

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	

How does Structure Affect Properties?

- The _____ of a compound determines its _____.
- Network Structures:
 - Atom _____
 - _____ with network structures are _____.
 - Ex) SiO_2 / _____
 - Networks with _____:
 - _____ ions
 - High _____ and _____ points
 - Example: NaCl / _____
 - Compounds made of molecules:
 - Sugar, _____
 - Weak _____ between each _____, despite the strong attraction _____ that make up each molecule.
- Different _____ have different _____ of _____.
 - The stronger the attraction between molecules, the higher the boiling and melting points.
 - When _____ is attracted to an atom of _____, this is called a _____.

Section 6.2: Ionic and Covalent Bonding

Why Do Chemical Bonds Form?

- Atoms bond so each will end up with a stable _____
- Full outermost _____
- To become more _____

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.

--	--	--	--	--	--	--

Electron Configuration

- 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

- Valence electrons from one atom are _____ to another atom.
- They become _____
- _____ charged ions are _____ to each other.
- Very _____ that form between ions with opposite charges.
 - Cations and anions
- In the form of _____, not _____.
- Forms _____.
- When you melt or _____ compounds in water, the _____ to move around.
- This allows them to _____!
- Ionic Compounds
 - _____: NaCl, or _____ for every _____ ion.
 - _____: CaF₂, or _____ for every _____ ions.

Chemical Formula	
NaCl	
MgO	
MgCl ₂	
Al ₂ O ₃	

• **Transition metals**

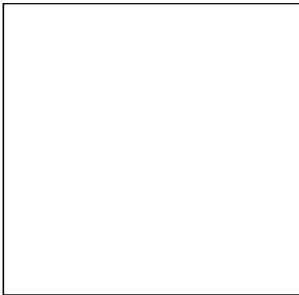
- Transition metals are _____.
- Form _____ because they are _____.
- The _____ are important in determining the _____ of an ionic compound.

Iron (II) _____	Iron (III) _____
Copper (II) _____	Copper (I) _____
Tin (IV) _____	Tin (II) _____
Lead (II) _____	Lead (IV) _____

- Example: iron (III) oxide _____

• **Writing Ionic Formulas**

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. _____



• **Rules for Naming Ions**

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

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

- Name the following Ions

1. NaF _____	2. MgO _____
3. SrCl ₂ _____	4. Li ₂ S _____
5. CaO _____	6. KI _____

- Name the following Ions (transition metals)

1. CuCl _____	2. PbO ₂ _____
3. ZnS _____	4. Ni ₂ O 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 _____.

SO₄⁻² _____ CO₃⁻² _____

MnO₄⁻ _____ SO₃⁻² _____

OH⁻ _____ NO₃⁻ _____

Common Polyatomic Ions			
NH ₄ ⁺	ammonium	CrO ₄ ⁻²	chromate
C ₂ H ₃ O ₂ ⁻	acetate	Cr ₂ O ₇ ⁻²	dichromate
CN ⁻	cyanide	MnO ₄ ⁻	permanganate
CO ₃ ⁻²	carbonate	NO ₂ ⁻	nitrite
HCO ₃ ⁻	bicarbonate	NO ₃ ⁻	nitrate
C ₂ O 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 ₂ O ₃ ⁻²	thiosulfate

• Rules for Naming Polyatomic Ions

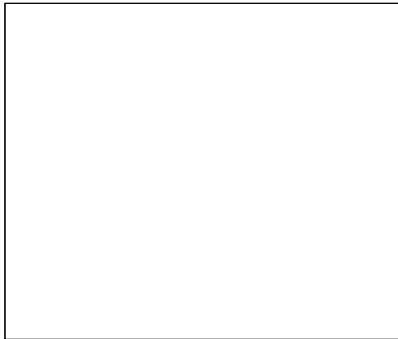
Step 1: Write the symbol of the _____.

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 _____

3. Hydrogen carbonate _____

2. Sodium carbonate _____

4. Calcium chlorate _____

- Figure out the polyatomic ion name.

1. NH₄F _____

3. Mg(NO₃)₂ _____

2. CaSO₄ _____

4. NaOH _____

Practice Naming Ion Compounds

CaCl₂ _____

K₂S _____

KMnO₄ _____

BaO _____

NH₄Cl _____

CsCl _____

MgSO₄ _____

NaBr _____

AlP _____

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

- Formed by _____ and _____
- Nonmetals _____ their valence electrons, but want a full outer shell
- A _____ formed when two _____ electrons.
- 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.
- Different from an _____ bond because they actually form _____.
- Often use a _____ to indicate a bond
- Called a _____
- Each line is _____
 - Example: _____
- Atoms _____ always share electrons _____.
 - _____ Covalent Bond- electrons are shared equally.
 - _____ Covalent Bond- Unequal sharing of electrons
- There are _____ that exist in nature as _____ molecules.
 - $H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2$
- There are _____ of covalent compounds.
- You will be learning about the easiest type of covalent compound to name:
 - _____ 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- _____

tri- _____

penta- _____

hepta- _____

nona- _____

di- _____

tetra- _____

hexa- _____

octa- _____

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 monoxide.

Name the binary covalent compounds

CO_2 : _____

N_2S : _____

CS_2 : _____

SiS_2 : _____

PBr_3 : _____

NBr_3 : _____

PBr_5 : _____

N_2Cl_4 : _____

P_2S_5 : _____

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 _____

iodine heptafluoride _____

phosphorous pentachloride _____

dinitrogen tetroxide _____

dinitrogen monoxide _____

phosphorous trichloride _____

carbon monosulfide _____

carbon monoxide _____

boron trihydride _____

iodine monochloride _____

disulfur hexabromide _____

tetrasulfur tetranitride _____

silicon disulfide _____

dihydrogen monoxide _____

phosphorous triiodide _____

chlorine pentafluoride _____

nitrogen trichloride _____

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.



Empirical vs Molecular formulas

- The empirical formula tells us the _____ formula, or the smallest _____ ratio of atoms in a compound.
 - _____ compounds can have the same _____ formula (ratio of atoms).
- The _____ formula tells you _____ how many atoms are in one molecule of a compound.
 - All compounds have _____ molecular formulas.

Acids and Bases

- _____ was a scientist who defined acids and bases.
- He defined an acid as any substance which donates a _____
- He defined a base as any substance which donates a _____

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 ₂ O ₄ _____	CBr ₃ _____	AlCl ₃ _____	NaNO ₃ _____
CaF ₂ _____	IF ₇ _____	CO _____	Fe ₂ O 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 _____