

# Chemical Bonds Worksheet

## Objectives:

- Identify the type of elements found in various portions of the periodic table
- Explain the trends of the following properties in the periodic table
  - Atomic size, Ionization energy, Electronegativity
- Predict the type of chemical bonds formed by elements
- Create Lewis Structures for covalent compounds

1. Define Ionic & Covalent Bonds. What combinations of atoms will result in ionic or covalent bonds?
2. What is a valence electron? How are valence electrons involved in bond formation?
3. Why do atoms form ions?
4. How does the electronegativity of an element change as you move down a group or across a period? How does the electronegativity difference between 2 atoms determine the type of bond that will be formed?
5. Create a Lewis Structure of the following covalent molecules:
  - Cl<sub>2</sub>
  - CO<sub>2</sub>
  - SO<sub>2</sub>
  - SO<sub>3</sub>
  - SO<sub>4</sub><sup>2-</sup>
  - CCl<sub>4</sub>
  - NH<sub>3</sub>
6. Predict the shape of the molecules from question 5
7. Predict the polarity of the molecules from question 5

## Answers

### 1. Definitions

Ionic Bond - A bond created by electrostatic attraction between oppositely charged ions

- Metal & Nonmetal

Covalent Bond – consists of a pair of electrons shared between two atoms.

- Nonmetal & Nonmetal

### 2. Valence Electrons - the electrons that occupy the outermost energy level of an atom.

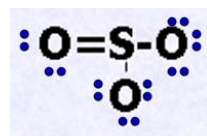
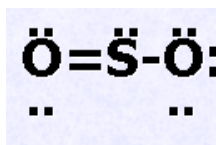
- Main group elements – the valence electrons are the outer shell s & p electrons

Valence electrons are responsible for the electron activity that occurs to form chemical bonds.

### 3. To have a noble gas valence electron structure (8 electrons, except for group IA), a more stable structure.

### 4. Decreases down a group, increases across a period (left to right). The greater the electronegativity difference between the 2 atoms, the more polar the bond that joins them

### 5 – 7 Lewis Structures

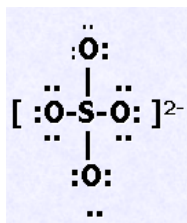


Linear  
Nonpolar

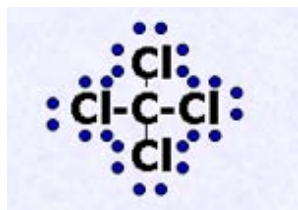
Linear  
nonpolar

Bent  
polar

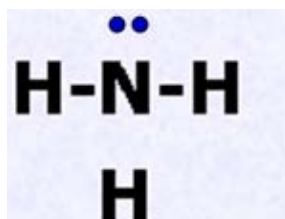
Trigonal Planar  
nonpolar



Tetrahedral  
nonpolar



Tetrahedral  
nonpolar



Trigonal Pyramidal  
polar