Al-Mustaqbal University College
Department of Radiology Techniques - First Stage

General Chemistry

Second Lecture

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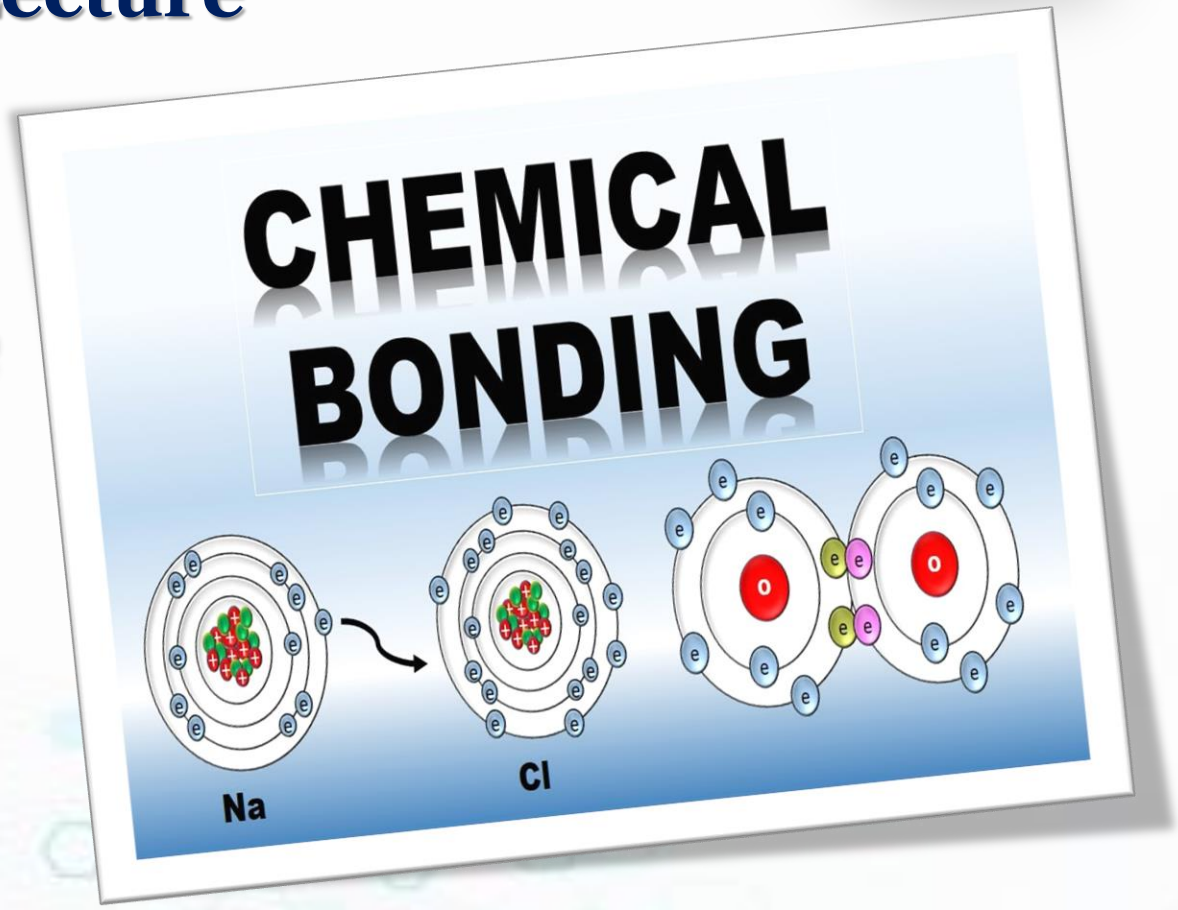
2022 – 2023



Out line

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

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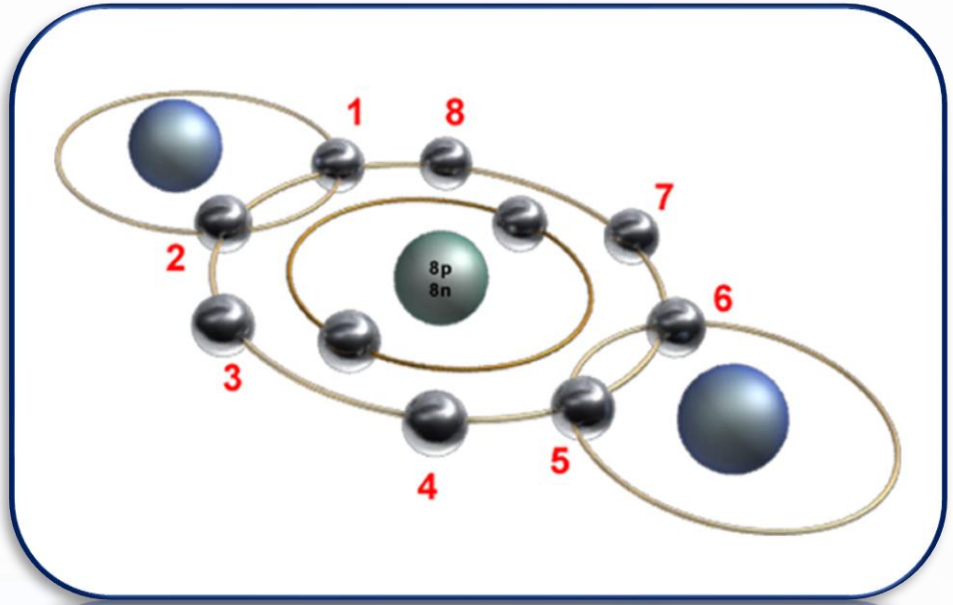
Chemical Bonding

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.



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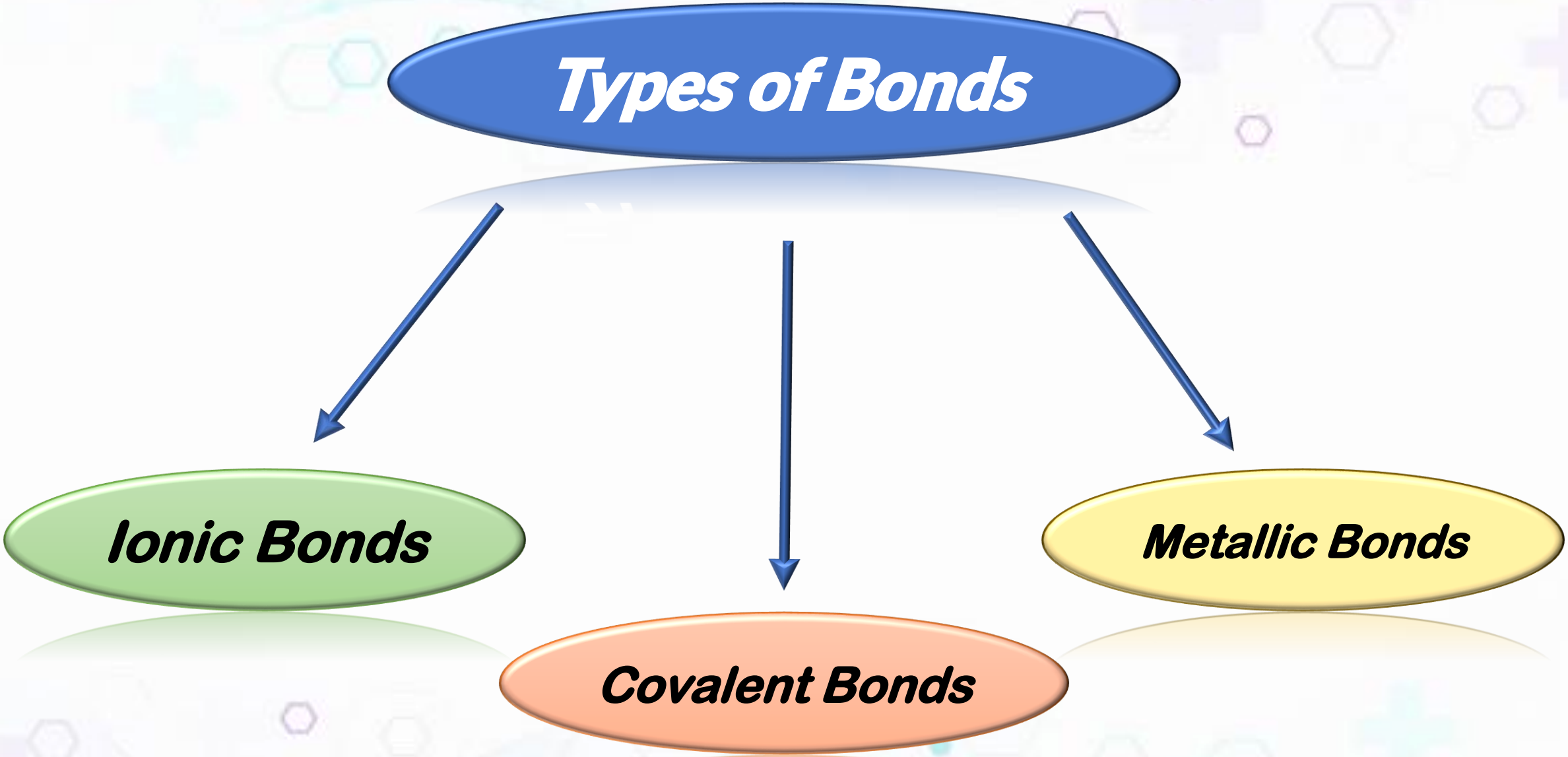
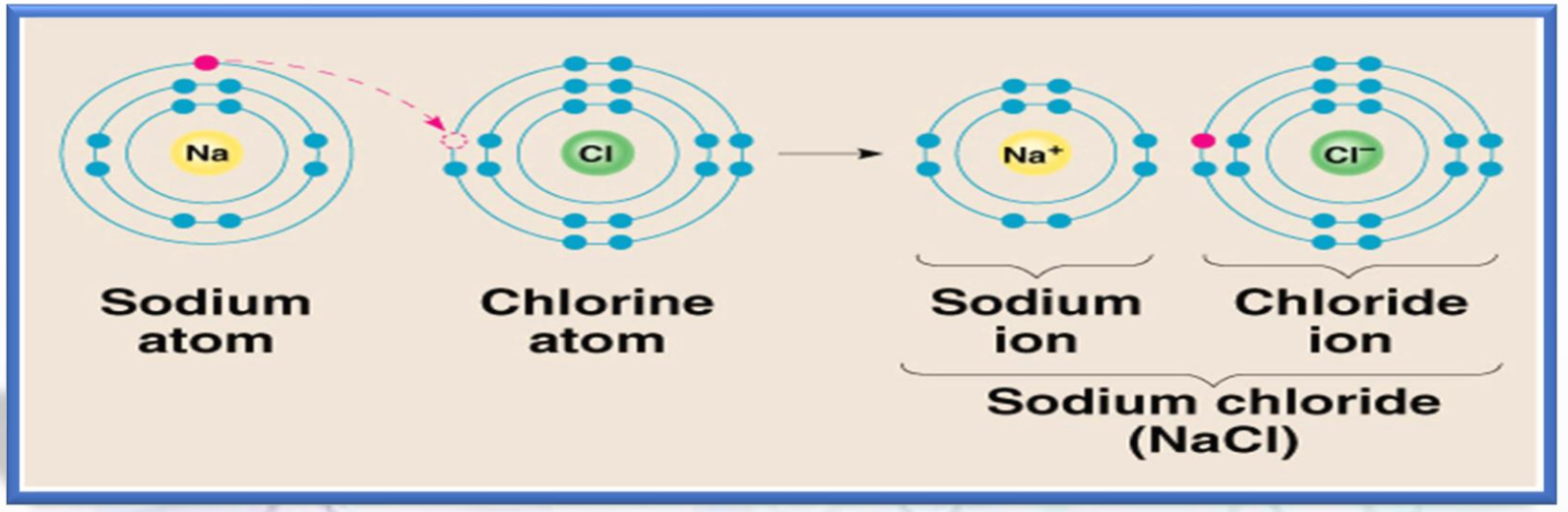

Types of Bonds
Ionic Bonds
Covalent Bonds
Metallic Bonds

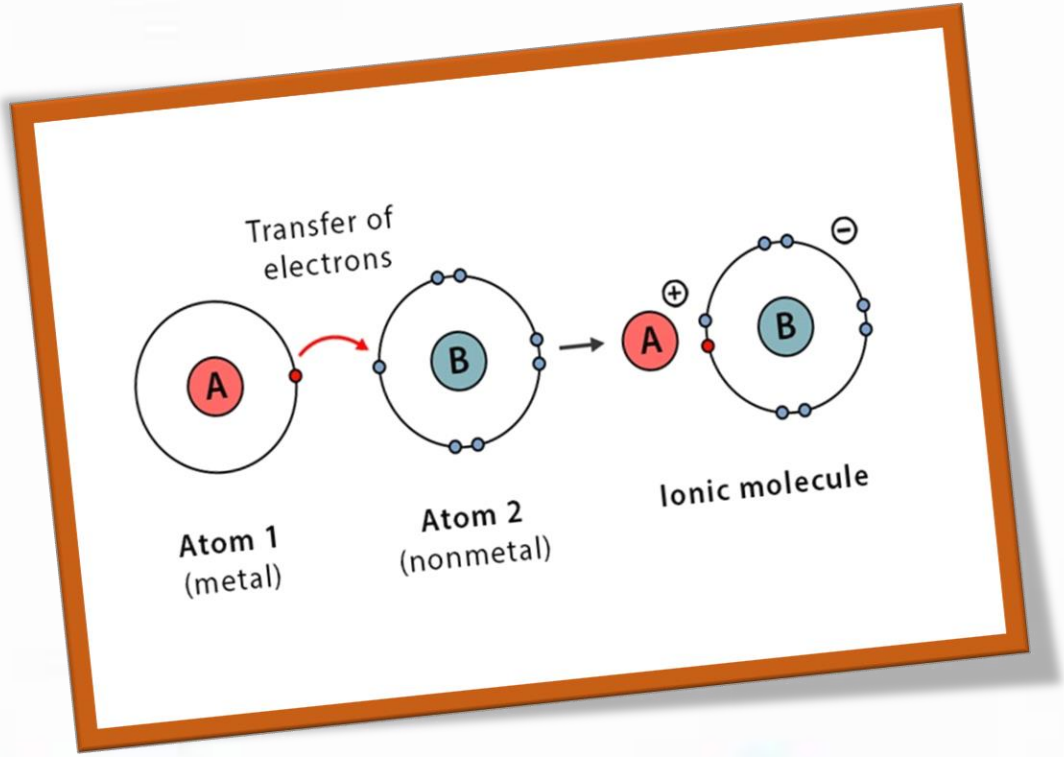
1. Ionic Bonds

- **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)**.



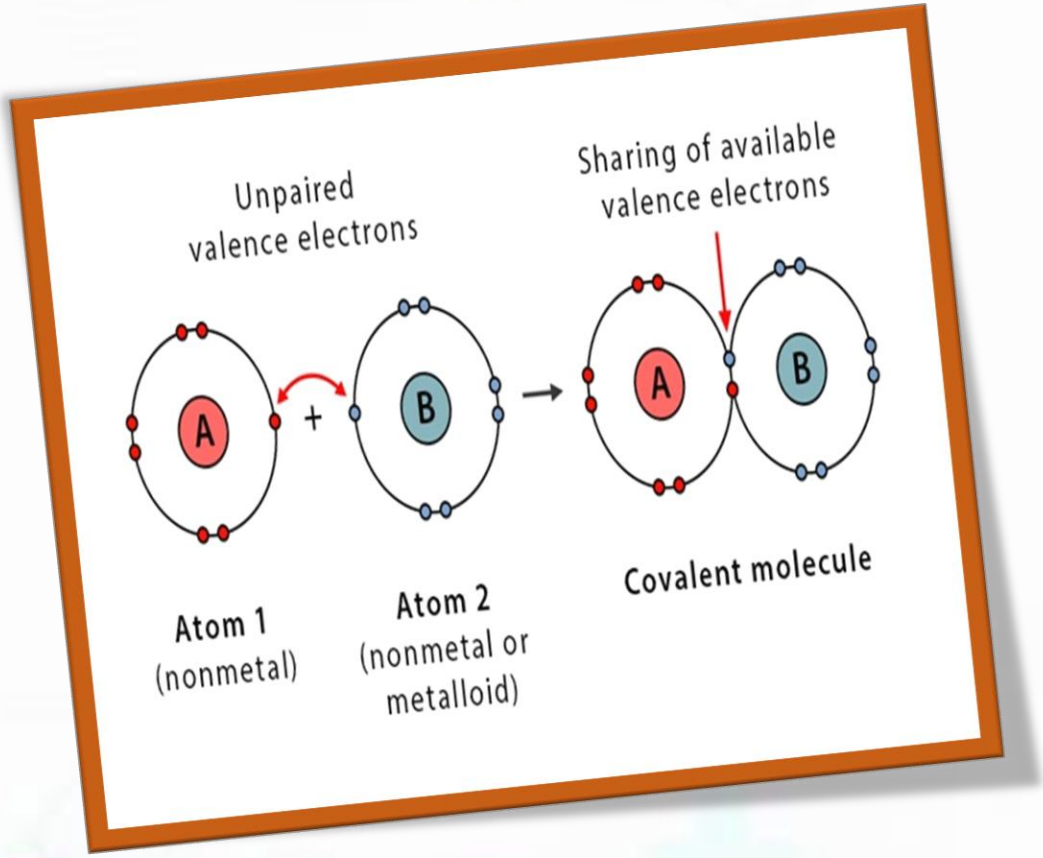
1. Ionic Bonds

- An ionic bond usually occurs between a metal and a non-metal.
- Ionic bonds are found in ionic compounds such as NaCl, KBr, $MgCl_2$.



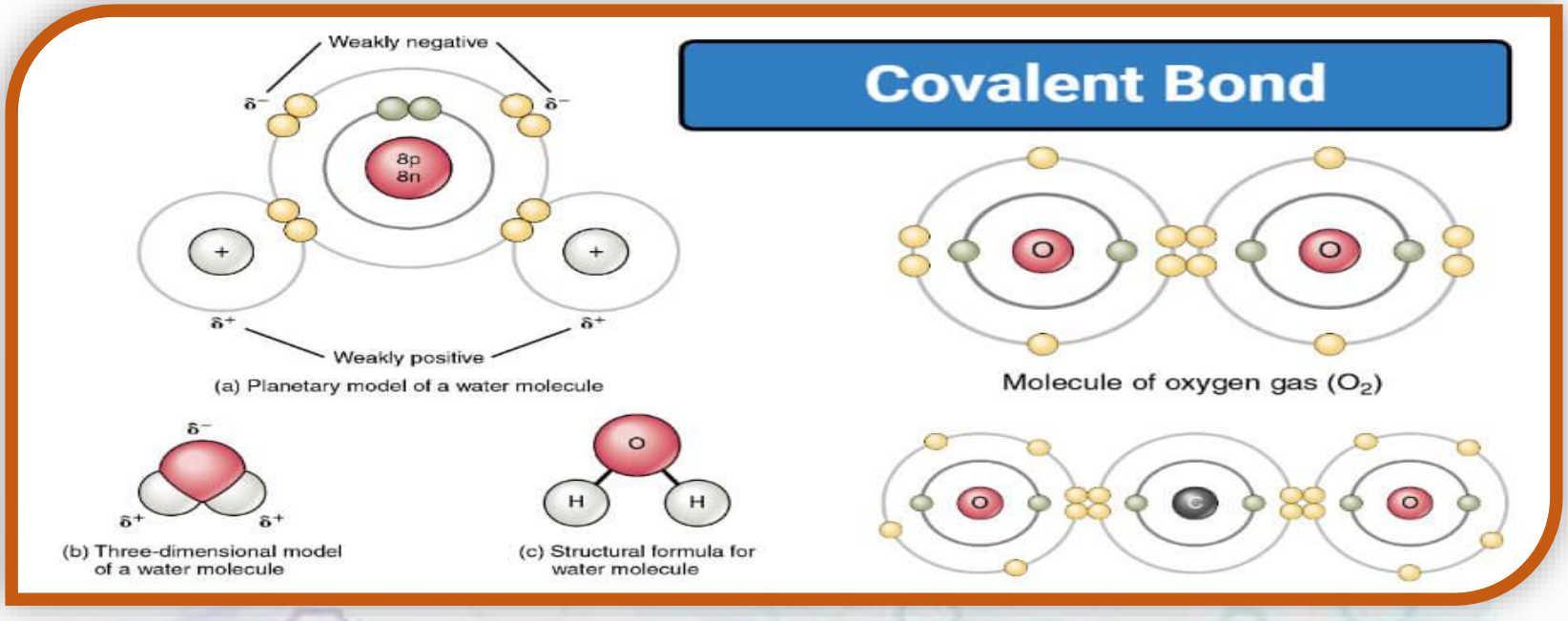
2. Covalent Bonds

- **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



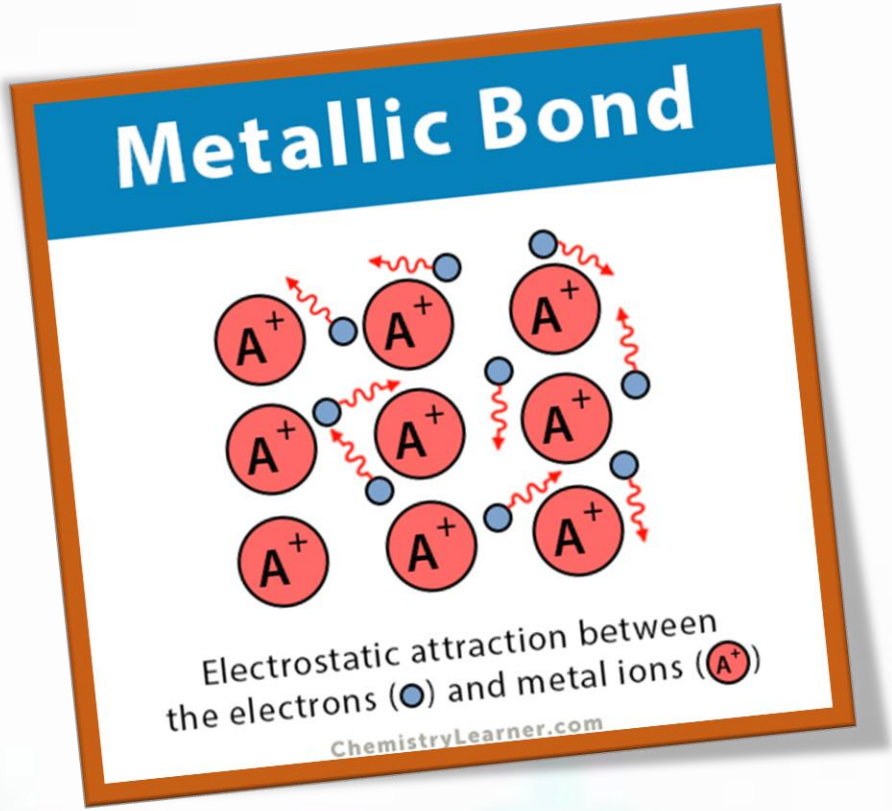
2. Covalent Bonds

- **Covalent bonds** are found in **molecular elements** such as H_2, F_2, Cl_2, O_3.
- And **molecular compounds** such as H_2O, CO_2, C_3H_8.



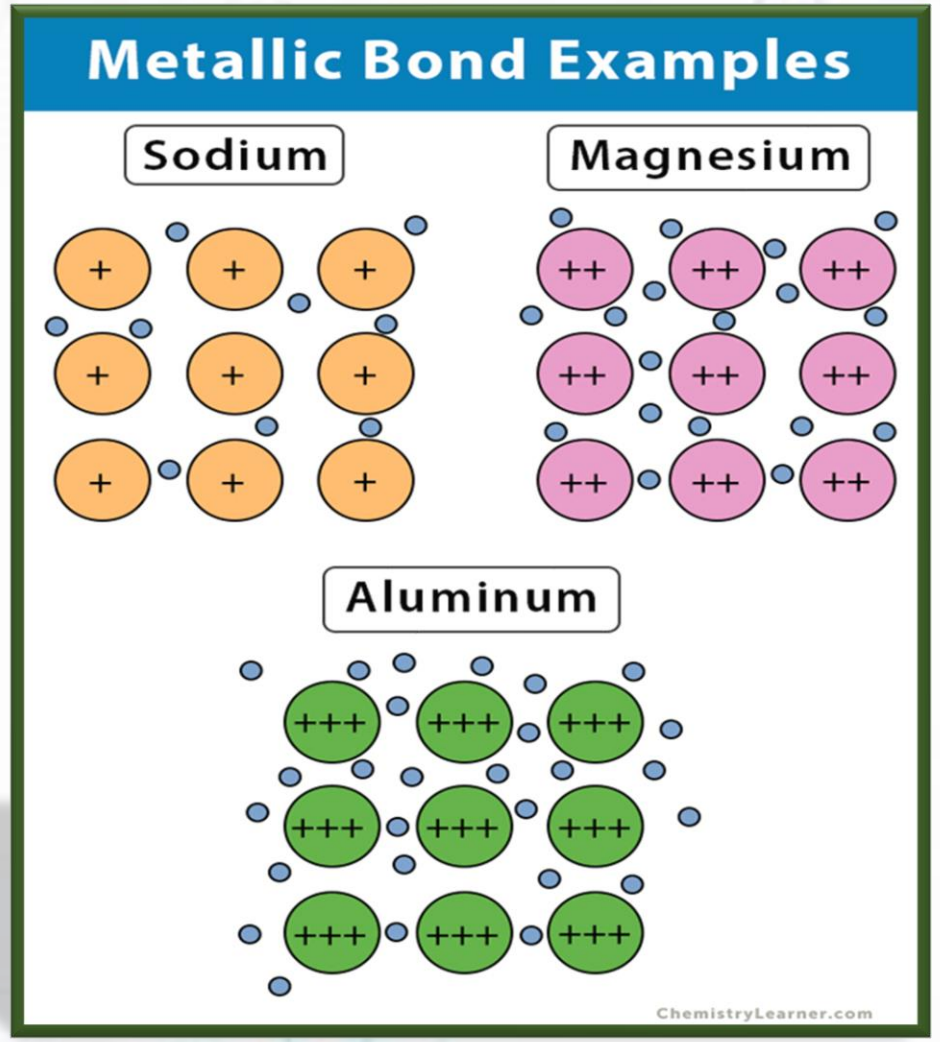
3. Metallic Bonds

- **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).



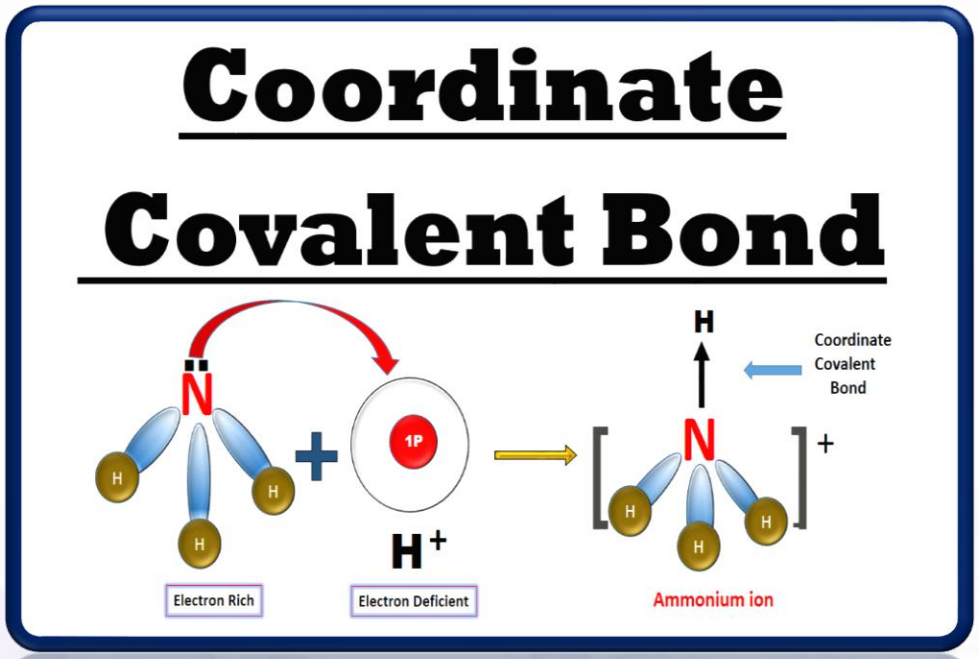
3. Metallic Bonds

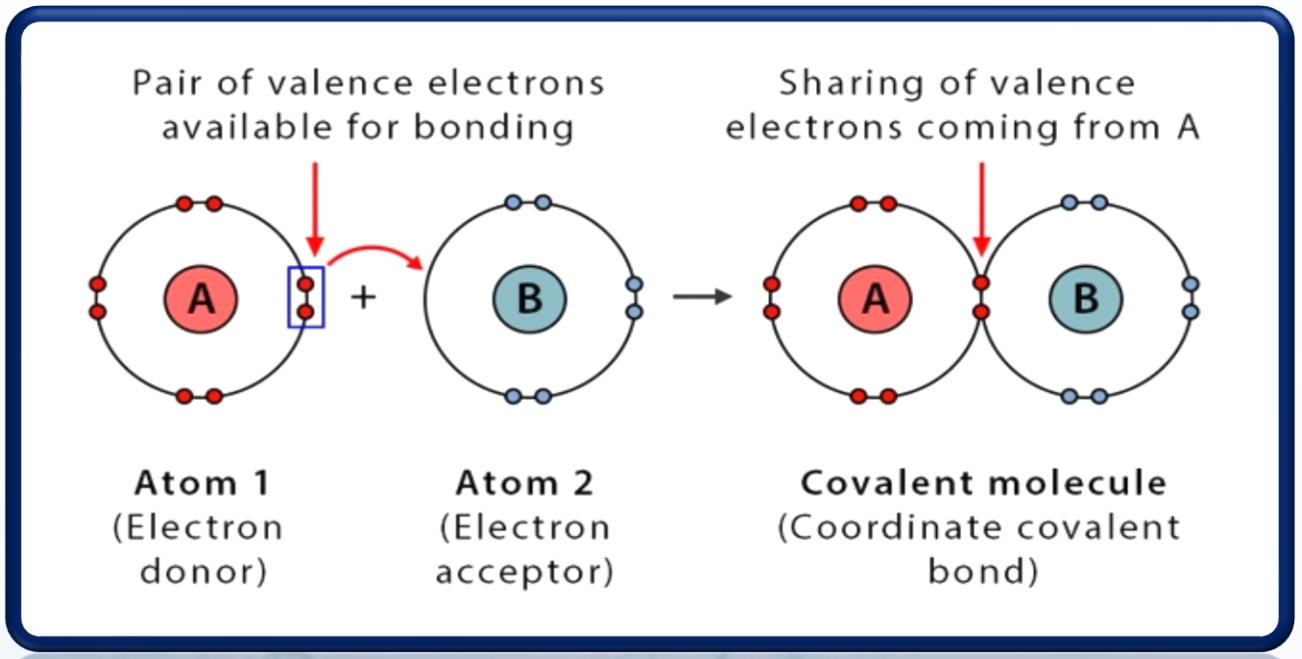
- The free movement of electrons make metals good conductors of heat and electricity.
- Aluminum more conduct electricity more than magnesium because it has more electrons delocalized.



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.





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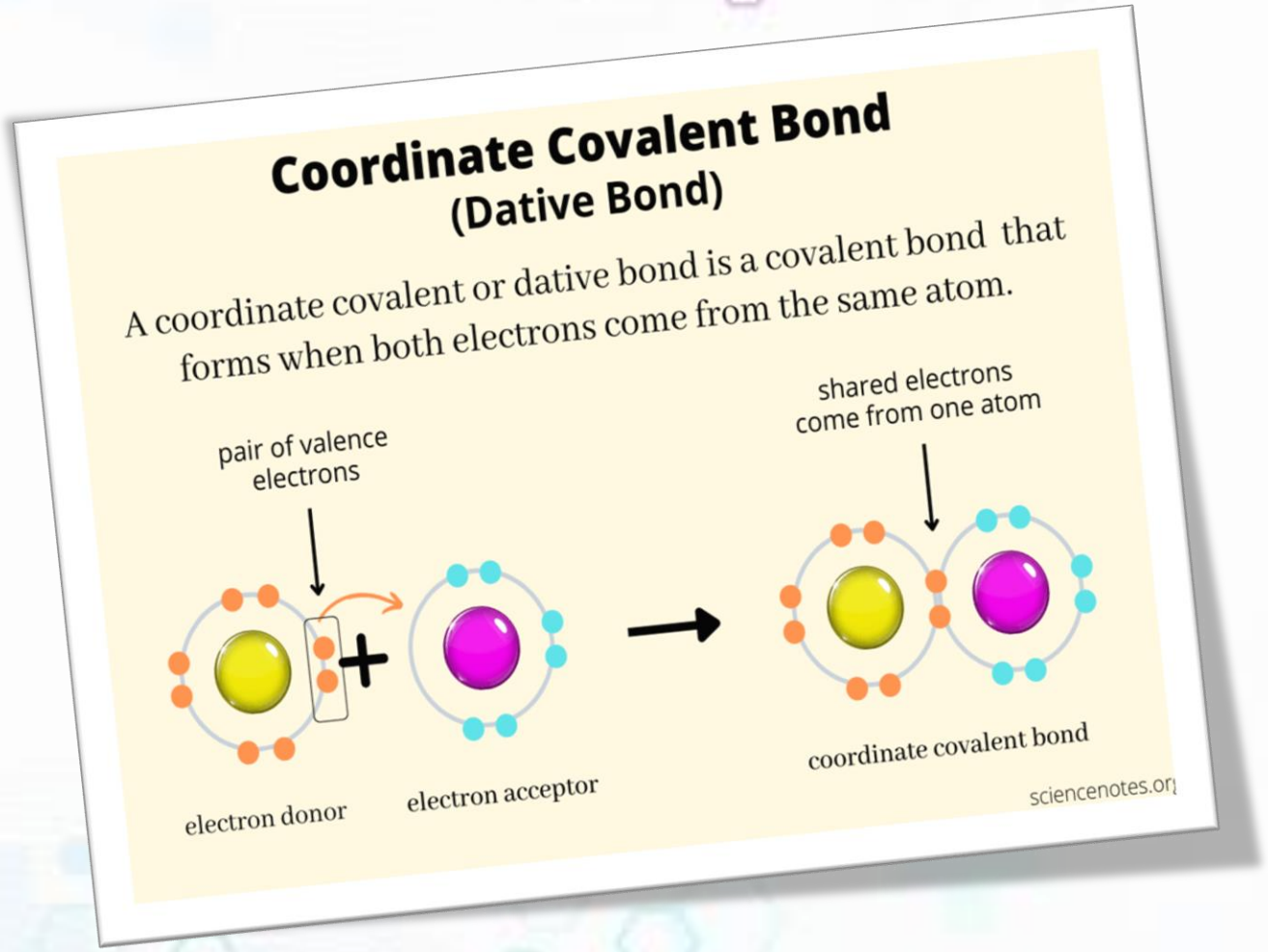
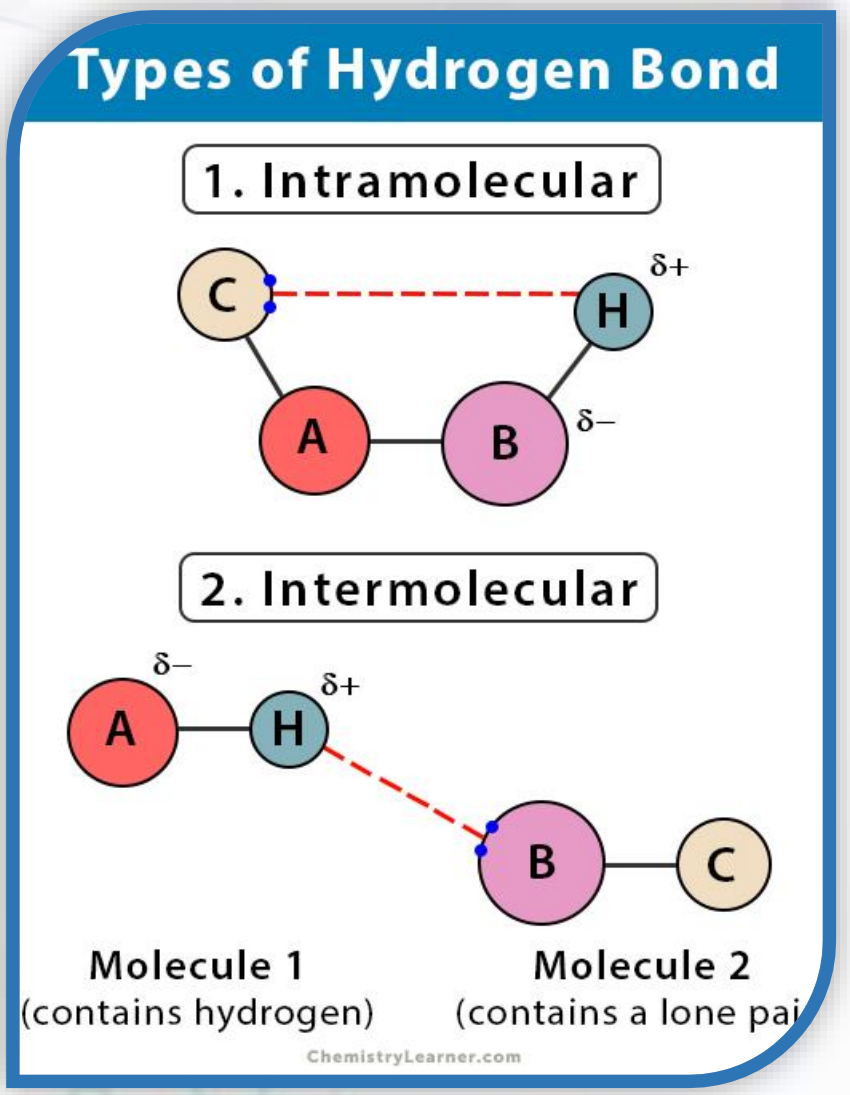
Coordinate Covalent Bonds

- 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.



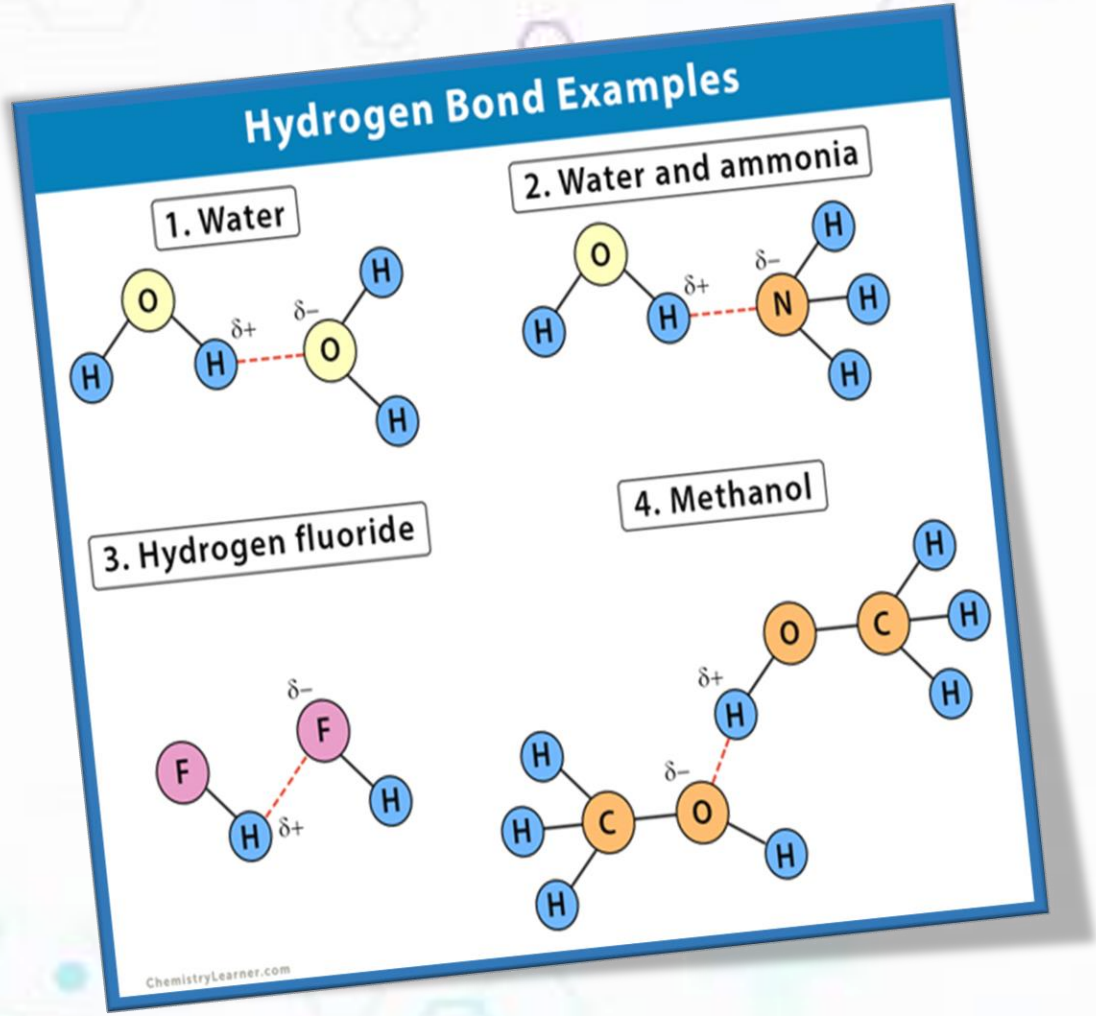
Hydrogen Bond

- **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**.



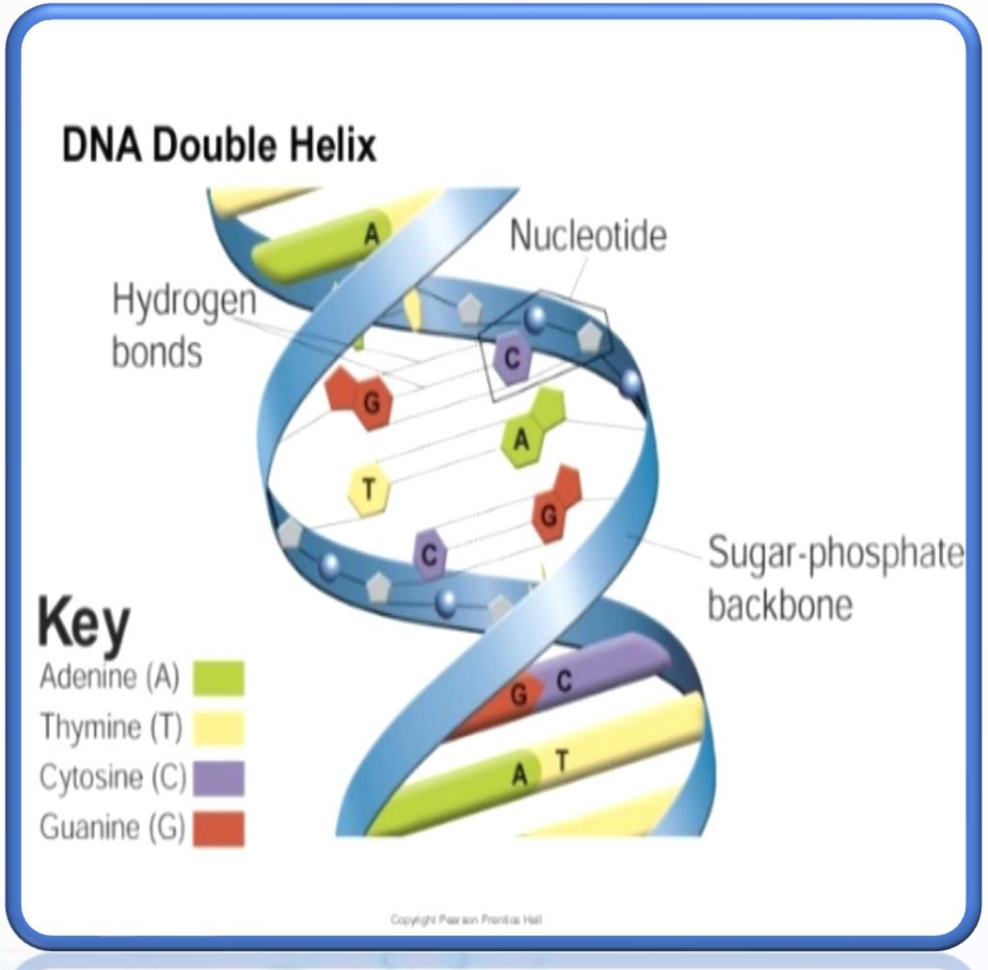
Hydrogen Bond

- 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).

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