STRUCTURAL ISOMERISM

Introduction

Isomerism in organic chemistry is a phenomenon shown by two or more organic compounds having the same molecular formula but different properties due to difference in arrangement of atoms along the carbon skeleton (structural isomerism) or in space (Stereo isomerism). The chart summarizes the types of isomerism, and we will discuss only ***structural isomerism*** in greater detail.

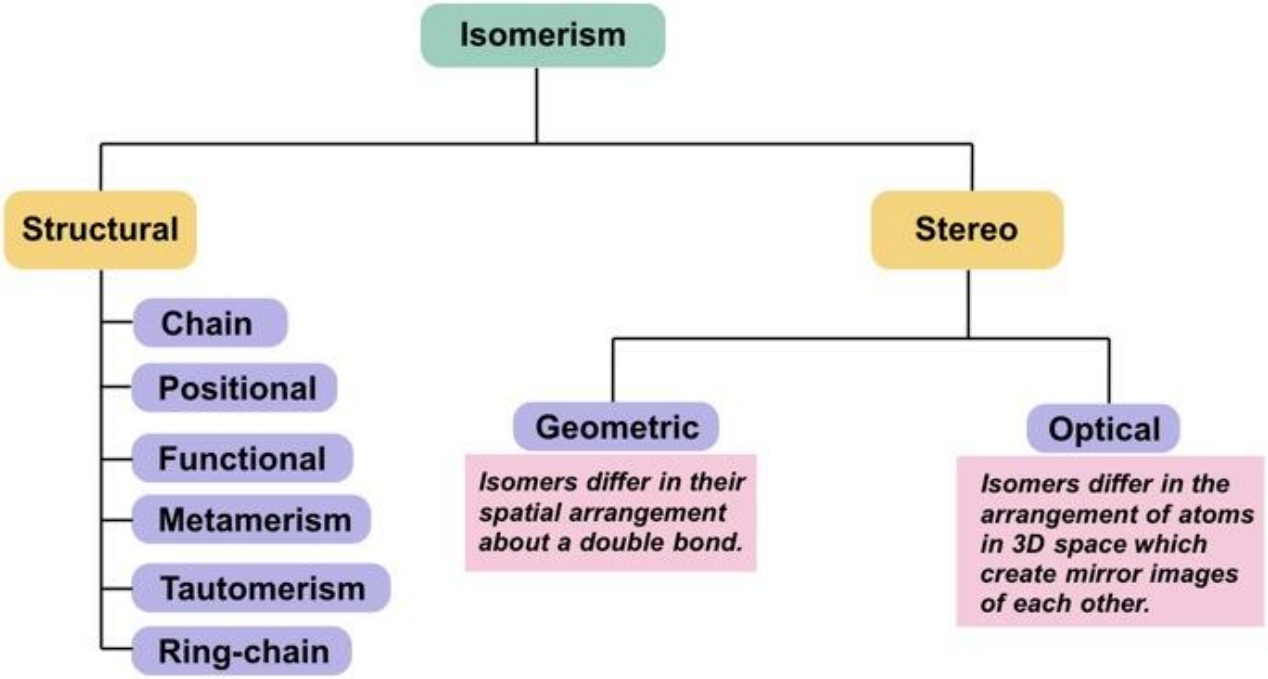

Figure 1. Isomerism

Structural Isomerism

Chain Isomerism

It occurs when carbon atoms are linked to the main chain in different ways. For example:

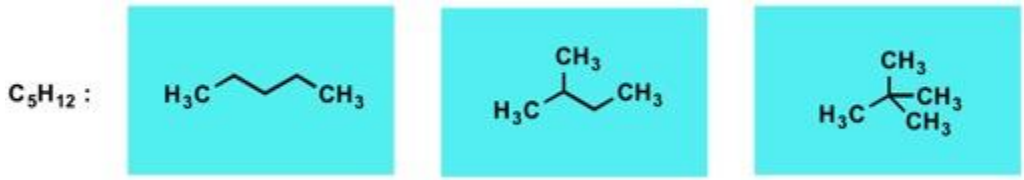

Figure 2. Pentane chain isomers

Position Isomerism

It occurs when functional groups are attached on different positions on a carbon chain. For example:

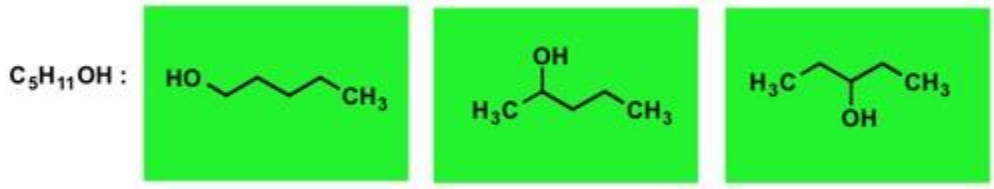

Figure 3. Position isomerism

Functional Isomerism

It is a very interesting form of isomerism where the compounds are different due to different arrangements of atoms leading to different functional groups. As functional groups are usually the reactive centre of a molecule this leads to entirely different properties. For example:

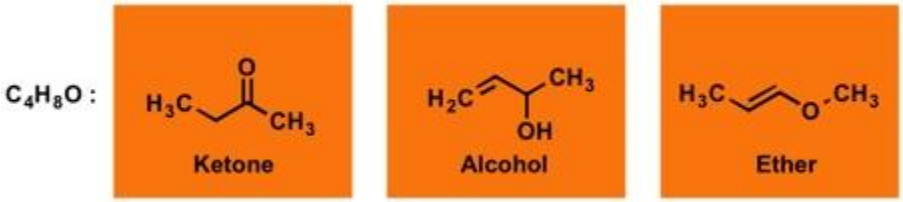

Figure 4. Functional isomerism

Metamerism

This form of isomerism is rare and is limited to molecules having a divalent atom like O or S and alkyl groups around it. The main examples come from ethers and thioethers.

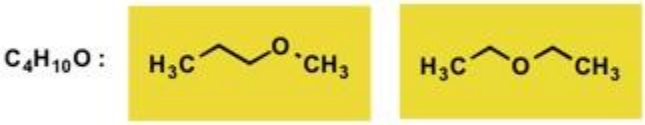

Figure 5. Metamerism

Tautomerism

This isomerism is due to spontaneous intreconversion of two isomeric forms with different functional groups. The prerequisites for this is the presence of the C=O, C==N or N=O in the usual cases and an alpha H atom. The most usual is the ‘keto-enol’ tautomerism, but there can be others like nitro-aci and amine-imine forms.

Figure 6. Tautomerism

In general the Keto form is more stable. Enols can be forms by acid or base catalysis from the ketone and are extensively used in making C-C single bonds in organic synthesis.

Ring-Chain isomerism

Here one isomer is an open chain molecule and the other a cyclic molecule.

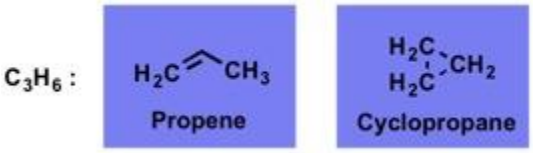

Figure 7. Ring-chain isomerism

Propene is an alkene and cyclopropane an alkane, two different classes of compounds.

Source : http://padakshep.org/otp/subjects/chemistry/organic-chemistry/structural-isomerism/