Types of Chemical Bonds

Atom Type(s)	Bond Type	Bond Characteristic
Metal (s) and nonmetal (s)	Ionic	Transfer of valence electrons
Nonmetals	Covalent	Sharing of valence electrons
Metals	Metallic	Pooling/sea of electrons

Lewis Structures

Step 1- Count total number of valence electrons

Step 2- Draw skeleton structure of how the atoms are bonded

Step 3- Bond = pair of electrons
— ••

Step 4- Distribute remaining valence electrons around atom to satisfy duet/octet rules

Lewis Structures

Duet Rule- Stable electron configuration with a pair of electrons

H and He

Octet Rule- Stable electron configuration with 8 valence electrons

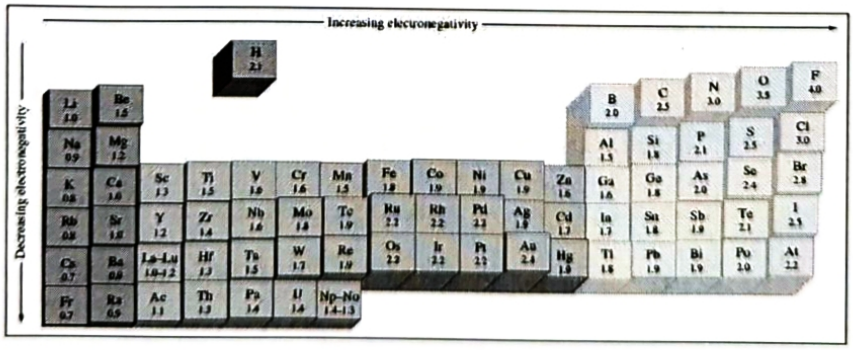
2nd row nonmetals

Double and triple bonds-

O_2 N_2

Electronegativity

- Definition: The ability of an atom in a molecule to attract electrons to itself.



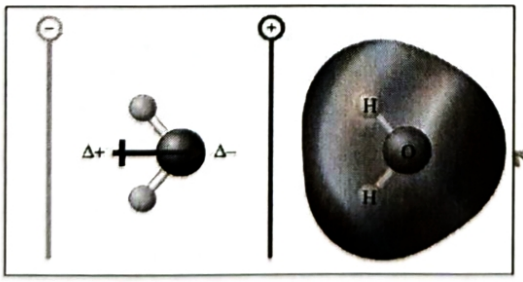
Ionic *vs.* Polar Covalent Bonds

Ionic- $NaCl \rightarrow Na^+ + Cl^-$ Difference of 2.1
0.9 3.0

Polar Covalent- O H Difference of 1.4 $\overset{+}{H}\text{-}\overset{-}{O}$
3.5 2.1

Unequal sharing of electrons

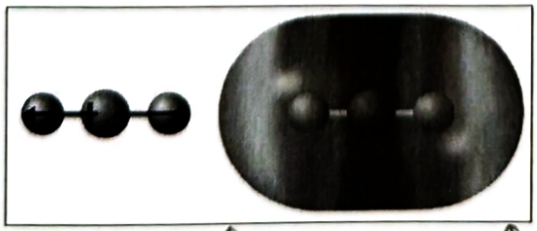
Electronegativity and Bond Polarity



H_2O

H-O-H
2.1 3.5 2.1

High e⁻ density



CO_2

O-C-O
3.5 2.5 3.5

High e⁻ density

Lewis Structures- Molecular Compounds and Polyatomic Ions

Step 1- Count total number of valence electrons

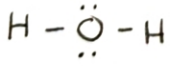
Step 2- Draw skeleton structure of how atoms are bonded

Step 3- Distribute nonbonding pairs of electrons around the most electronegative atoms

Step 4- Use double/triple bonds to satisfy octet rule

Water (H_2O)

Skeletal structure



Total valence electrons = 8

Distribute electrons (octet and/or duet rules)

Need for double or triple bonds? No