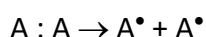
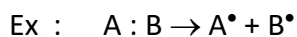


Types of Bond fission:

- Cleavage of covalent bond and the distribution of bonding pair of electrons is called bond fission.
- Bond fission is of two types

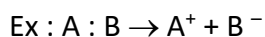
Homolytic fission (Homolysis) : In the cleavage of bond each bonded atom takes away one electron, forming free radicals.

- Homolysis may take place in between same atoms or different atoms
- Homolysis generally occurs in presence of light or heat.



Heterolytic fission (Heterolysis) : In the cleavage of this bond, one bonded atom takes away the bonding pair of electrons, forming oppositely charged ions.

- Ions are produced in this fission.
- Heterolysis occurs in presence of polar solvents



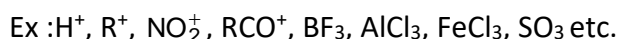
- Alkyl halides and Grignard reagents undergo heterolytic cleavage.

Types of reagents :

There are 3 types of reagents

1. Electrophilic reagents
2. Nucleophilic reagents
3. Free radicals

Electrophilic reagents (electrophiles) : These reagents attract electrons. Electrophiles may be positively charged or electron deficient neutral molecules.

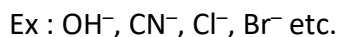


2. Nucleophilic reagents (Nucleophiles) :

These reagents will donate electrons.

These are electron rich species. They may be negatively charged or neutral. Electron pair donors are Lewis bases.

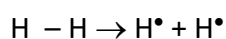
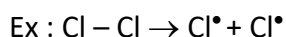
\therefore All Lewis bases are nucleophiles



Free radicals : An atom or group of atoms which carry unpaired electron are called free radicals.

Free radicals are electrically neutral and paramagnetic due to the presence of unpaired electrons.

Free radicals are formed in homolytic fission. Free radicals are unstable and highly reactive.



The order of stability of some free radical is
benzyl > allyl > tertiary > secondary > primary > methyl.

Types of Reaction Intermediates:

Reactant + Reagent \rightarrow Intermediate \rightarrow Product

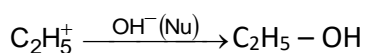
Carbonium ions : Carbonium ion is the organic species in which carbon carries positive charge.

Therefore carbonium ion is called carbo cation. These are formed when the bond between carbon and heteroatom undergoes heterolytic cleavage.

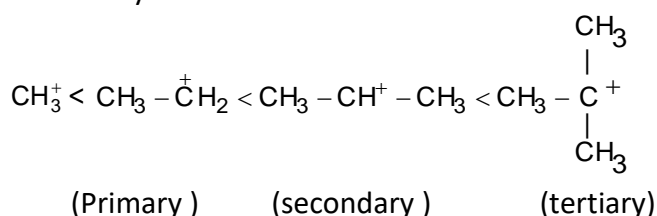
Carbon bearing positive charge in carbonium ion has only six electrons.

Carbonium ion is attacked by nucleophile

Ex : $\text{C}_2\text{H}_5 - \text{Cl} \rightarrow \text{C}_2\text{H}_5^+ + \text{Cl}^-$



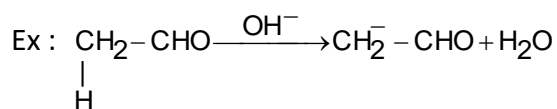
Stability of various carbonium ions :



2. Carban ion (carbon anion) :

It is organic species in which carbon carries negative charge.

- Carban ion is formed when a bond is present between carbon and more electro positive atom
- Carbon in carban ion carries 8 electrons
- Carban ion is attacked by electrophile



Acetaldehyde Carban ion