

# Chemical Bonds

Important: The **GREATER** the Electronegative Difference → the **GREATER** the Bond Strength

## Ionic Bonds

- Ionic Bonds form between **METALLIC** and **NONMETALLIC** elements with a **GREAT electronegative difference**
- Ionic Bonds are formed by **ELECTROSTATIC ATTRACTION** between positive and negative ions
- Electrons **TRANSFER** between atom bonds
- **Inorganic compounds** such as acids and salts have Ionic Bonds

### PROPERTIES

- Ionic Bonds have charged ions in gas, liquid, and solid
- Ionic Bonds in **SOLIDS** are **NOT GOOD ELECTRICAL CONDUCTORS**
- Ionic Bonds in **GASES** and **LIQUIDS** are **GOOD ELECTRICAL CONDUCTORS**
- Ionic Bonds have **HIGH MELTING POINTS**
- Ionic Bonds are **SOLUBLE** in **WATER**
- Ionic Bonds are have **DEFINED CRYSTALS**

**ELECTRONEGATIVE DIFFERENCE MUST be GREATER than 1.67**

### Note:

**POLYATOMICS** are **COVALENTLY BONDED** but they still possess a charge so they are considered **IONIC BONDS**

## Covalent Bonds

- Covalent Bonds form between atoms with **SIMILAR ELECTRONEGATIVITY**
- Covalent Bonds are formed by **SHARING** of the **ELECTRON PAIRS**
- **ORGANIC ACIDS** and **WATER** are **POLAR COVALENT**
- Covalent Bonds **easily form between 2 NON-METALS**

### PROPERTIES

- Covalent Bonds are **NOT CONDUCTORS** of electricity in any phase
- Covalent Bonds have **LOW MELTING** and **BOILING POINTS**
- Covalent Bonds have **PLASTICITY**
- Covalent Bonds form **STABLE MOLECULES**

**ELECTRONEGATIVE DIFFERENCE** for Covalent Bonds **MUST be LESS than 1.67**

**ELECTRONEGATIVE DIFFERENCE** for **POLAR Covalent Bonds MUST be between .5 and 1.8**

### Note:

Molecules and Diatomics are Covalent Bonds

## Metallic Bonds

- Metallic Bonds form when electrons **MOVE** from atom to atom.
- Metallic Bonds form when the electrons become **DELOCALIZED** (they are not localized together – the electrons are everywhere)
- Metallic Bonds form through the **MOTION**
- Metallic Bonds form between **METALLIC** and **NONMETALLIC** elements

### PROPERTIES

- Metallic Bonds are **GOOD CONDUCTORS** of electricity in **ALL PHASES**
- Metallic Bonds are **LUSTROUS** (shimmering)
- Metallic Bonds have **various MELTING POINTS**
- Metallic Bonds have **MALLEABILITY** (can be pulled to form a wire) and **DUCTILITY** (can be pounded into other shapes).

