STRUCTURAL ISOMERS

Structural isomers are defined as *molecules having the same molecular formula but a different structural formula*.

Hydrocarbon molecules with more than three carbons in the chain can have more than one isomer and the number of possible isomers increases with the size of the molecule.

Pentane (C_5H_{12}) can have three isomers while a large alkane such as $C_{20}H_{42}$ can have up to 350,000 isomers.

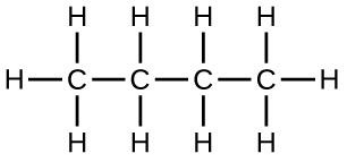
It is important to remember that isomers with the same molecular formula are different in terms of structure and properties.

The concept of isomers is best illustrated with some examples.

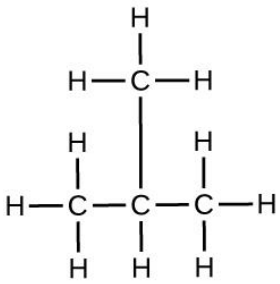
EXAMPLES OF ISOMERS

Example 1

Butane C_4H_{10}, has two possible isomers:



n-butane

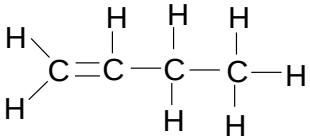


2-methylpropane

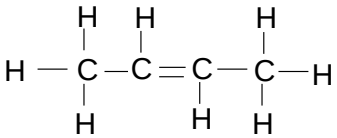
Where n indicates the normal straight chain isomer.

Example 2

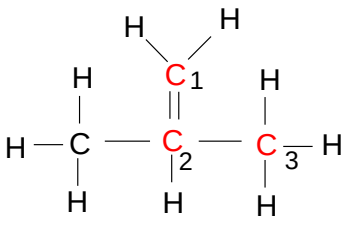
Possible isomers of butene, C_4H_8



1-butene



2-butene

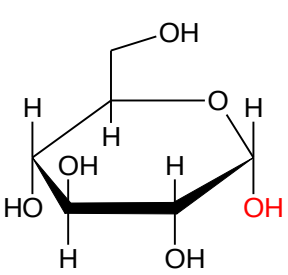


2-methyl prop-1-ene

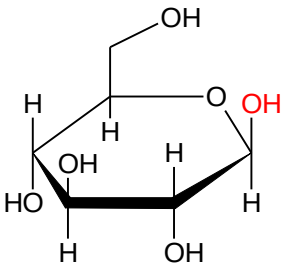
SIGNIFICANCE OF STRUCTURAL ISOMERS IN LIVING SYSTEMS

The sugar, glucose, has two structural isomers called α-glucose and β-glucose. The difference between the two forms lies in the position of a hydroxyl group on the fifth carbon in the furanose ring.

The two isomers are shown below:



α–glucose



β-glucose

Starch, which is found in cereals such as bread and potatoes, is a polymer of α-glucose. It is an essential part of the human diet as humans are able to break it down and utilise the glucose produced for energy.

Cellulose, which is found in grass, leafy vegetables and wholemeal bread, is a polymer of β-glucose. Cellulose cannot be digested by humans and has no nutritional value.

The above example illustrates how even subtle differences between two isomers can affect the reactivity and property of a substance.