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Study Notes On R/S Configuration

R/S Nomenclature

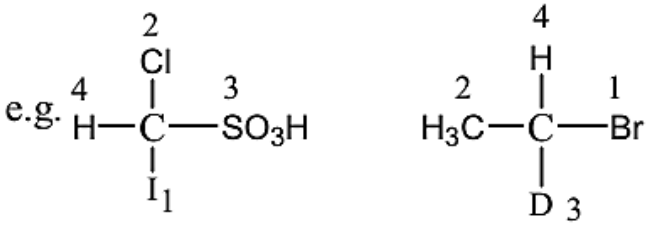
This is an absolute configuration of the chiral centre proposed by R.S. Chan, Sir Christopher Ingold and V. Prelog. It was derived to provide exact knowledge and differentiation among the enantiomers.

To start with the nomenclature, we first need to find a carbon atom attached with four different groups, known as Chiral Centre and then we follow the rules.

Sequence rule: Priority to the four atoms or groups of atoms attached to the chiral centre can be determined by following certain sequence rule:

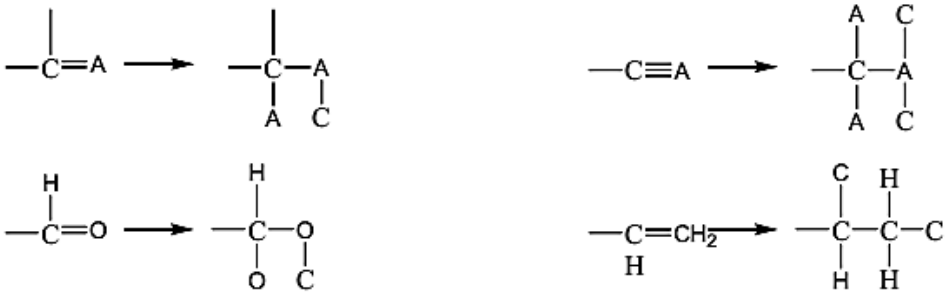
Rule 1: If the chiral centre is attached with four completely different groups, then priority depends on atomic number. The atom of high atomic number gets the higher priority.

Rule 2: In case of isotopes, the atom with higher atomic mass number gets the higher priority. For example: among Br, C, D, H priority order is
Br > C > D > H.

e.g. 

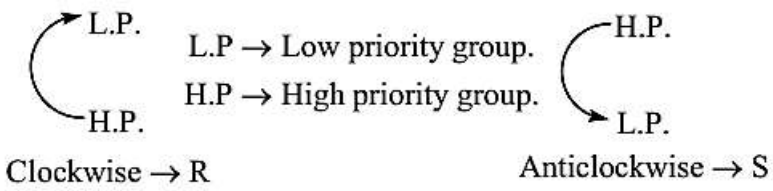
Rule 3: If the relative priority of two groups cannot be decided by the rule mentioned above, then we move towards the next atoms in sequence.

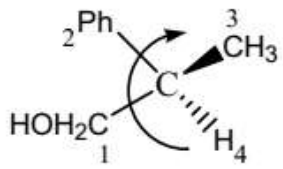
Rule 4: Where there is a double bond or triple bond, both atoms are considered to be duplicated or triplicated; as shown below-



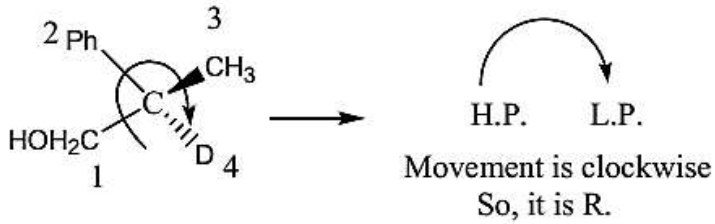
(1) Using the above given method, assign the priority.
(2) Find the position of the 4th group.
(3) Connect 1 → 2 → 3 making a circle. And see how it goes- clockwise or anticlockwise.

Case 1: If the fourth group is below the plane.

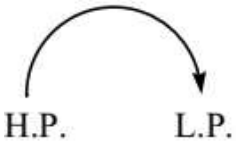




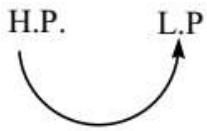
Note: In this case 4th group 'H' is below the plane and rotation is clockwise. So, it is 'R'.



Case 2: If the fourth group is above the plane.
Then,

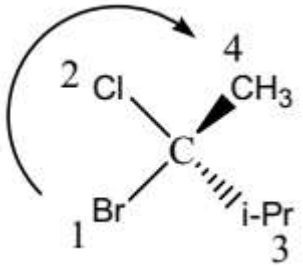


Clockwise movement → S



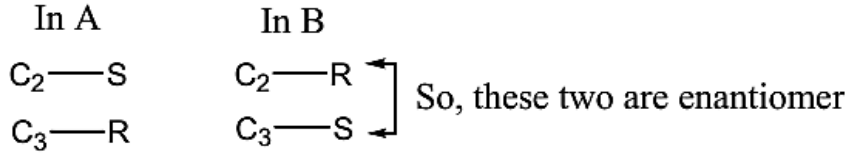
Anticlockwise movement → R

For example:

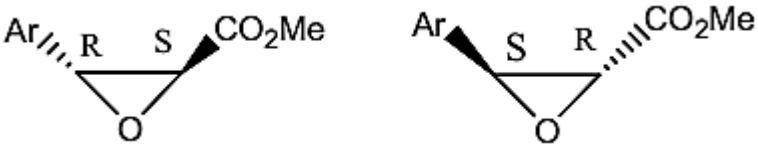


Note: In this case, the 4th group is above the plane. So, on moving clockwise we obtain 'S'.

Case 3: If the fourth group is on the plane then make double interchange in such a way that the 4th group goes below the plane.
So, in compound 'A' and 'B', the configuration at chiral centre are



Example:

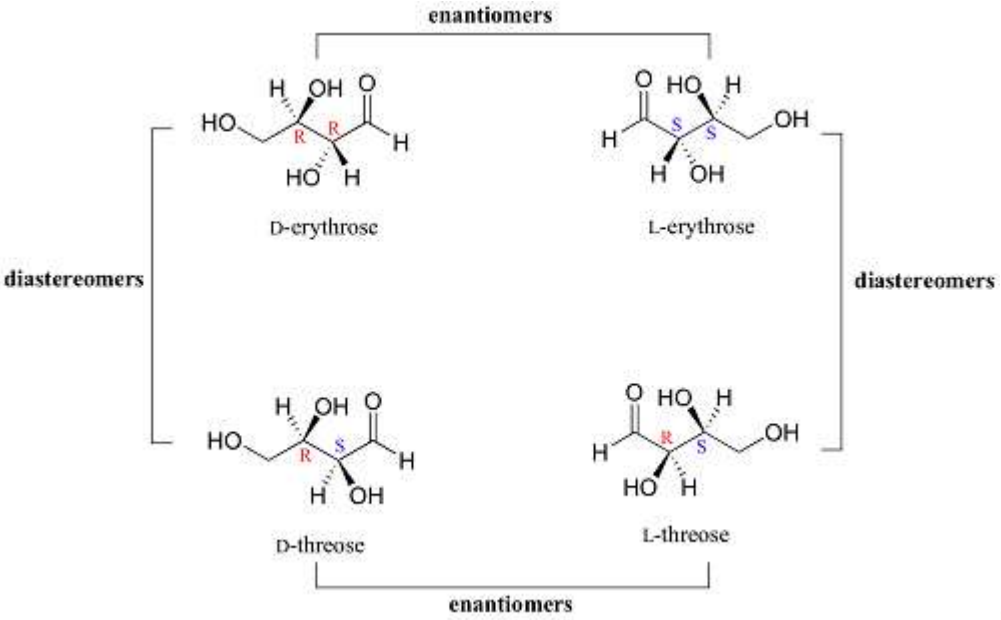


These are **enantiomers.**

Diastereomers:

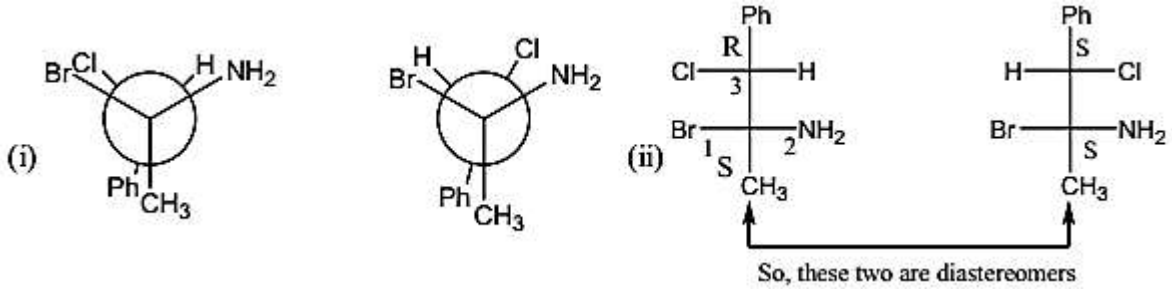
If structures have more than one stereogenic centre, it gives rise to Diastereomers.

Example:



Meso Compounds:

Compounds that contain stereogenic centres but are achiral are known as meso compounds. There is a plane of symmetry with 'R' stereochemistry on one side and 'S' stereochemistry on another.



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