Chemical Bonding **Name**_____

Covalent Bonding

Read from **Lesson 2: Covalent Bonding** in the **Chemistry Tutorial Section, Chapter 6** of **The Physics Classroom**:
Part a: Covalent Bonds Part b: Lewis Electron Dot Structures

Part 1: Lewis Dot Structure

1. a. Write the shortened electron configuration for a neutral phosphorus atom. _____
   b. Draw the Lewis electron dot diagram for this atom.

   c. How many electrons does this atom need to gain, lose, or share in order to have a complete octet in its outer energy level?

2. a. Write the shortened electron configuration for a neutral sulfur atom. _____
   b. Draw the Lewis electron dot diagram for this atom.

   c. How many electrons does this atom need to gain, lose, or share in order to have a complete octet in its outer energy level?

3. a. Write the shortened electron configuration for a neutral carbon atom. _____
   b. Draw the Lewis electron dot diagram for this atom.

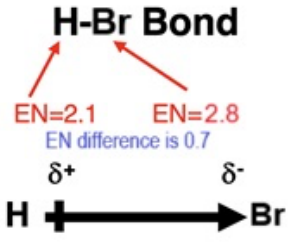
   c. How many electrons does this atom need to gain, lose, or share in order to have a complete octet in its outer energy level?

4. Add up all the total number of valence shell electrons in the following compounds:
   a. NCl_3 b. H_2S

   c. CH_3OH d. XeF_6

Part 2: Types of Covalent Bonding

Use this Electronegativity Table to identify the electronegativity (EN) values of the two atoms in each example. Write the electronegativity difference between the two atoms, then identify the type of bond (nonpolar covalent or polar covalent. If the bond is polar covalent, identify the positive dipole (smaller EN value) and the negative dipole (greater EN value). Draw an arrow along the bond axis or parallel to it that points to the negative dipole. Place a + sign on the end of the arrow opposite the arrowhead. The example to the right is an example of a **polar covalent** bond.



1. P-Cl 2. B-Br

3. N-F 4. C-H

Chemical Bonding

5. Which of the following elements: F, Cl, Br, I would react with hydrogen to create the **least** polar bond? Which would create the **most** polar bond? Explain your reasoning.

6. Classify the following compounds as having nonpolar covalent bonds or polar covalent bonds and place them in the appropriate list.

Cl_2 PCl_3 H_2S C_6H_6 O_2 CCl_4 SiO_2 NI_3 CO NO_2 BH_3

Nonpolar covalent bonds:

Polar covalent bonds:

7. Mark Eury and Aaron Agin are working in the chemistry lab, and they are trying to identify an unlabeled compound. The compound does not dissolve well in water, and it fails to light the light bulb on a conductivity tester. The compound is either sodium chloride or carbon tetrachloride. Mark claims that the compound is carbon tetrachloride while Aaron suggests that it is sodium chloride. Who is correct and why?