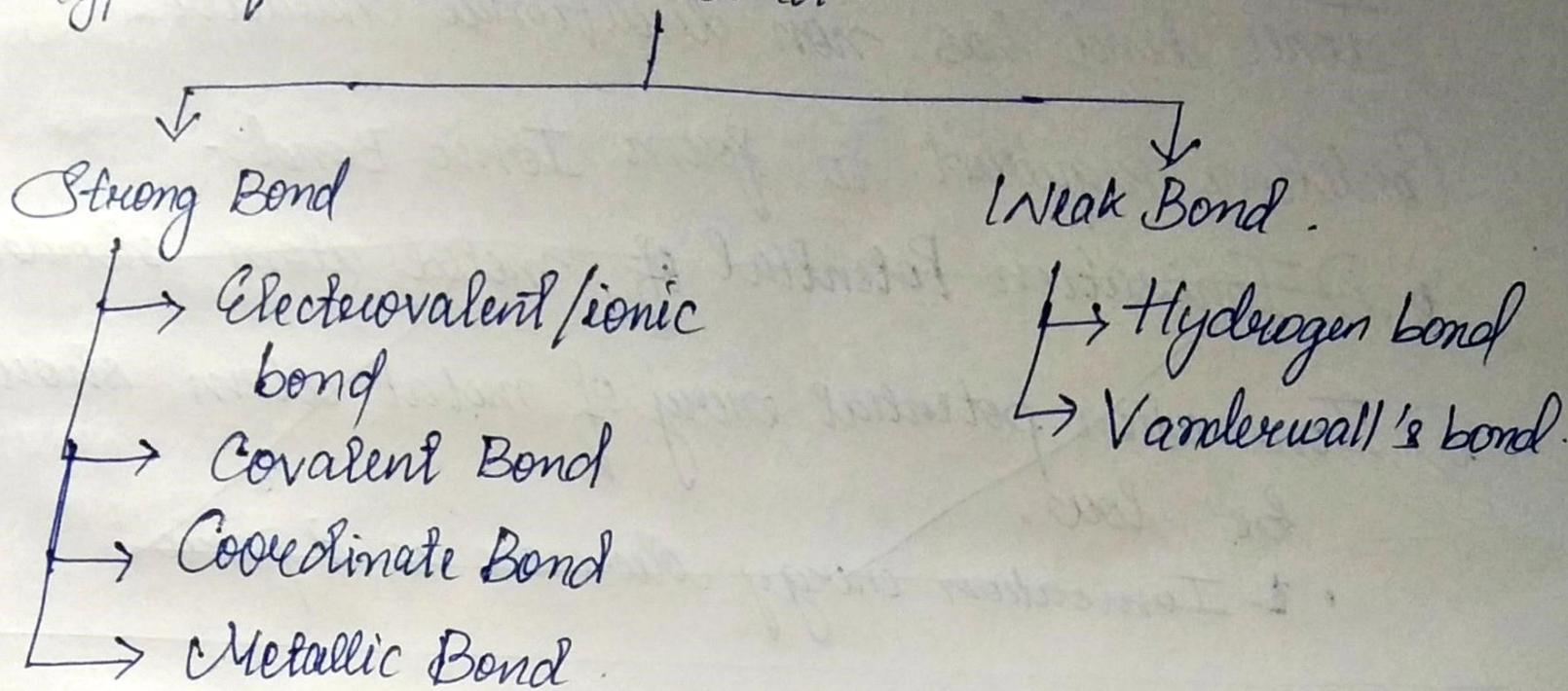


①

# CHEMICAL BONDING

\* Chemical Bond :- The attractive force which holds various constituents (atoms, ions, etc.) together in a molecule is called chemical bond.

## Types of Chemical Bond.



Conditions required to form bonds :-

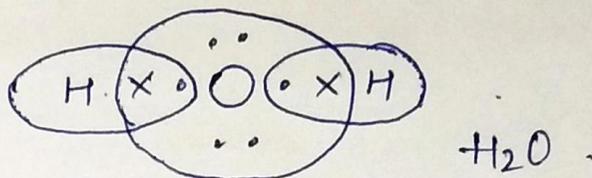
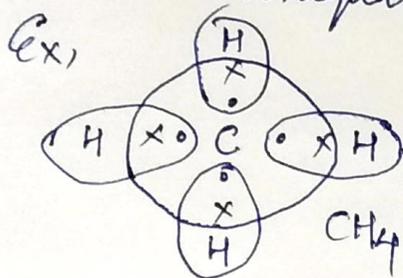
- i) To acquire stability ~~or~~ (inert gas configuration).
- ii) To acquire lower energy state.

## \* Lewis Octet Rule

According to Lewis, every element wants to get stable electronic configuration (inert gas configuration), because noble gases are stable in nature.

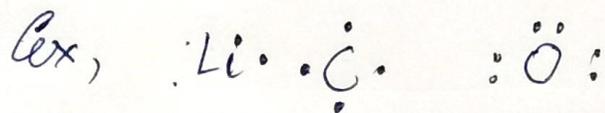
So, to achieve inert gas configuration, element conditions are:-

- i) ~~the~~ transfer of electrons occur between two atoms which results in electrovalent or ionic bond.
- ii) Sharing of electrons which results in covalent bond.
  - Equal sharing  $\rightarrow$  covalent bond.
  - Unequal sharing  $\rightarrow$  coordinate bond.



## Lewis Structures

Lewis symbols :- It is a notation to represent valence electrons are called Lewis symbols.



# This number of valence electrons helps to calculate the group valence of the element.

Group valence of elements = No. of dots in Lewis symbol.

# Following steps to represent Lewis Dot structures

Step 1. Determine the no. of valence electrons.

Step 2. Determine the central atom

Step 3. Then subtracts the no. of electrons consumed for forming single bonds from the total valence electrons.

Step 4:- Distribute the remaining ~~no~~ Valence electrons as pairs around each terminal atoms so for each atom attains octet rule.

Step 5:- Match the no. of electrons which was distributed to the no. of valence electron counted in Step 1.

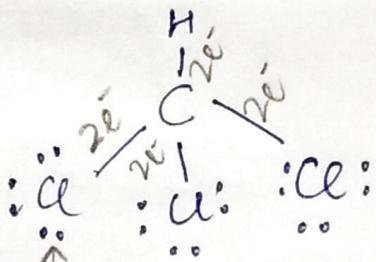
Step 6:- Complete the octet on the central atom.

Ex.  $\text{CHCl}_3$

\* Step 1: Total valence electrons :-  $\text{C} = 4 + 1 + 3 \times 7$   
 $= 4 + 1 + 21$   
 $= 26e^-$

\* Step 2: The central atom will be Carbon because it has 4 valence electrons and its bonding capacity is higher.

~~Step 3~~



\* Step 3:- 4 single bonds =  $4 \times 2 = 8e^-$

$$\begin{array}{r} 26 \\ - 8 \\ \hline 18e^- \end{array}$$

\* Step 4:- adding V.E around terminal atoms.

(Matching Step)

\* Step 5:- 4 single bonds =  $4 \times 2 = 8e^-$   
 9 lone pairs of Cl,  $9 \times 2 = 18e^-$   
 $\underline{26e^-}$

\* Step 6:-

Check the octet on Carbon atom (Central atom).

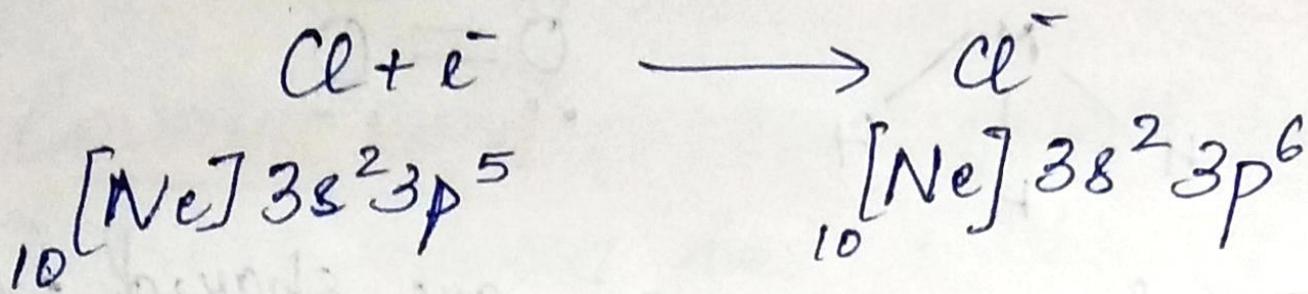
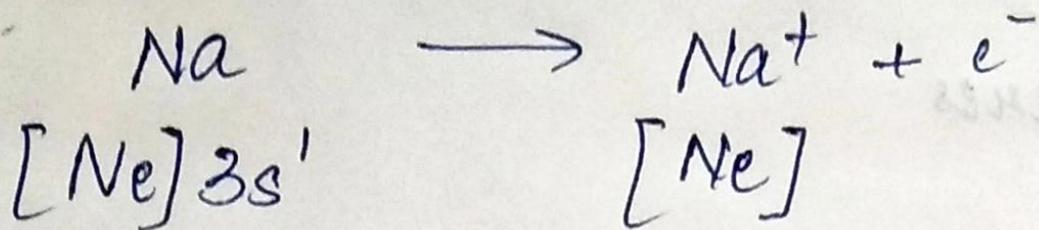
(4)

## \* Ionic gas configuration.

Noble gases  $\rightarrow ns^2 np^6$  [Except He =  $1s^2$ ]

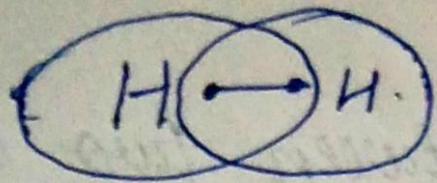
The negative and positive ions thus formed attain stable noble gas configurations.

Ex.



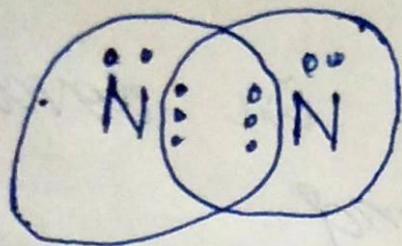
## \* Covalent Bond

Bond formed by sharing of electrons between two combining atoms in outermost orbit to achieve octet configuration.



Duplet

$H_2$ ,  $H-H$  Single bond (Sharing of Covalent bond between 2 H atoms,  $2e^-$ )



$N_2$ ,  $N \equiv N$  (Triple bond)  
[Sharing of  $6e^-$ ].

## 1) Electrovalent / Ionic Bond

- The bond formed as a result of the electrostatic attraction between the positive and negative ions is known as ionic bond.

Ionic bond has non-directional character.

Conditions required to form Ionic Bond:-

- ~~i) Ionisation Potential of metal atom should be low.~~
- ~~ii) Ionisation potential energy of metal atom should be low.~~
- ~~iii) Ionisation energy decreases as period.~~

Conditions required to form Ionic bond:-

- i) ~~The~~ The cation should have low ionization energy.  
i.e.  $Li < Na < K < Rb < Cs$  (I.E along group)
- ii) The anion should have high electron affinity  
i.e.  $Cl > F > Br > I$ . (Electron affinity along group)
- iii) The lattice enthalpy of an ionic compound should be high.

