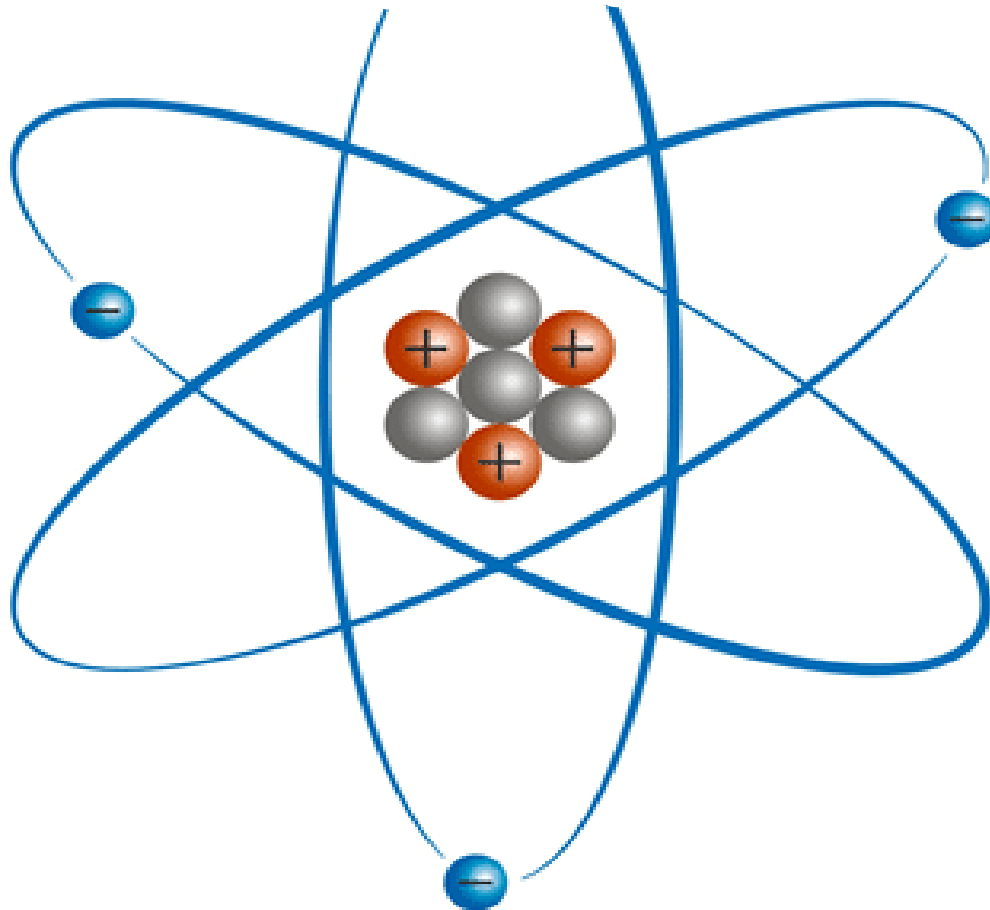


Dr.Eirteham.S.Raheem



Atom structure

-  Proton
-  Neutron
-  Electron

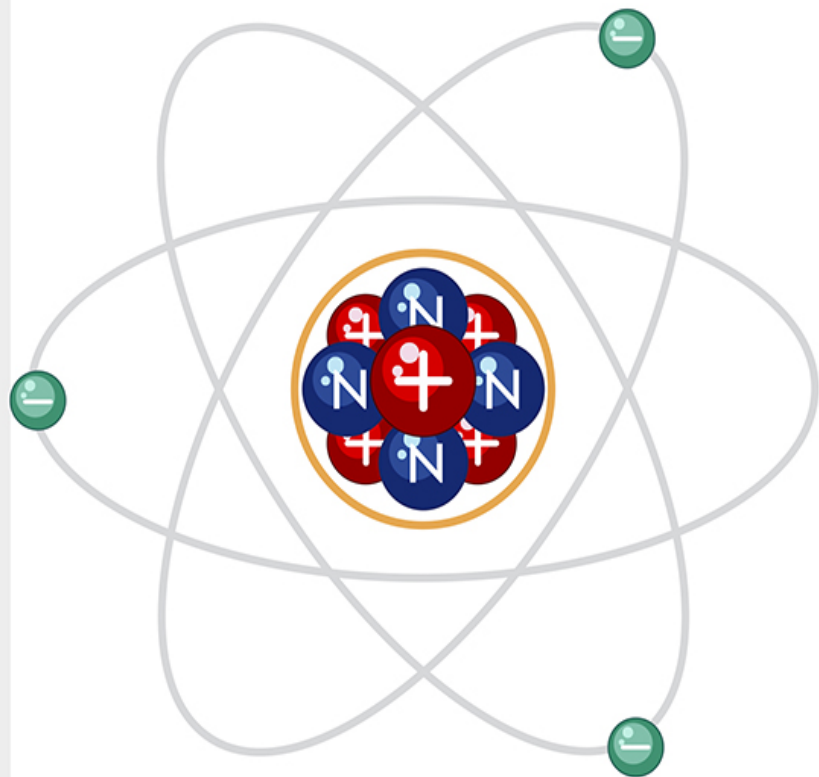
The atom & molecular structure

Objective:

At the end of the lecture, you must know:

- What is an atom?
- What is the structure of an atom?
- What are the molecule?
- What is the element?
- What are the difference between atom , molecule and element?
- What is the chemical bonding?

WHAT IS AN **ATOM**?



An atom is the **smallest** unit of matter that retains all of the chemical properties of an element.

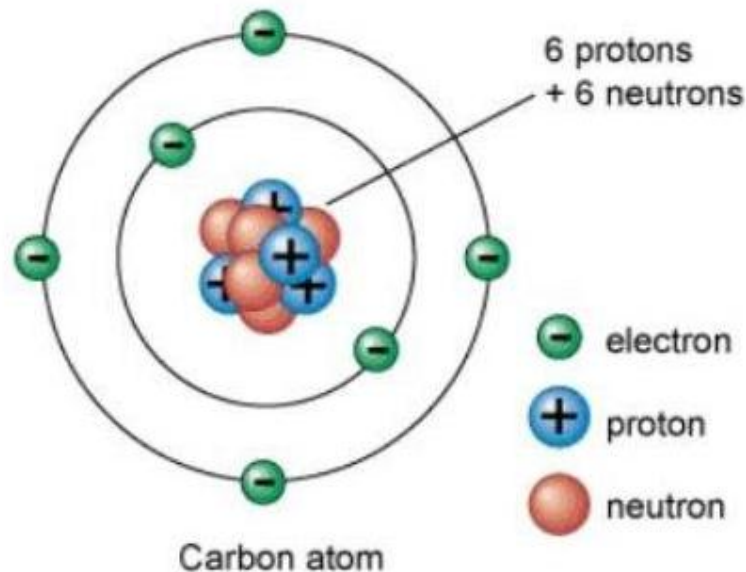
They are submicroscopic, meaning they are so small they cannot be seen with a microscope. They are composed of smaller subatomic particles known as protons, neutrons, and electrons.

The number of protons is called the **atomic number**. This number uniquely identifies each chemical element.

A molecule is formed when two or more atoms of any kind of element are joined together chemically.

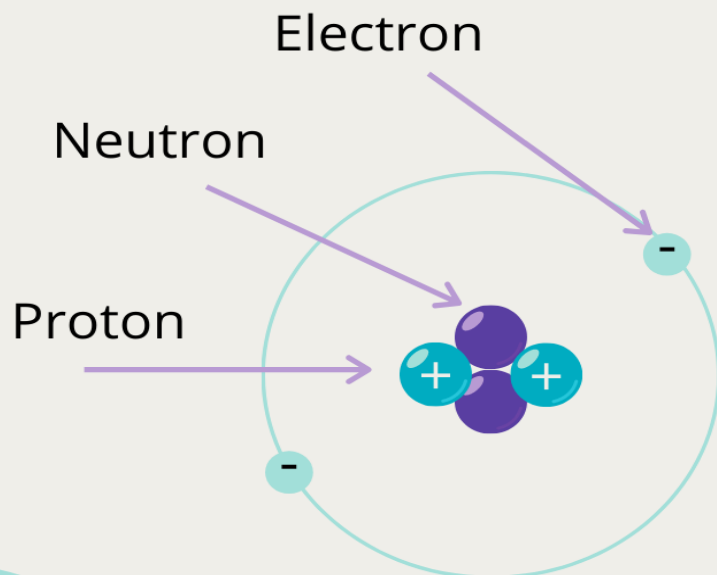
Structure of an atom

- 3 kinds of sub-atomic particles
 - Protons: positively charged, in nucleus
 - Neutrons: neutrally charged, in nucleus
 - Electrons: negatively charged, in cloud around nucleus



How to calculate Atomic and Mass number?

ATOMIC NUMBER VS MASS NUMBER



Mass number is the number of protons plus neutrons



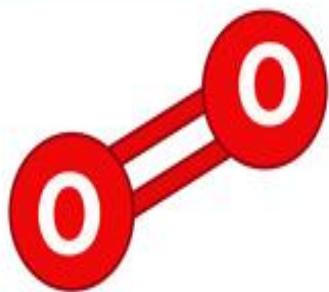
Atomic number is the number of protons



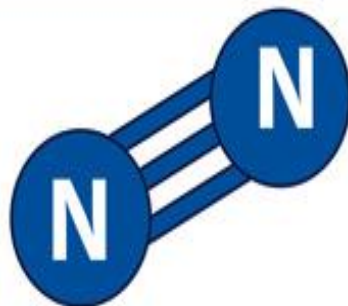
Molecules:

- A molecule is two or more atoms connected by chemical bonds which form the smallest unit of a substance.

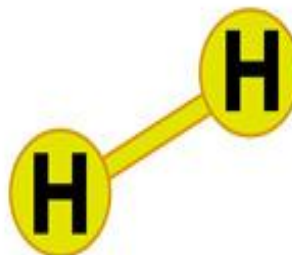
Examples of Molecule



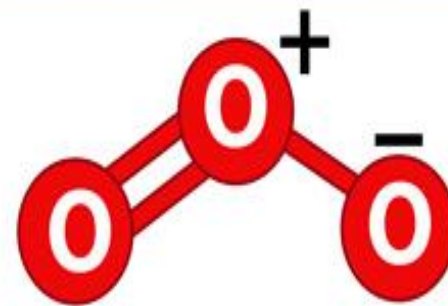
Oxygen
(O₂)



Nitrogen
(N₂)



Hydrogen
(H₂)



Ozone
(O₃)

What is an element?

- A element is a pure substance made of one type of atom
- Elements are divided into metals and non-metals
- Examples of non-metal elements include carbon, oxygen, hydrogen, and nitrogen
- Examples of metal elements include aluminum, iron, copper, and gold



A gold bar

What are the difference between atom , molecule and element

Atom	Molecule	Element
Atom is a smallest particle of an element.	Molecule is a group of two or more atoms combined together.	Element is a pure substance that cannot be converted into simpler substance by any chemical or physical means.
It consists of nucleus (containing protons and neutrons) and electrons.	It consists of combination of two or more same or different atoms chemically bound together. e.g. H ₂ ,	It is made up of atoms of only one kind.

Chemical Bonds

Three types:

Magnesium oxide



Potassium dichromate Nickel(II) oxide

Ionic

Sulfur



Bromine Sucrose

Covalent

Magnesium



Gold Copper

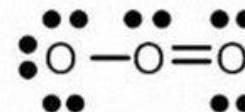
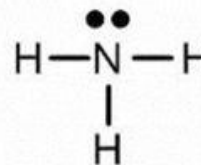
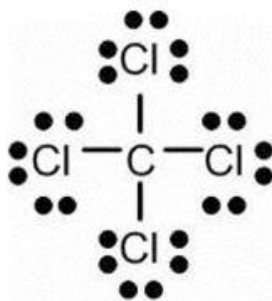
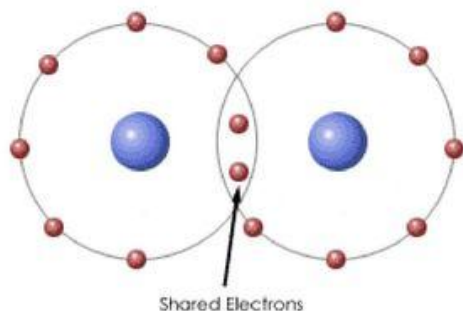
Metallic

Definitions



Chemical Bonds

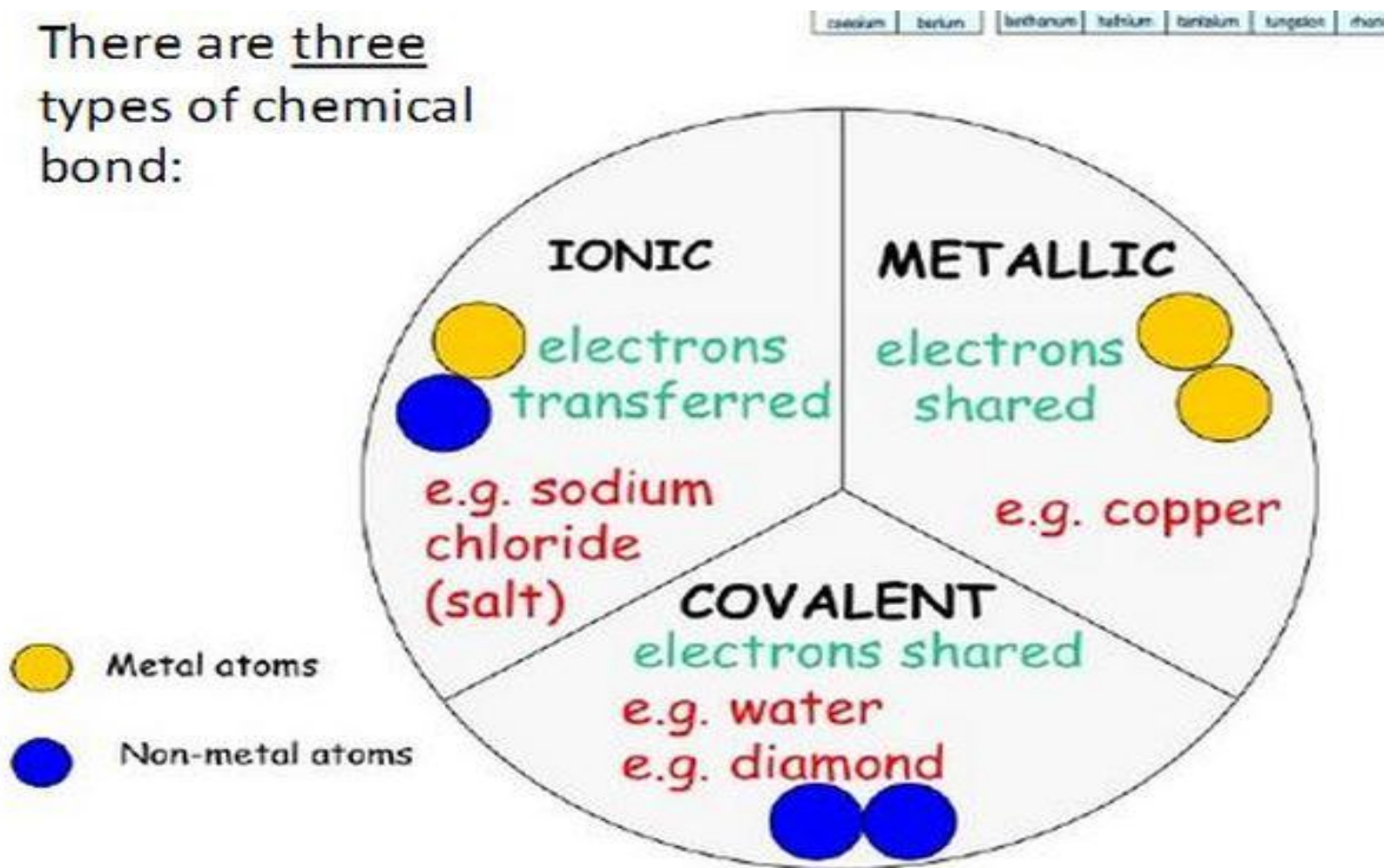
- Force that holds atoms together
- It's all about the electrons (e-)
 - Electrons are attracted to positively charged nucleus of other atom



Correct Lewis structures for carbon tetrachloride, ammonia, and ozone.

Three major types of bonding

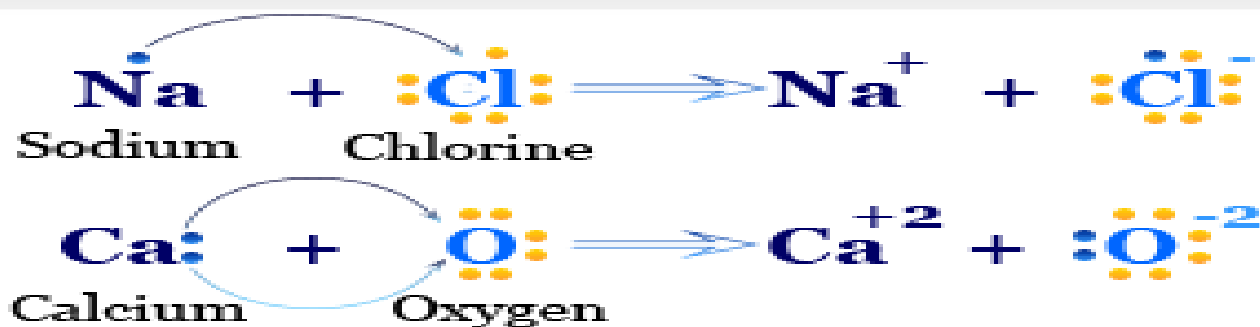
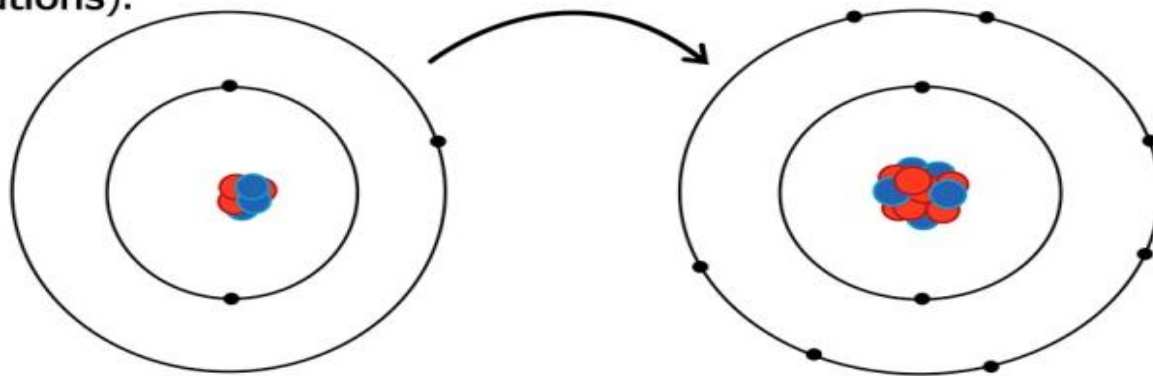
There are three types of chemical bond:



IONIC BOND

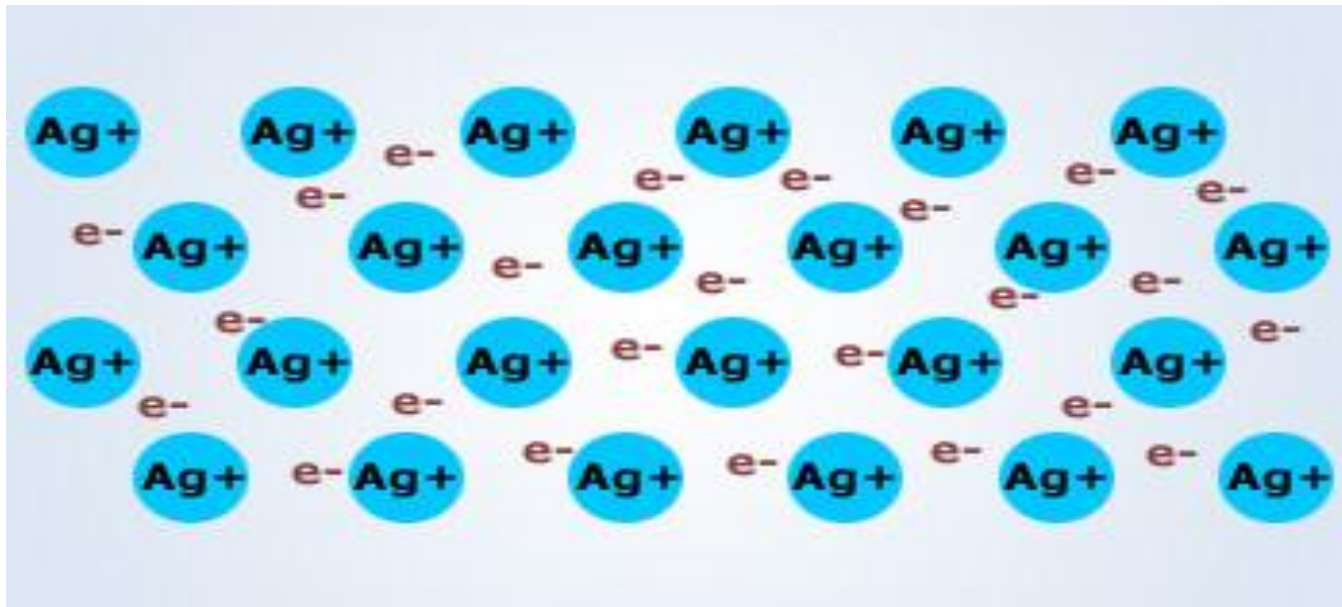
What is an ionic bond?

Ionic bonds occur between a metal and a non-metal. An **ionic bond** results from the transfer of **electrons** from a **metal** to a **non-metal** in order to obtain a full valence shell for both atoms. Atoms that gain electrons make negatively charged ions (called **anions**). Atoms that lose electrons make positively charged ions (called **cations**).



Metallic bond

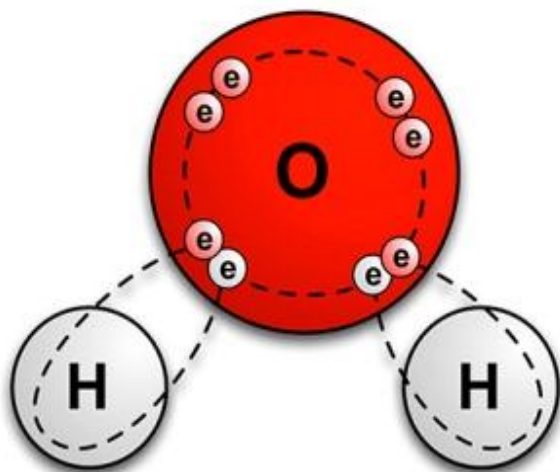
- Always formed between two metals (pure metals)
- Solid gold , silver, lead, etc...



COVALENT BOND

What is a covalent bond?

A covalent bond is defined as a chemical bond wherein **two or more atoms share one or more electron pairs**. A covalent bond is formed by the sharing of electrons between atoms of two elements, such as between two non-metals.

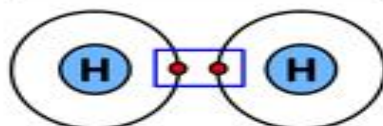


Example: A water molecule consists of two hydrogen (H) and one oxygen (O) atom. Oxygen has a valency of two, and hydrogen has only one electron in its orbital. So, each hydrogen atom will share its electron and covalently bond with the oxygen. As a result, there will be two single bonds.

Types of Covalent Bond

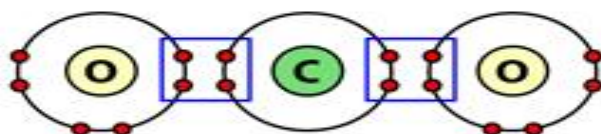
Based on the number of shared electron pairs

Single Bond



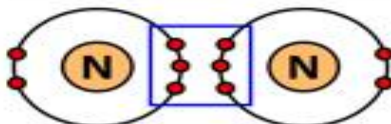
Hydrogen (H_2)

Double Bond



Carbon dioxide (CO_2)

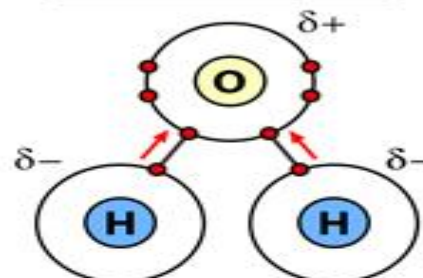
Triple Bond



Nitrogen (N_2)

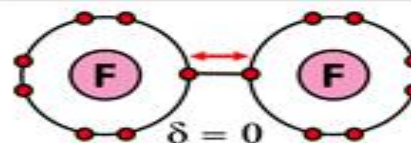
Based on the polarity and coordination of the atoms

Polar Bond



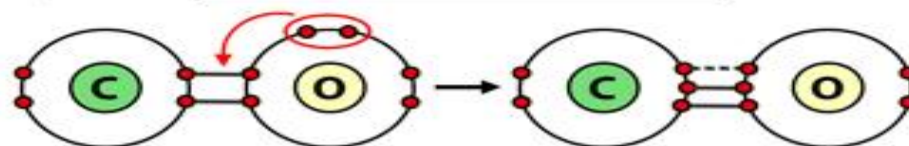
Water (H_2O)

Nonpolar Bond



Fluorine (F_2)

Coordinate Bond



Carbon monoxide (CO)

A festive 'Thank you' card is the central focus, featuring a white card with the words 'Thank you' in a black cursive font, resting on a brown envelope. The scene is decorated with scattered gold and pink streamers and small, shiny gold and silver confetti pieces on a light gray marble background.

Thank you