Isomerism

Isomers are compounds that have the same molecular formula with a slightly different structural formula. That is they have the same **type and number** of atoms but they are linked together in different ways. This gives them slightly different physical and chemical properties.

As the number of carbon atoms in the molecular formula increases, so does the possible number of structural isomers.

Alkanes with four carbons (C_4H_{10}) have 2 isomers
Alkanes with five carbons (C_4H_{10}) have 3 isomers
Alkanes with six carbons (C_4H_{10}) have 5 isomers
Alkanes with seven carbons (C_4H_{10}) have 9 isomers
Alkanes with eight carbons (C_4H_{10}) have 18 isomers

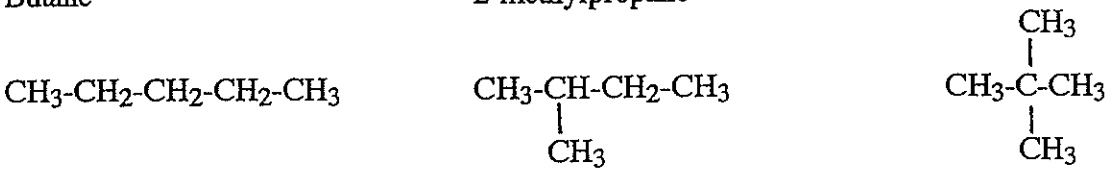
Types of isomerism

A Structural Isomers

i. Chain Structural Isomerism

Compounds where there is a change in the length of the parent chain

Butane 2-methylpropane



pentane 2-methylbutane 2,2-dimethylpropane

ii Position Structural Isomerism

Compounds where the parent chain remains the same, but the position of the substituent group changes.

3-methylpentane 2-methylpentane

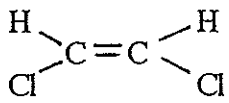
iii Position Structural Isomerism with multiple bonds

Compounds with more than four carbons that contain double or triple bonds, where the position of the bond changes.

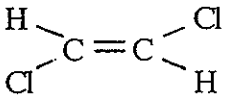
2-pentene 1-pentene

IV Geometric Isomerism

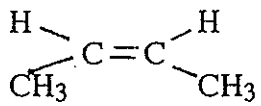
Geometric isomerism occurs when the compound has a double bond. The bond prevents rotation of the substituent groups and allows two structures with slightly different physical and chemical properties.



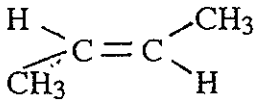
Cis-1,2,-dichloroethene



Trans-1,2-dichloroethene



Cis-2-butene



Trans-2-butene