

The concept of isomerism illustrates the fundamental importance of molecular structure and shape in organic chemistry and the isomers play a vital role in biological processes.

Structural Isomerism

Same molecular formula and different bond pattern *i.e.*, different arrangement of atoms or groups of atoms within the molecules.

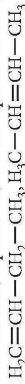
Chain Isomerism

Due to different arrangements of carbon atoms leading to linear and branched chains. *e.g.*,



Position Isomerism

Due to different positions of side chains, substituents, functional groups, double bonds, triple bonds, etc. on the parent chain. *e.g.*,



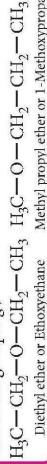
Functional Isomerism

Due to presence of different functional groups. *e.g.*,



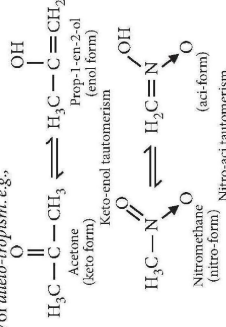
Metamerism

Arises when different alkyl groups are attached to the same functional group. *e.g.*,



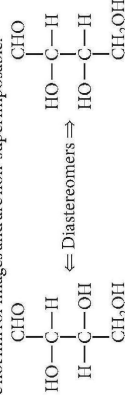
Tautomerism

Tautomers have different functional groups and exist in dynamic equilibrium with each other due to a rapid interconversion from one form to another and the phenomenon is known as tautomerism. It is also called as *desmotropism* or *kryptotropism* or *prototropy* or *allelotropism*. *e.g.*,



Diastereoisomers

- Chiral molecules having different arrangement of groups or atoms at one or more (but not all) of the equivalent stereocentres.
- They are not mirror images and are non-superimposable.



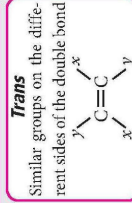
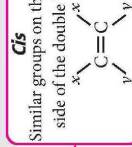
Isomerism

Stereoisomerism

Same molecular formula and bond pattern but different arrangement of atoms or groups of atoms in space.

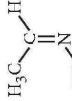
Geometrical Isomerism

Same structural formula but differ in the spatial arrangement of atoms or groups of atoms about double bond ($\text{C}=\text{C}$, $\text{C}\equiv\text{C}$, $\text{C}=\text{N}$ or $\text{N}=\text{N}$).



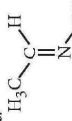
Syn

Two substituents (usually alkyl and hydroxyl) on the same side of the plane.



Anti

Two substituents (usually alkyl and hydroxyl) on the opposite side of the plane.



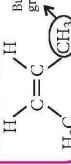
E

E is assigned to an isomer in which high priority atoms or groups are on the opposite sides.



Z

Z is assigned to an isomer in which high priority atoms or groups are on the same side.

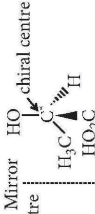


Optical Isomerism

Same molecular formula but differing only in the behaviour towards polarised light are called optical isomers and the phenomenon is called optical isomerism.

Enantiomers

- Chiral molecules with one or more stereocentres.
- Non-superimposable mirror images.
- No symmetry elements.



Meso Compounds

- Molecules with multiple stereocentres.
- Internal plane of symmetry thus, optically inactive.

