

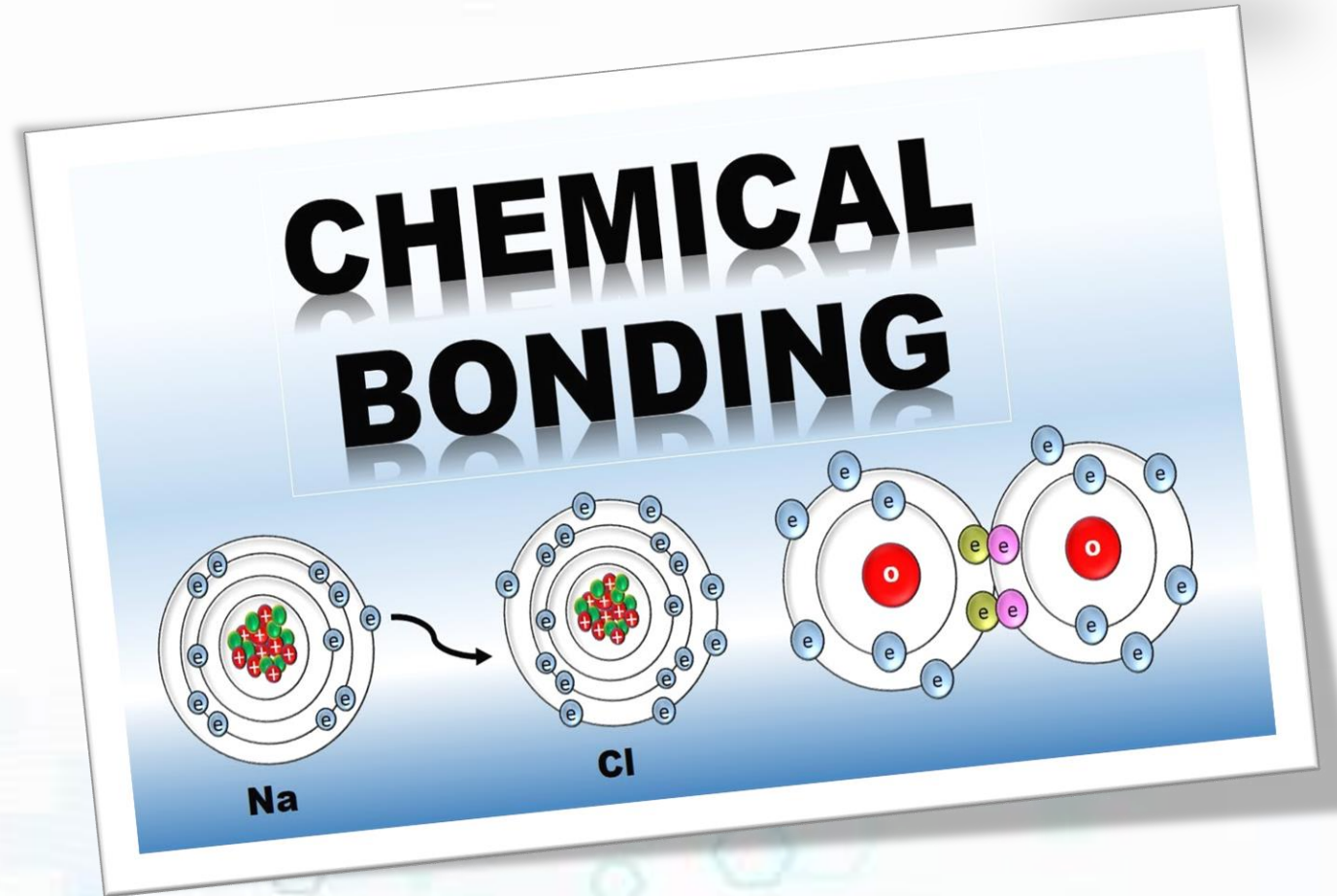


*Al-Mustaqbal University College*  
*Department of Radiology Techniques - First Stage*  
***General Chemistry***

## Second Lecture

**Asst. Lec.**

**Alaa Salman Al-Labban**



# *Out line*

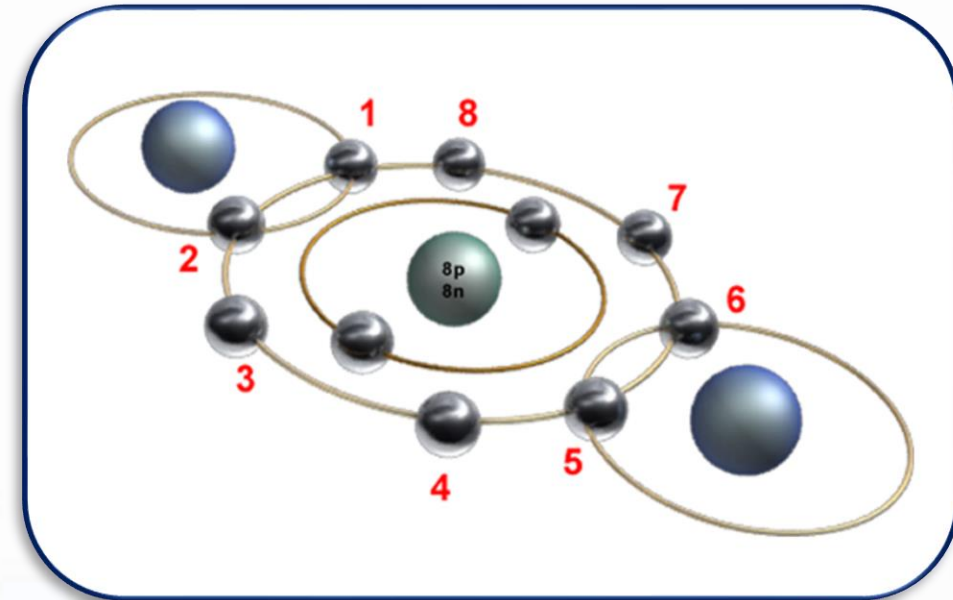
- ✓ **Chemical Bonds**
- ✓ **Types of Chemical Bonds**
- ✓ **Ionic Bonds**
- ✓ **Covalent Bonds**
- ✓ **Metallic Bonds**
- ✓ **Coordinate Covalent Bonds**
- ✓ **Hydrogen Bond**



# Chemical Bonding

**Chemical bond:** is an attraction between atoms.

- ❑ Atoms form chemical bonds to achieve a **fill valence shell** of electrons.
- ❑ This may be achieved in **two ways**:
  1. **Transferring** of electrons between **metal** and **non-metal** atoms.
  2. **Sharing** of electrons between **non-metal** atoms.





# ***Types of Bonds***

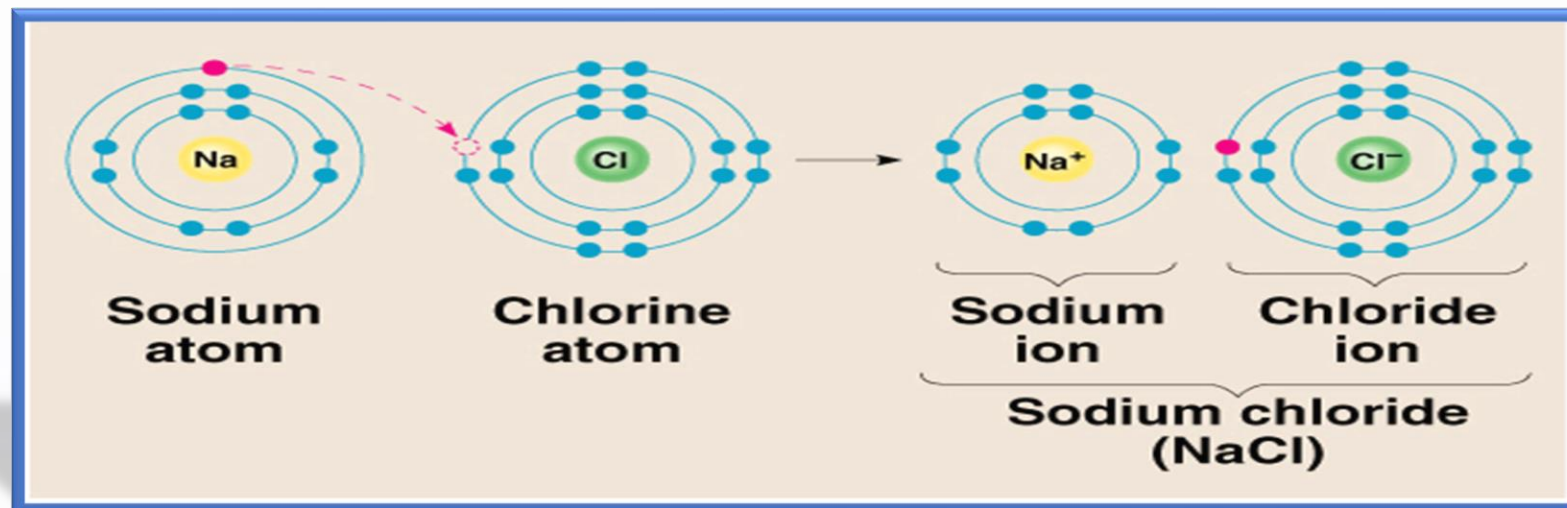
***Ionic Bonds***

***Covalent Bonds***

***Metallic Bonds***

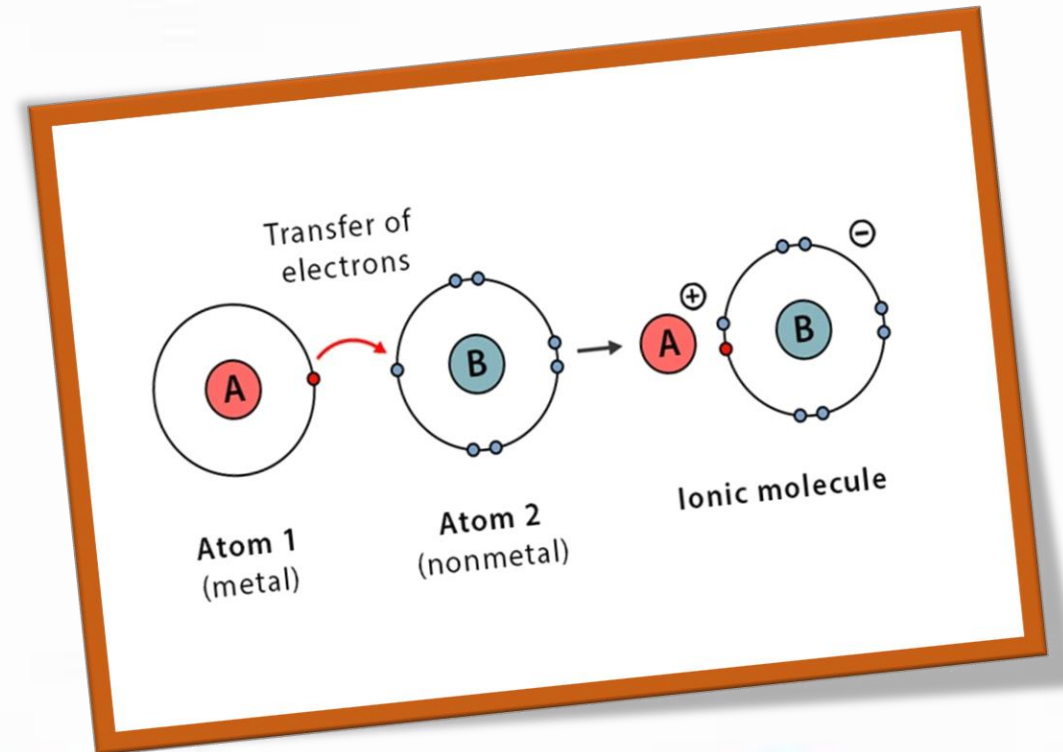
# 1. Ionic Bonds

- ❑ **Ionic bond:** is the **electrostatic attraction** between oppositely charged ions.
- ❑ **Ionic bonds** involve **electron transfer** (one atom loses electrons and another gain them).
- ❑ The **atom** that **loses** electrons becomes a **cation (a positive ion)**.
- ❑ The **atom** that **gains** electrons becomes an **anion (a negative ion)**.



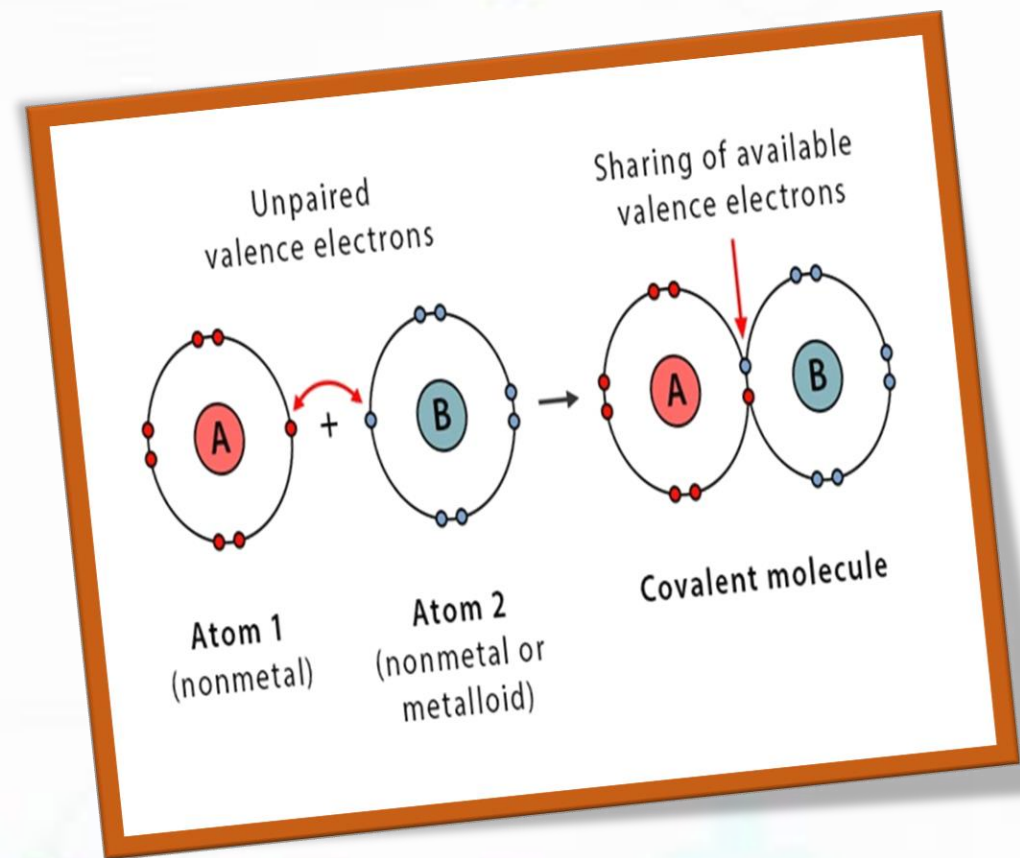
# 1. Ionic Bonds

- ❑ An ionic bond usually occurs between a metal and a non-metal.
- ❑ Ionic bonds are found in ionic compounds such as NaCl,  $\text{Al}_2\text{O}_3$ , KBr,  $\text{MgCl}_2$ .



## 2. Covalent Bonds

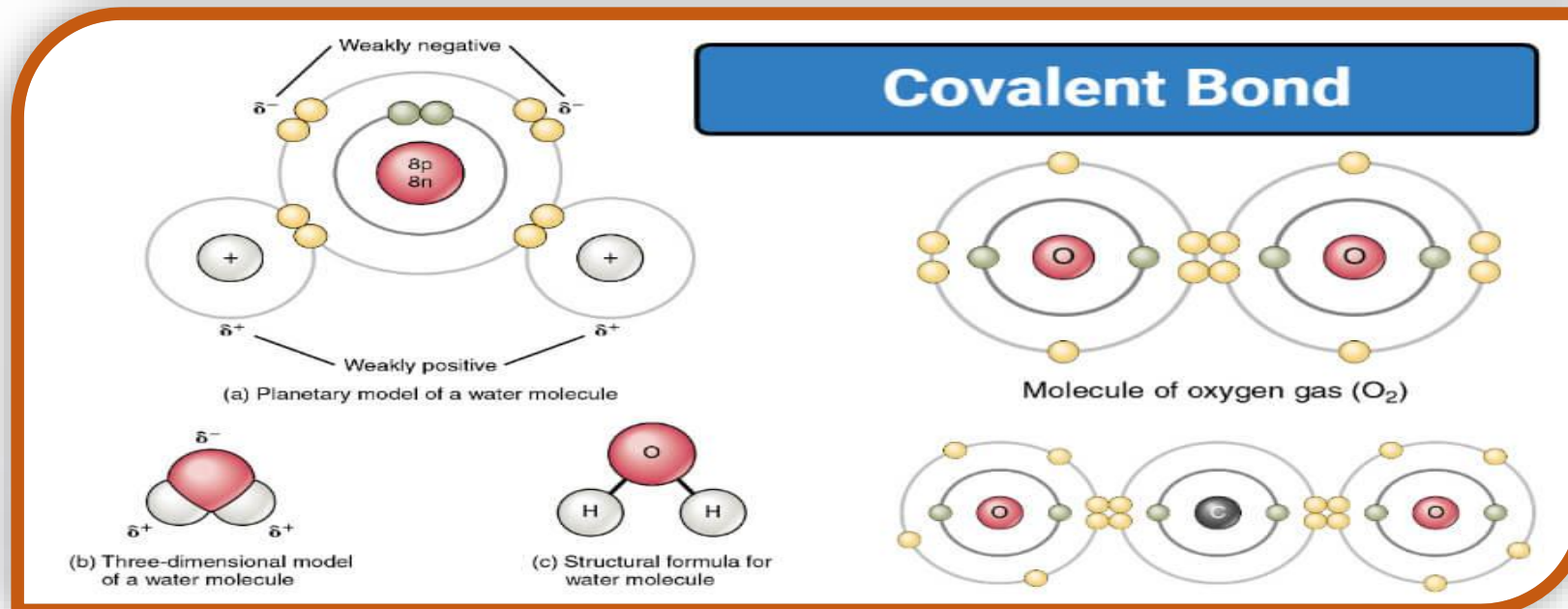
- **Covalent Bond:** It is a strong bond formed between two atoms by sharing two valence electrons, one from each atom.
- A covalent bond usually occurs between two non-metals atoms





## 2. Covalent Bonds

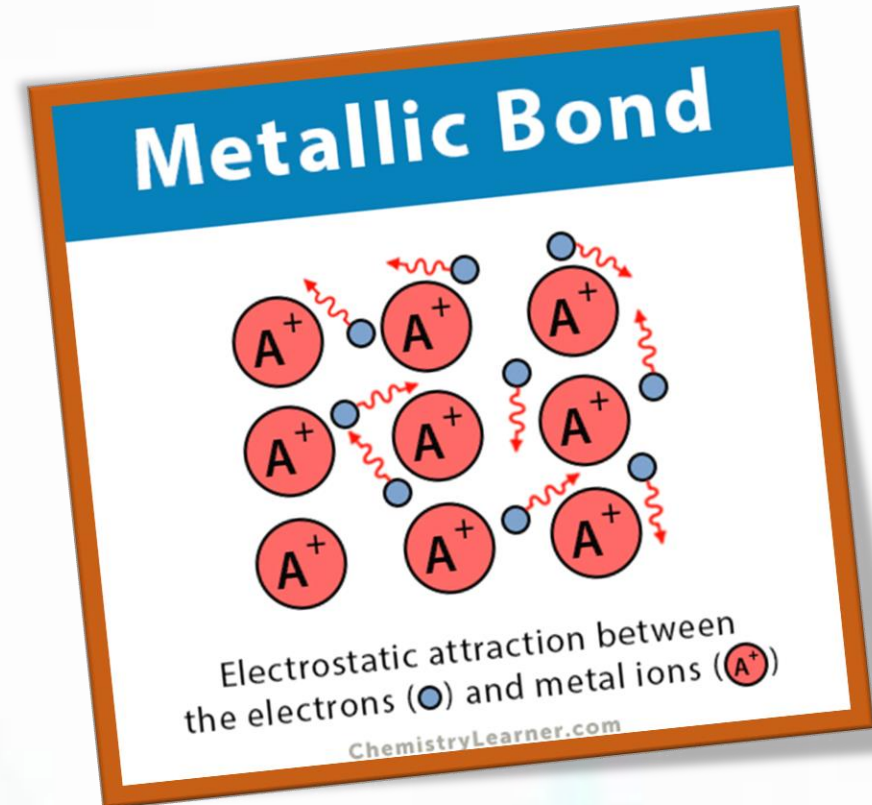
- ❑ Covalent bonds are found in molecular elements such as  $\text{H}_2$ ,  $\text{F}_2$ ,  $\text{Cl}_2$ ,  $\text{O}_3$ .
- ❑ And molecular compounds such as  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ,  $\text{C}_3\text{H}_8$ .





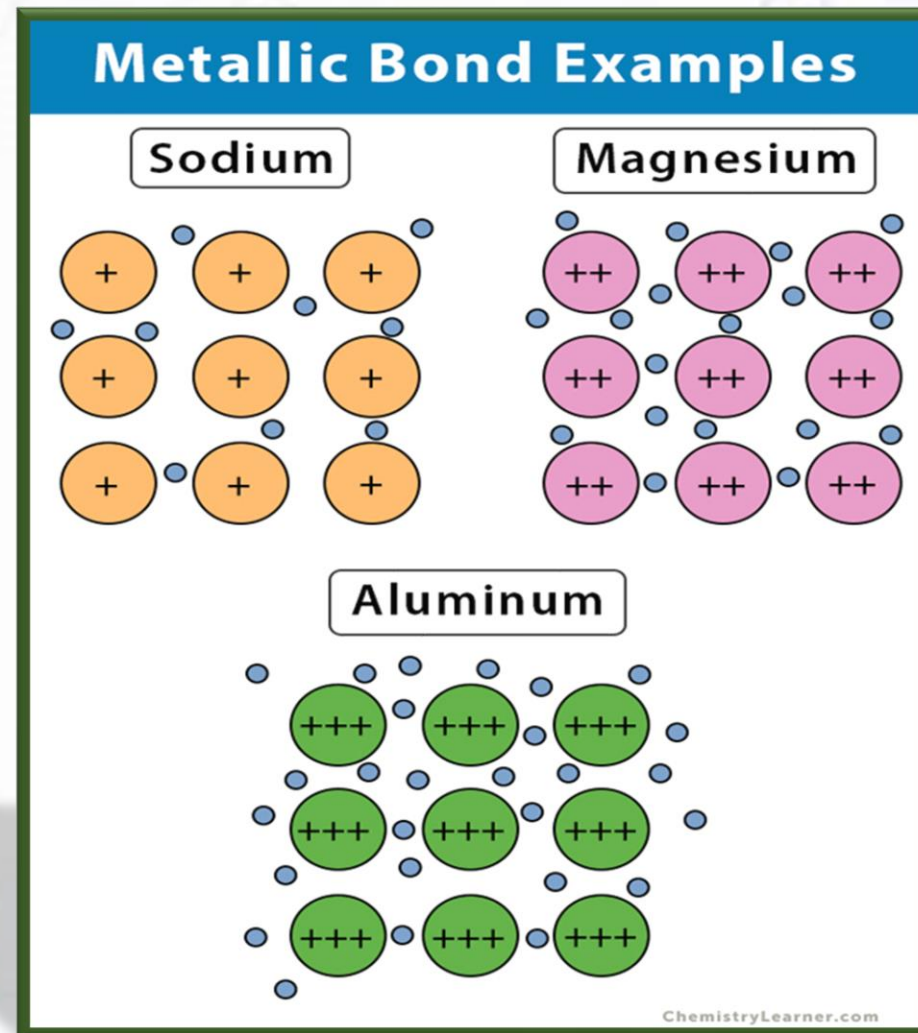
### 3. Metallic Bonds

- **Metallic Bond:** Is the type of bonding found in metallic crystals, that formed by the attraction between the metal positive ion and delocalized electrons (sea of electrons).
- A metallic substance may be a pure element (e.g. aluminum foil, copper wires), or it may be a mixture of two or more elements in an alloy (e.g. brass instruments, "white gold" jewelry).



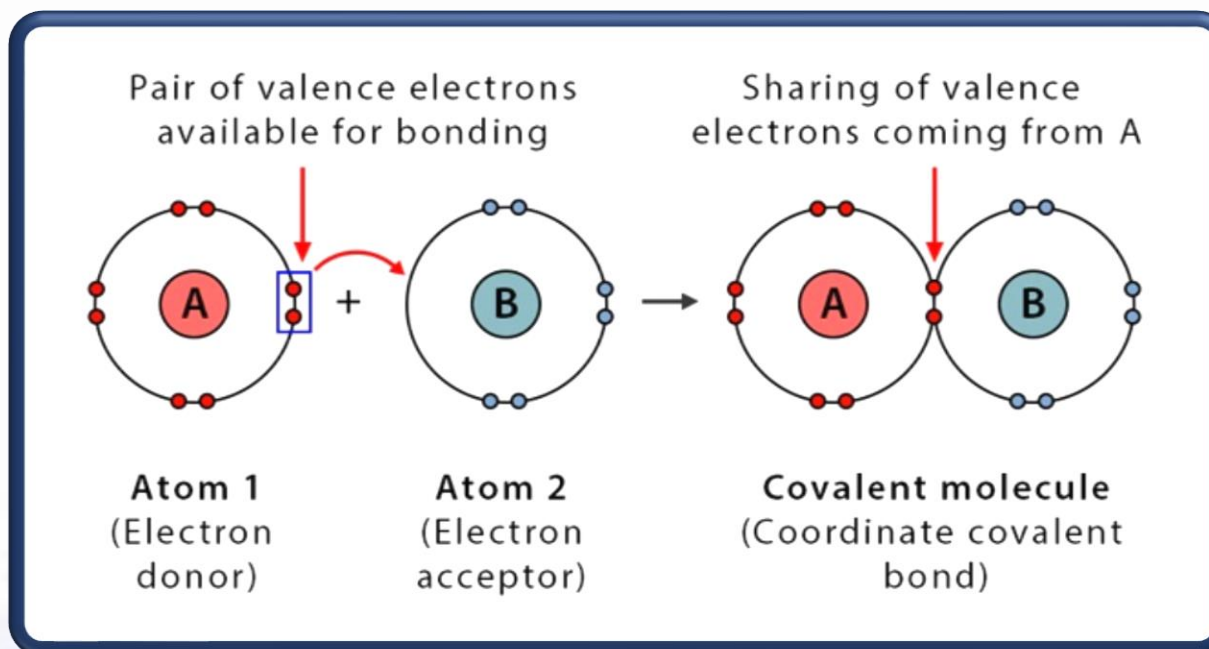
### 3. Metallic Bonds

- ❑ The free movement of electrons make metals good conductors of heat and electricity.
- ❑ Aluminum more conduct electricity more than magnesium because it has more electrons delocalized.



## Coordinate Covalent Bonds

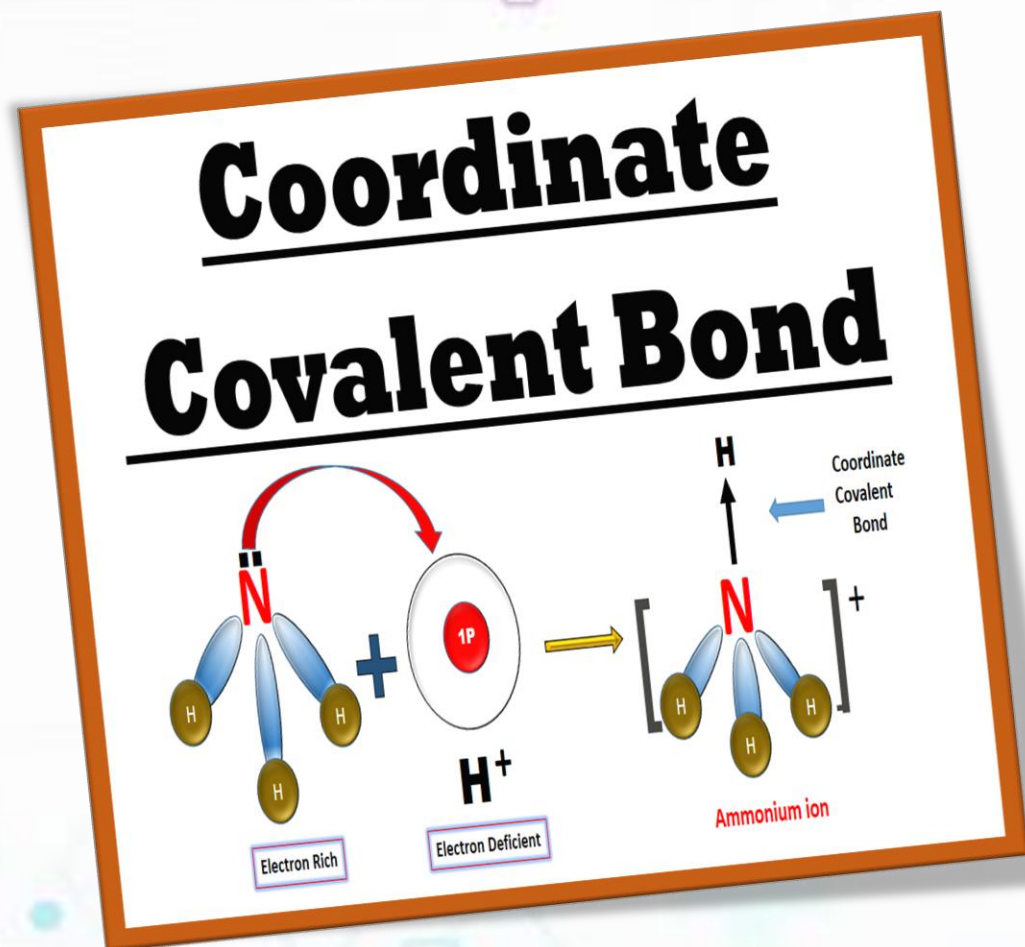
- **Coordinate Covalent Bond:** It's a type of covalent bond that formed when **one atom donates both of the shared electrons to the other atom to make the bond.**





## Coordinate Covalent Bonds

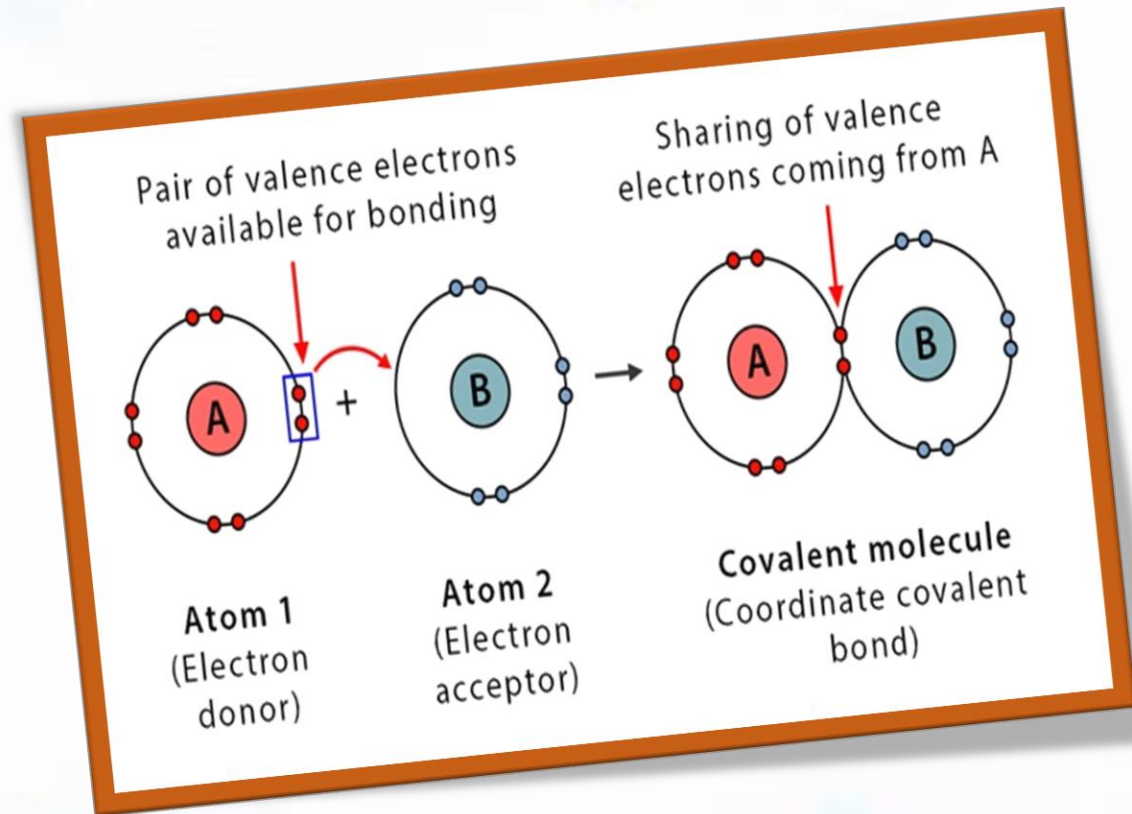
- **Coordinate Covalent Bond:** It's a type of covalent bond that formed when one atom donates both of the shared electrons to the other atom to make the bond.





## Coordinate Covalent Bonds

- This is different from a covalent bond because both electrons come from one atom or molecule but are shared as in a typical covalent bond.

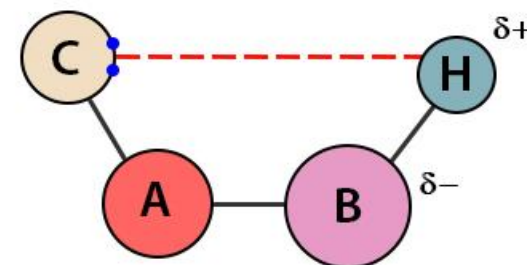


# Hydrogen Bond

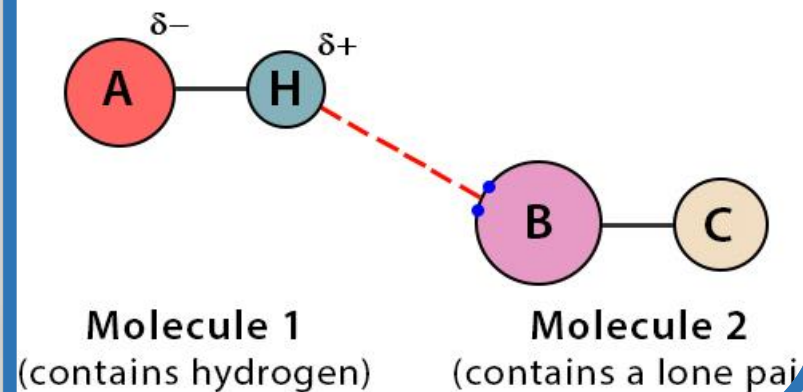
- ❑ **Hydrogen Bond:** is a type of chemical bond that involves the **electrostatic attraction** between a **hydrogen atom** of one molecule and an **atom** containing a **lone pair** of electrons (**an electronegative atom**) of a different molecule.
- ❑ Usually the electronegative atom is **oxygen, nitrogen, or fluorine**, which has a **partial negative charge**. The **hydrogen** then has the **partial positive charge**.

## Types of Hydrogen Bond

### 1. Intramolecular



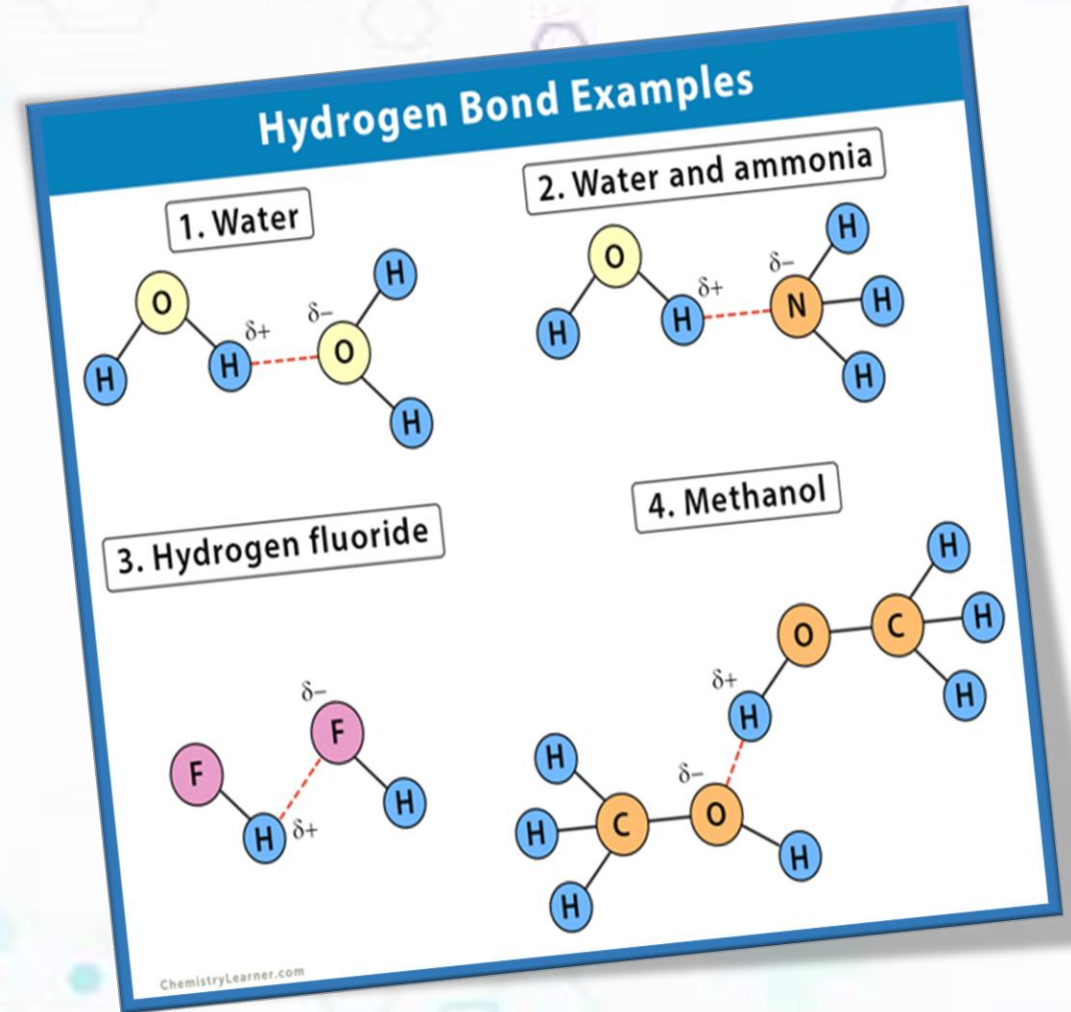
### 2. Intermolecular



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# Hydrogen Bond

- **Hydrogen Bond** is a **weak attraction**, where it's **weaker** than **covalent, ionic and metallic bonds**.
- **Is very important**, where this type of bond occurs in **both inorganic molecules (such as water)** and **organic molecules (such as DNA)**.





# Hydrogen Bond

□ **Hydrogen bonds** are especially **important in biology** (e.g. **Hydrogen bonds** keep the **two helices of DNA** together; the **structures and functions of proteins and enzymes** are **determined by Hydrogen bonds**).

