Name _____ Date _____ Period _____

Unit 4 Covalent Bonding Webquest

Activity #1- Introduction to Covalent Bonding

Open Chemical Bonding. Scroll down to the heading "Covalent Bonding."

1. As opposed to _____ bonding in which a complete transfer of electrons occurs, _____ bonding occurs when two or more elements _____ electrons. Covalent bonding occurs because the atoms in the compound have a similar tendency for electrons (generally to _____ electrons). This most commonly occurs when two _____ bond together. Because both of the nonmetals will want to _____ electrons, the elements involved will share electrons in an effort to _____ their valence shells.

2. How many valence electrons are in one atom of hydrogen?

3. How many valence electrons does hydrogen need to have a full first shell?

4. How does the hydrogen atom "pick up" another electron?

5. What compound does hydrogen form?

6. How do hydrogen atoms make a covalent bond?

7. Visit the simulation, Covalent bonding between hydrogen atoms. Describe or draw what you see.

Name _____ Date _____ Period _____

8. Label the substances below as “ionic” or “covalent”.

NaCl crystal

_____ _____

Activity #2- Introduction to Lewis Structures

1. Go to Lewis Structures (electron dot diagrams). Fill in the chart.

Number of Valence Electrons	1		2		3	4	5	6	7	8
Example	Hydrogen	Group I (Alkali metals)	Helium	Group II (alkali earth metals)	Group III	Group IV	Group V	Group VI	Group VII (Halogens)	Group VIII except Helium (Noble Gases)
Lewis Structure (e- dot diagram)										

2. Write the Lewis structure for an atom of each of the following elements. NOTE: You must look up the group # on the periodic table to do this. Check your answers here.

Element	Lewis structure	Element	Lewis structure	Element	Lewis structure	Element	Lewis structure
Barium		Sulfur		Silicon		Arsenic	
Xenon		Rubidium		Indium		Bromine	

Name _____ Date _____ Period _____

Go to Covalent Bonding.

H_2 Watch it here! 3. Draw the Lewis structure for a a. H atom b. H_2 molecule	H_2 See an explanation 4. Once the H atoms bond, how many electrons a. does each atom have? _____ b. are shared? _____ 5. Each atom is now stable like the noble gas _____.
HBr Watch it here! 6. Draw the Lewis structure for a a. H atom b. Br atom c. HBr molecule	HBr See an explanation 7. How many valence electrons are necessary for a full shell for a. an H atom? _____ b. a Br atom? _____ 8. After bonding, how many electrons a. are shared by the H and Br? _____ b. does H have surrounding it? _____ c. does Br have surrounding it? _____
NH_3 Watch it here! 9. Draw the Lewis structure for a a. H atom b. N atom c. NH_3 molecule	NH_3 See an explanation 10. How many valence electrons necessary for a full shell for a. an H atom? _____ b. a N atom? _____ 11. After bonding, does each atom obey the octet rule?

Name _____ Date _____ Period _____

Activity #3- Lewis Structures for molecules (single bonds)

Open Dr. Gutow's Lewis Structure Tutorial. Follow the steps for each of the following compounds and fill in the diagrams and charts.

CH_4 Step 1:

Atom	# Valence electrons
Total	

CF_2Cl_2 Step 1:

Atom	# Valence electrons
Total	

CH_4 Step 2:
Picture so far

CF_2Cl_2 Step 2:
Picture so far

Total valence electrons	
Used so far	
Remaining	

Total valence electrons	
Used so far	
Remaining	

CH_4 Step 3:
Why are you done after step 2 for this molecule?

CF_2Cl_2 Step 3:
Picture so far

	Total valence electrons	
	Used so far	
	Remaining	

CF_2Cl_2 Step 3:
Why are you done after step 3 for this molecule?

Name _____ Date _____ Period _____

Open Molecular Geometry and Bonding and choose "LEWIS STRUCTURES HAVING ONLY SINGLE BONDS - Quiz" from the list. These quizzes are randomly generated so everyone will have different questions. Enter the molecular formula given (example: NH_2O) and draw the correct Lewis Structure for each question. After you check your answers, you can hit the back button on your browser to see the Lewis Structures again.

Question	Molecular formula	Lewis Structure
1		
2		
3		

Activity #4- Lewis Structures for molecules (multiple bonds)

Open Dr. Gutow's Lewis Structure Tutorial. Follow the steps for each of the following compounds and fill in the diagrams and charts.

SO_2 Step 1:

Atom	# Valence electrons
Total	

O_3 Step 1:

Atom	# Valence electrons
Total	

SO_2 Step 2:
Picture so far

O_3 Step 2:
Picture so far

Name _____ Date _____ Period _____

Total valence electrons		Total valence electrons	
Used so far		Used so far	
Remaining		Remaining	

SO_2 Step 3:
Picture so far

O_3 Step 3:
Picture so far

Total valence electrons		Total valence electrons	
Used so far		Used so far	
Remaining		Remaining	

SO_2 Step 4:
Picture so far

O_3 Step 4:
Picture so far

Total valence electrons		Total valence electrons	
Used so far		Used so far	
Remaining		Remaining	

SO_2 Step 5:
Picture so far

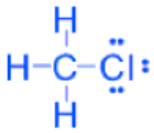
O_3 Step 5:
Picture so far

Total valence electrons		Total valence electrons	
Used so far		Used so far	
Remaining		Remaining	

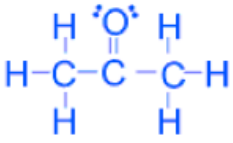
Name _____ Date _____ Period _____

Open Molecular Geometry and Bonding and choose "LEWIS STRUCTURES HAVING DOUBLE BONDS - Quiz" from the list. These quizzes are randomly generated so everyone will have different questions. Enter the molecular formula and draw the correct Lewis Structure for each question. After you check your answers, you can hit the back button on your browser to see the Lewis Structures again.

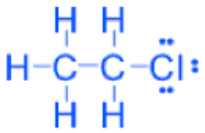
Question	Molecular formula	Lewis Structure
1		
2		
3		



Lewis Dot stucture for CH_3Cl



Lewis Dot stucture for CH_3COCH_3



Lewis Dot stucture for C_2H_5Cl

Name _____ Date _____ Period _____

Open Molecular Geometry and Bonding and choose "LEWIS STRUCTURES INVOLVING TRIPLE BONDS - quiz" from the list. These quizzes are randomly generated so everyone will have different questions. Enter the molecular formula and draw the correct Lewis structure for each question. After you check your answers, you can hit the back button on your browser to see the Lewis structures again.

Question	Molecular formula	Lewis Structure
1		
2		
3		

Activity #5 - Naming Covalent Compounds

Open Naming Covalent Compounds

Simple covalent compounds are generally named by using prefixes to indicate how many atoms of each element are shown in the formula. Also, the ending of the last (most negative) element is changed to -ide.

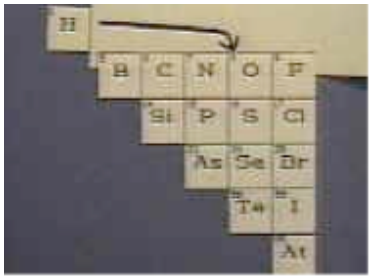
1. When is the **mono-** prefix not used to show one atom of an element?

2. When do you drop the "o" and "a" endings of these prefixes?

1	
2	
3	
4	
5	
6	

Name _____ Date _____ Period _____

3. How do you know which element to put first in the name?



4. Name the following compounds.

   a. PH_3 _____

   b. CO _____

   c. HI _____

   d. N_2O_3 _____

5. Open Nomenclature. What are the common names of:

   a. H_2O _____

   b. NH_3 _____

   c. CH_4 _____

6. Write the formulas for the following covalent compounds. Check your answers here.

   a. antimony tribromide _____

   b. hexaboron monosilicide _____

   c. chlorine dioxide _____

   d. hydrogen iodide _____

   e. iodine pentafluoride _____

   f. dinitrogen trioxide _____

   g. ammonia _____

   h. phosphorus triiodide _____

Name _____ Date _____ Period _____

7. Write the names for the following covalent compounds. Check your answers here.

   i. P_4S_5 _____

   j. O_2 _____

   k. SeF_6 _____

   l. Si_2Br_6 _____

   m. SCl_4 _____

   n. CH_4 _____

   o. B_2Si _____

   p. NF_3 _____

Activity #6- Comparing Properties of Ionic and Covalent Substances

Visit the website Bonding by Analogy: Dog - Bone Bonds, and write an explanation of each of the following types of bonding in terms of ATOMS AND ELECTRONS. You may also find the videos helpful.

1. Ionic bonds:

2. Covalent bonds:

3. Polar covalent bonds:

4. Metallic bonds:

Name _____ Date _____ Period _____

Open Review Ionic and Covalent Compounds. Fill in the charts.

Definitions	
For the quiz questions below, write the definition in your notes, then check the first answer pull down box for the correct answer, and the second pull down box for the second half of the definition.	
.... in terms of electrons	**.... types of elements**
Covalent bonding:	Covalent bonding:
Polar covalent bonding:	Polar covalent bonding:
Non-polar covalent bonding:	Non-polar covalent bonding:
Ionic bonding:	Ionic bonding:

Name _____ Date _____ Period _____

Compound	Type and bonding	Graphic Image
For the quiz questions below, click on the graphic for the molecular structure, then write in the type of bonding (ionic, polar covalent, non-polar covalent), and then the electron definition. Finally, check the first answer pull down for the correct answer.		
Iodine I_2		
Hydrochloric acid HCl		
Oxygen O_2		
Magnesium Oxide MgO		
Water H_2O		
Sodium Fluoride NaF		
Hydrogen H_2		
Methane CH_4		
Iron (III) oxide Fe_2O_3		
Magnesium Nitride Mg_3N_2		
Ethane C_2H_6		
Carbon monoxide CO		
Carbon dioxide CO_2		

Name _____ Date _____ Period _____

Open Ionic & Molecular Compounds. Fill in the table.

Table: Comparing ionic and molecular compounds.

	Molecular compounds	Ionic compounds
Smallest particles		
Origin of bonding		
Forces between particles		
Elements present		
Metallic elements present		
Electrical conductivity		
State at room temperature		
Melting and boiling points		
Other names		

Name _____ Date _____ Period _____

Activity #7: Review

Open Lewis Dot Structures (Multiple Choice). Read the directions and do 8 problems. Write the formula and correct Lewis Dot Structure in the table.

Formula	Lewis Dot Structure

Open Classifying Compounds Quiz. These quizzes are randomly generated so you must write out the questions and answers. Feel free to summarize the question rather than writing it word-for-word.

1.

2.

3.

4.

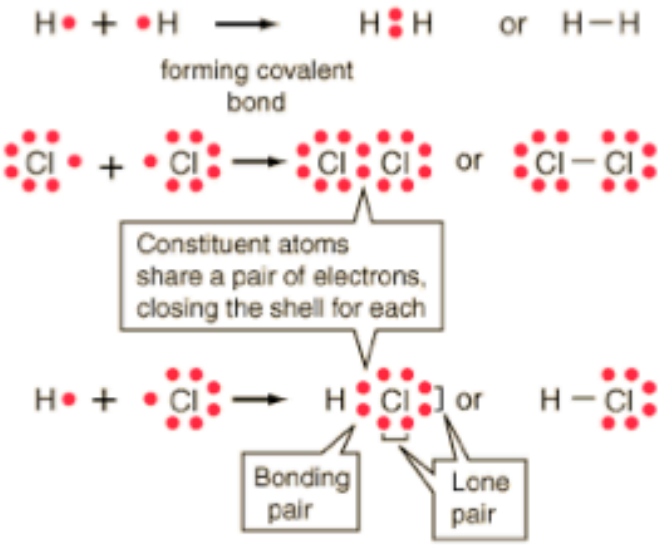
5.

6.

Name _____ Date _____ Period _____

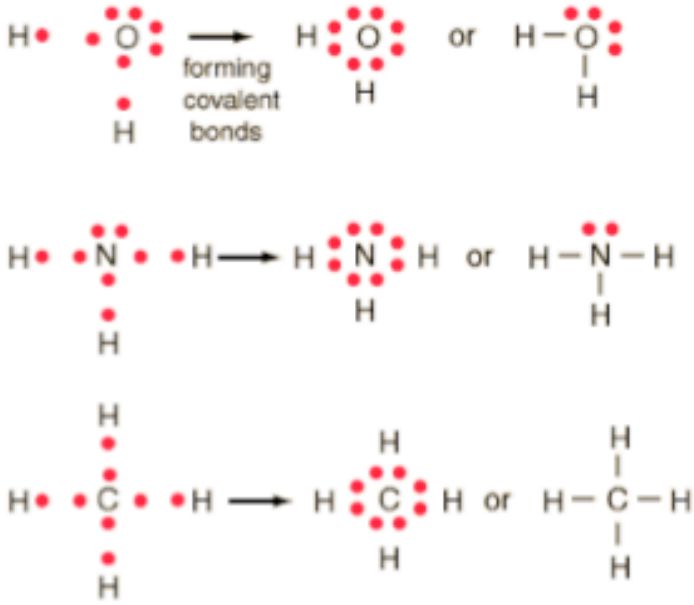
Addendum – More on Lewis Structures (just read!)

In the idealized covalent bond, two atoms share a pair of electrons, closing the shell for each of them.



The atoms share a pair of electrons, and that pair is referred to as a bonding pair. The pairs of electrons which do not participate in the bond have traditionally been called "lone pairs". A single bond can be represented by the two dots of the bonding pair, or by a single line which represents that pair. The single line representation for a bond is commonly used in drawing Lewis structures for molecules.

For multiple single bonds, the procedure is similar that for a single bond.



Name _____ Date _____ Period _____

The Lewis diagrams can also help visualize double and triple bonds.