

* Isomerism

In organic chemistry the various type of the organic compounds are studied and when two or more organic compounds have equal number of atoms and like atoms or same atoms then we can study of phenomenon of isomerism.

These compounds have the same molecular formula but differ from each other in physical or chemical properties, and are called isomers and the phenomenon is called isomerism.

The difference in their properties of compounds must be due to different modes of combination or arrangement of atoms within the molecule. There are main two type of isomerism -

- 1. Structural Isomerism (without space)
- 2. Stereoisomerism (with space)

1. Structural Isomerism - when the isomerism is due to difference in the arrangement of atoms within the molecule, without any reference to space, the phenomenon is called structural isomerism.

Structural isomers are compounds that have the same molecular formula but different structural formulas.

Structural Isomerism is of five types:-

- (a) Chain Isomerism
- (b) Position Isomerism
- (c) Functional Isomerism
- (d) Metamerism
- (e) Tautomerism

2. Stereoisomerism - The isomerism is caused by different arrangement of atoms or groups in space. The phenomenon is called Stereoisomerism. The stereoisomers have the same structural formulas but differ in arrangement of atoms in space.

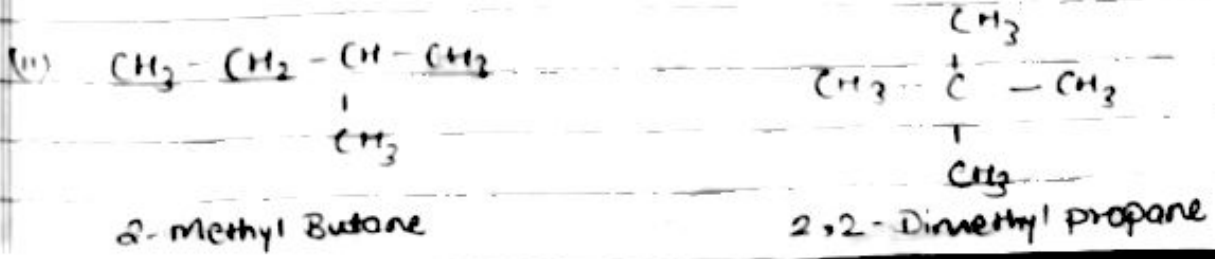
There are two types of Stereoisomerism -

- (a) Geometrical or Cis-Trans Isomerism
- (b) Optical Isomerism

→ Structural Isomerism -

(a) Chain Isomerism - Chain isomers have the same molecular formula but differ in the order in which the carbon atoms are bonded to each other.

eg. (i) n-Butane and Isobutane



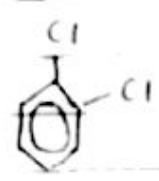
(b) Position Isomerism - Position isomers have the same molecular formula but differ in the position of a functional group on the carbon chain.

eg -

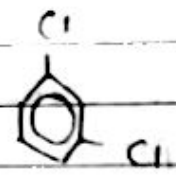
(i) n Propyl alcohol and Isopropyl alcohol -



(ii) o-Dichlorobenzene and m-Dichlorobenzene -



o-Dichlorobenzene



m-Dichlorobenzene

(c) Functional Isomerism - functional isomers have the same molecular formula but different functional groups.

eg -

(i) Ethyl alcohol and Dimethyl ether



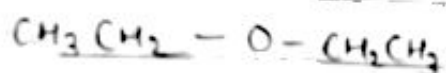
(ii) Acetone and Propionaldehyde



Metamerism

This type of isomerism is due to the unequal distribution of carbon atoms on either side of the functional group members belong to the same homologous series.

(i) Diethyl ether and Methyl propyl ether

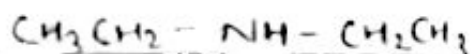


Diethyl ether

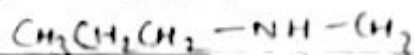


Methyl propyl ether

(ii) Diethylamine and Methylpropylamine

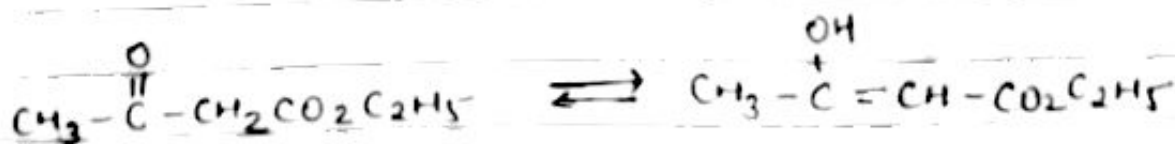


Diethylamine



Methylpropylamine

(5) Tautomerism - It is a special type of functional isomerism in which the isomers are in dynamic equilibrium with each other. For example, ethyl acetoacetate is an equilibrium mixture of the following two forms. At room temperature the mixture contains 93% of keto-form plus 6% of the enol-form.



Keto-form

Enol-form