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Weblinks

chemwiki.ucdavis.edu/Organic_Chemistry/.../**Optical_Activity**

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CHEMISTRY	PAPER No.: 13 Applications of group theory
	MODULE No. : 12 Symmetry and optical activity and dipole moment

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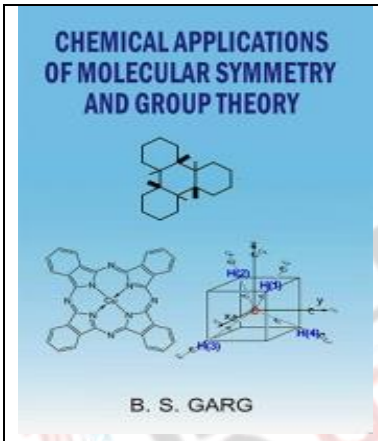
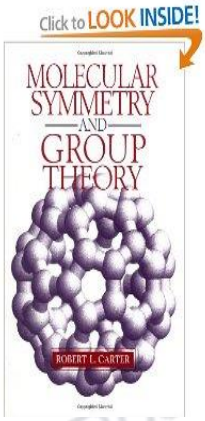
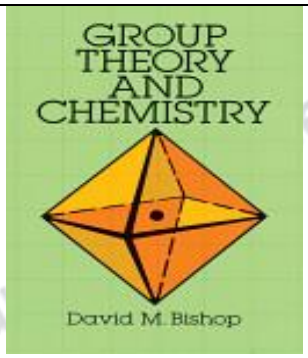
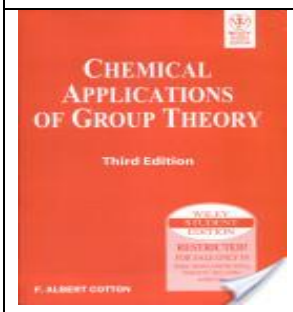
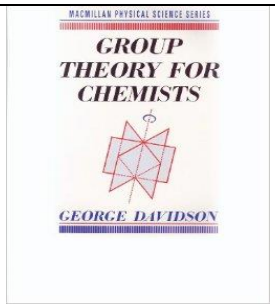
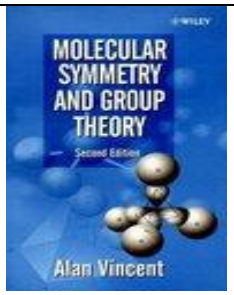
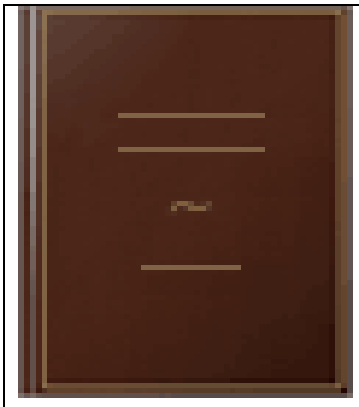
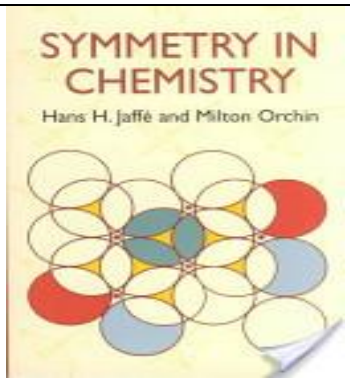
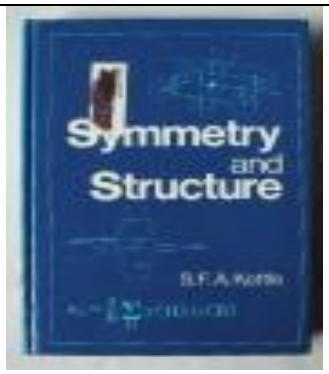
Suggested Readings

 B S Garg Chemical applications of molecular symmetry and group theory . Macmillan 2013	 R L Carter. Molecular symmetry and group theory. john Wiley and sons,1997	 D M Bishop. Group theory and chemistry Claredon Press Oxford,1973
 F A Cotton. Chemical applications of group theory. Wiley Interscience, 1970	 G Davidson. Group theory for chemist. Macmillan, 1991	 A Vincet. Molecular symmetry and group theory. John wiley and sons. New York, 2001
CHEMISTRY	**PAPER No.: 13 Applications of group theory**	
	MODULE No. : 12 Symmetry and optical activity and dipole moment	

 D S Schonland. Molecular symmetry. Van Nostrand Co. Inc. Princeton. N.J1965,	 H Jaffe, M Orchin. Symmetry in chemistry. John wiley and sons. New York, 1965	 S F A Kettle. Symmetry and structure. Wiley, 1985

Glossary

A

Alternate axis of symmetry: Combination two operations mirror plane and proper axis of rotation

Asymmetrical molecules- Lacks all the elements of symmetry (i.e., plane of symmetry, centre of symmetry and axis of symmetry) and are not superimposable on their mirror images.

Axis of symmetry- Represents the line around which the molecule has identical atoms at equal distances from this line.

C

Conformations-Are the different 3-D orientations achieved by the molecule formed due to rotation about sigma bonds. These are freely inter-convertible into each other.

Configurations- Arise due to certain types of rigidity with in the molecule. They can get converted into another only if some bonds are broken and then re-established after rearrangement. They cannot be inter-converted into each other freely.

Chirality: Deals with the property of a molecule to rotate the plane polarised light

Centre of inversion: Imaginary point that lies in the body of the object in such a manner that each and every point on the object can be reflected through this point.

Combination of operation: One symmetry operation performed after another symmetry operation successively without disturbing the order of performing the symmetry operations.

D

Dextro rotatory -If the substance rotates plane polarised light to the right (clock wise), it is called dextro or the *d*-form and it is indicated by placing a (+) sign

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Dissymmetric molecules: All molecules which lack S_n axis of any order will be dissymmetric and optically active

Dipole moment: Dipole moment (DPM) is vector property .It has both magnitude and direction and it results from unequal sharing of electrons between atoms of a bond in molecule.

E

Eclipsed conformation- The C-H bonds on the front and back carbons are aligned with each other with dihedral angles as 0^o.

Enantiomers- Pair of stereoisomers, which are non-super imposable on their mirror image and possess identical physical and chemical properties but differ in the direction (sign) of rotation of the plane polarized light.

I

Improper axis. It is a combination of C_n axis and reflection through a plane perpendicular to C_n axis

Inversion centre: Imaginary point that lies in the body of the object in such a manner that each and every point on the object can be reflected through this point.

L

Levorotatory: If the substance rotates plane polarised light to theeft (anticlock wise), it is called levo or the l-form and it is indicated by placing a (-) sign

O

Optical activity: Property of a molecule to rotate the plane polarised light

P

Point group: Collection of symmetry operations which form the group

R

Reflection plane: Imaginary mirror plane passing through the object in such a manner that it divides the object in two equivalent halves

S

Symmetry element: It is an imaginary geometric entity 'a point' or 'a line' or' a plane' about which symmetric movements (symmetry operations) can be performed.

Symmetry operation: It is a physical movement (rotations etc) of the body of the object around an imaginary point or a line or a plane in such a manner that after the movement the final configuration of the object is indistinguishable from the original configuration of the object.

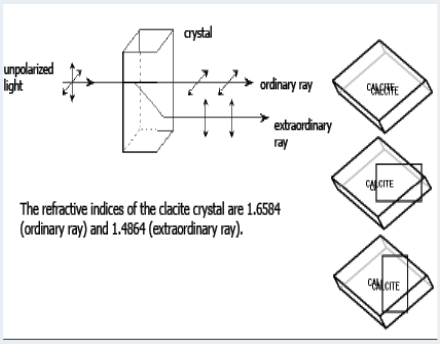
Symmetrical: Molecule which has symmetry around a line ,a point or a plane.

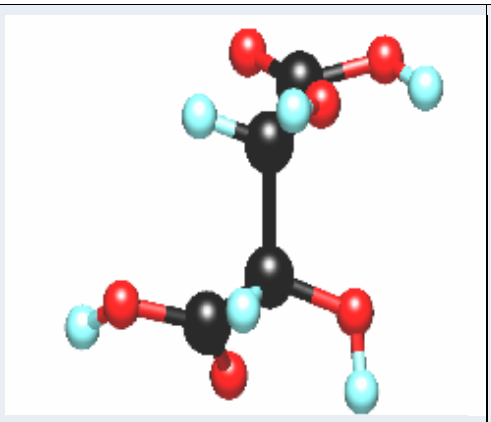
Superimposability: Putting the molecule over its mirror image

Superimposable. Molecule and its mirror image can be super imposed on each other

Time-Lines

Source:faculty.concordia.ca/muchall/chem325/LC-History.pdf

Timelines	Image	Description
1669 ➔		The Danish professor of mathematics and medicine, Erasmus Bartholinus, observed that Iceland spar (calcite, calcium carbonate) exhibits double refraction - images viewed through crystals are doubled.
1677 ➔ The Dutch mathematician/astronomer/physicist, Huggens, noted that each ray emerging from Iceland spar was polarized.		
1815		Jean Baptiste Biot notes certain natural organic compounds (liquids or solutions) rotate plane polarized light.
1853		Pasteur investigates meso-tartaric acid (another isomer of racemic and tartaric acid) but fails to separate it into (+) and (-) forms.

1854		Pasteur notes a certain plant mold metabolizes (+) - tartaric acid but not (-) -tartaric acid.

Did You Know?

Source: **http://en.wikipedia.org/wiki/Human_nutrition**

Description	Image
Most of the naturally occurring carbohydrates have D configuration while most of the naturally occurring amino acids have L configuration	