3)_2$ _____ 4. NaOH _____

Practice Naming Ion Compounds

$CaCl_2$ _____

K_2S _____

$KMnO_4$ _____

BaO _____

NH_4Cl _____

$CsCl$ _____

$MgSO_4$ _____

$NaBr$ _____

AlP _____

$ZnCl_2$ _____

CuO _____

$Pb3N$ _____

Practice Writing Ionic Compound Formulas

potassium iodide _____

tin (IV) chloride _____

barium sulfate _____

sodium chloride _____

strontium sulfide _____

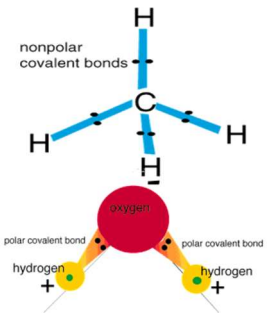
copper (II) carbonate _____

aluminum bromide _____

lithium nitride _____

Covalent Bonds

- Occur between _____
- Formed when two atoms _____ with _____
- _____ hold onto their _____, but want a _____
- A _____ when two atoms _____
- Can be between _____, or between two atoms of the _____
- They actually form molecules. (Molecular compounds)
- Atoms may share more than _____ of electrons.
  - A _____ is when atoms share two pair (___) of electrons.
  - A _____ is when atoms share three pair (___) of electrons.
- **Properties of Covalent Compounds**
  - Weaker _____
  - Low _____ and _____
  - Do _____ when in solution
  - Generally _____
  - Generally _____or _____ at room temperature
- Atoms _____ always share electrons _____.
  - _____ Covalent Bond- electrons are shared equally.
  - _____ Covalent Bond- Unequal sharing of electrons



- There are _____ that exist in nature as _____molecules.
  - Ex: _____
- _____ Compounds
  - What does binary mean?
  - Binary covalent compounds are between _____.
- Nonmetals can share electrons in many _____.
- Two nonmetals can create multiple compounds together.
  - Example:
- Hydrogen only has _____ and _____
  - Behaves _____ than any other element on the PT
  - This means that hydrogen can act as either a _____or a _____
- **Prefixes**
  - To show the correct ratio of elements, we use _____.
  - Remove the ____ or _____ from a prefix before adding it to element. Leave _____.

How would you write each of the prefixes in front of oxide?

mono- _____ di- _____
tri- _____ tetra- _____
penta- _____ hexa- _____
hepta- _____ octa- _____
nona- _____ deca- _____

Prefix	Number
mono	1
di	2
tri	3
tetra	4
penta	5
hexa	6
hepta	7
octa	8
nona	9
deca	10

Naming Binary Covalent Bonds

Step 1: Write the name of the first _____.
Step 2: Write the name of the _____ changing its ending to -ide.
Step 3: Add _____ to specify how many of each element are present.

Rules for Using Prefixes

- Rule 1: Prefixes are only for _____ compounds.
- Rule 2: The prefix _____ is never used on the _____ of a binary covalent compound. It is _____ that there is only 1.
  - Example: CO_2 is _____, and not monocarbon dioxide.
- Rule 3: Remove the -o or -a from a prefix before adding it to _____.
  - Example: CO is _____, and not carbon monooxide.

Name the binary covalent compounds

CO_2: _____

CS_2: _____

PBr_3: _____

PBr_5: _____

P_2S_5: _____

N_2S: _____

SiS_2: _____

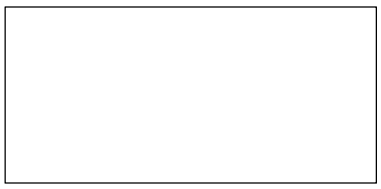
NBr_3: _____

N_2Cl_4: _____

Writing Covalent Bond Formulas

Step 1: Write the symbol of the _____ and the _____ that matches the _____.

Step 2: Write the symbol of the _____ and the _____ that matches the _____.



What is the formula of each of the binary covalent compounds named below.

carbon tetrachloride _____

phosphorous pentachloride _____

dinitrogen monoxide _____

carbon monosulfide _____

boron trihydride _____

disulfur hexabromide _____

silicon disulfide _____

phosphorous triiodide _____

nitrogen trichloride _____

iodine heptafluoride _____

dinitrogen tetroxide _____

phosphorous trichloride _____

carbon monoxide _____

iodine monochloride _____

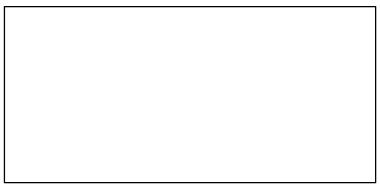
tetrasulfur tetranitride _____

dihydrogen monoxide _____

chlorine pentafluoride _____

nitrogen dioxide _____

Metallic Bond



- The bonding between atoms within _____.
- The sharing of _____ electrons.
  - _____of electrons
- Metals are _____ and conduct _____ well
  - Their atoms and electrons can _____ throughout a metal's packed structure.

Review

- What elements do ionic compounds contain?
- What elements do covalent compounds contain?
- Decide whether the compounds are ionic or covalent.

SrO____	NCl_3 _____	KF _____	AgCl _____
N_2O_4____	CBr_3 _____	$AlCl_3$ _____	$NaNO_3$ _____
CaF_2____	IF_7 _____	CO _____	Fe_2O_3 _____

- Write the formulas of the compounds.

hydrogen monochloride: _____

barium fluoride _____

tin (II) sulfide _____

dinitrogen monoxide _____

carbon disulfide_____

disulfur hexachloride _____

sodium phosphate _____

platinum (II) chloride _____