Cleavage (fission or breaking) of covalent bonds.

Breaking of covalent bond of the compound is known as **bond fission**. A bond can be broken by two ways,

(1) **Homolytic bond fission or Homolysis**

(i) In homolysis, the covalent bond is broken in such a way that each resulting species gets its own electron. This leads to the formation of odd electron species known as **free radical**.

$$A : B \longrightarrow \underset{\text{Free radical}}{\dot{A}} + \dot{B}$$

(ii) The factor which favors homolysis is zero or a small difference in electronegativity between A and B.

(iii) Homolysis takes place in gaseous phase or in the presence of non-polarsolvents (CCl_4, CS_2), peroxide, UV light, heat $(\geq 500^o C)$, electricity and free radical.

(iv) Mechanism of the reaction in which homolysis takes place is known as homolytic mechanism or free radical mechanism.

(2) **Heterolytic bond fission or heterolysis**

(i) In heterolysis, the covalent bond is broken in such a way that one species (i.e., less electronegative) is deprived of its own electron, while the other species gains both the electrons.

$$A : B \longrightarrow \underset{\text{carbanion}}{A :^{\ominus}} + \underset{\text{carbocatio n}}{B^{\oplus}}$$

Thus formation of opposite charged species takes place. In case of organic compounds, if positive charge is present on the carbon then cation is termed as **carbocation**. If negative charge is present on the carbon then anion is termed as **carbonion**.

(ii) The factor which favors heterolysis is a greater difference of electronegativity between A and B.

(iii) Mechanism of the reaction in which heterolysis takes place is known as Heterolytic mechanism or ionic mechanism.

(iv) The energy required for heterolysis is always greater than that for homolysis due to electrostatic force of attraction between ions.