

CHEMICAL BONDS

Chemical Bonds – force of attraction which links atoms together
- electrostatic in nature

Types of Chemical Bonds:

- 1.) Ionic Bond – electrical attraction between the opposite charges of cations and anions
 - metal reacts with nonmetals
 - metals lose electron; nonmetals gain electrons
 - unequal sharing of electrons
- 2.) Covalent Bond – bond formed by the sharing of electrons between atoms
 - nonmetals reacts with nonmetals
 - equal sharing of electrons

Octet Rule: “In covalent bond formation, atoms go as far as possible toward completing their octets by sharing electron pairs.”

Langmuir Formula

- used in determining the number of covalent bonds formed if there is an atom which obeys the expanded octet rule

$$\text{No. of covalent bonds} = \frac{8n - \# \text{ of valence e}^- \text{'s}}{2}$$

Where: n is the number of atoms in the ion/molecule

Important Factors in Determining the Best Lewis Structure:

a.) **Formal Charge** – are charges atoms would have if all of the atoms have the same EN, i.e., we assume 100% covalent character

$$\text{Formal Charge} = G - U - C$$

where: G = the group number of the atom

U = the number of unshared electrons (the number of e⁻'s present as lone pairs)

C = the number of covalent bonds

b.) **Resonance**

“If a multiple bond is present, the molecule/ion can be represented by several Lewis structures.”

Rules in Determining Important Resonance Structures:

- 1.) The resonance structures must have the same atomic positions. They differ only in the position of electrons.
- 2.) Distribution of formal charges must be reasonable, that is, positive electropositive atoms, negative for electronegative atoms.
- 3.) Like formal charges should not be adjacent to one another.