Summary

Asymmetric carbon

The carbon atom which is attached with four different groups of atoms is called asymmetric carbon.

Asymmetric molecule

If all the four aubstituents attached to carbon are different, the resulting molecule will lack symmetry. Such a molecule is called asymmetric molecule. Asymmetry of molecule is responsible for opitcal activity in such organic compounds.

Achiral molecule

A molecule that is superposable on its mirror image. Achiral molecules lack handedness and are incapable of existing as a pair of enantiomers.

Axial bond

The six bonds of a cyclohexane ring (below) that are perpendicular to the general plane of the ring, and that alternate up and down around the ring.

Boat conformation

A conformation of cyclohexane that resembles a boat and that has eclipsed bonds along its two sides.

Chair conformation

The all-staggered conformation of cyclohexane that has no angle strain or torsional strain and is, therefore, the lowest energy conformation.

Chiral molecule

A molecule that is not superposable on its mirror image. Chiral molecules have handedness and are capableof existing as a pair of enantiomers.

Chirality

The property of having handeness.

Configuration

The particular arrangement of atoms (or groups) in space that is characteristic of a given stereoisomer.

Conformation

A particular temporary orientation of a molecule that results from rotations about its single bonds.

Conformational anylysis

An analysis of the energy changes that a molecule undergoes as its groups undergo rotation (sometimes only partial) about the single bonds that join them.

Conformer

A particular staggered conformation of a molecule.

Connectivity

The sequence, or order, in which the atoms of a molecule are attached to each other.

Dextrorotatory

Those substances which rotate the plane of polarisation of light towards right are called dextrorotatory. Currently, dextro and laevo rotations are represented by algebraic signs of (+) and (–) respectively.

Leavorotatory

A compound that rotates plane polarized light in a counterclockwise direction.

Eclipsed conformation

A temporary orientation of groups around two atoms joined by a single bond such that the groups directly oppose each other.

Enantiomers

Stereoisomers that are mirror images of each other. enantiomers rotate the plane of polarised light to the same extent but in opposite direction.

Equatorial bond

The six bonds of a cyclohexane ring that lie generally around the “equator” of the molecule.

Meso compound

An optically inactive compound whose molecules are achiral even though they contain tetrahedral atoms with four different attached groups. A meso-compound is optically inactive due to internal compensation.

Optically active substances

Those substances which rotate the plane of polarisation of plane-polarised light when it is passed through their solutions are called optically active substances. This phenomenon is called optical activity.

Plane of symmetry

An imaginary plane that bisects a molecule in a way such that the two halves of the molecule are mirror images of each other. Any molecule with a plane of symmetry will be achiral.

Plane-polarized light

Ordinary light in which the oscillations of the electrical field occur only in one plane. It is obtained by passing a monochromatic light (light of single wavelength) through a Nicol prism.

Polarimeter

A device used for measuring optical activity.

(R–S) System

A method for designating the configuration of tetrahedral stereogenic centres.

Racemic form (racemate or racemic mixture)

An equimolar mixture of enantiomers. A racemic mixture is optically inactive due to external compensation.

Racemisation

The process of conversion of an enantiomer into racemic mixture is known as an racemisation.

Retention

If in an optically active molecule that relative configuration of the atoms groups around a chiral centre remains the same before and after the reaction, the reaction is said to proceed with retention of configuration.

Relative configuration

The relationship between the configuration of two chiral molecules. Molecules are said to have the same relative configuration when similar or identical groups in each occupy the same position in space. The configurations of molecules can be related to each other through reactions of known stereochemistry, for example, through reactions that cause no bonds to a stereogenic center to be broken.

Resolution

The process by which the enantiomers of a recemic form are separated.

Ring flip

The change in a cyclohexane ring (resulting from partial bond rotations) that converts one ring conformation to another. A chair-chair ring flip converts any equatorial substitutent to an axial substituent and vice versa.

Ring strain

The increased potential energy of the cyclic form of a molcule (usually measured by heats of combustion) when compared to its acyclic form.

Specific rotation

Specific rotation is defined as the number of degrees of rotation observed when the concentration of optically active substance is 1 g cm ^{3} and length of polarimeter tube is 1 decimetre (dm) for D-line of sodium vapour lamp at 25ºC.

Stereogenic center

An atom bearing group of such nature that an interchange of any two groups will produce a stereoisomer.

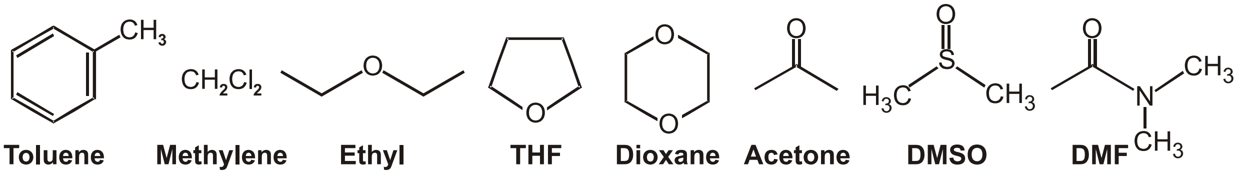
Steric hindrance

An effect on relative reaction rates caused when the spatial arrangement of atoms or groups at or near the reacting site hinders or retards a reaction.

Torsional strain

The strain associated with an eclipsed conformation of a molecule; it is caused by repulsions between the aligned electron pairs of the eclipsed bonds.

(a) Aprotic Solvents



	Toluene	Methylene chloride	Ethyl ether	THF	Dioxane	Acetone	DMSO	DMF
bp (ºC) :	111	40	35	66	101	56	189	153

MATCHING LIST (2)

1.

List-I	List-II
(P) Homologoues	(1) May be constitutional isomers
(Q) Duma's method	(2) For estimation, Nitrogen collected as NH_3
(R) Kjeldal's method	(3) For estimation, nitrogen collected as N_2
(S) Dimethyl ether & n-propyl ether	(4) Differ by 14 amu in terms of molecular mass

Codes:

	P	Q	R	S
(A)	4	2	3	1
(*B)	4	3	2	1
(C)	1	3	2	4
(D)	1	2	3	4

Sol. (P) Homologous may be constitutional isomers

(Q) Duma's method nitrogen collected as N_2

(R) Kjeldal method Nitrogen collected as NH_3

(S) $CH_3 — O — CH_3$ and $CH_3CH_2CH_2 — OH$ differ by 14 amu.

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