STEREOCHEMISTRY

Deg-II (H) , Paper-IV , Chapter-4

Lecture-11 ,Date : 10-08-2020

Absolute Configuration

(R & S System of Nomenclature)

Optical Isomerism Continue..

The D, L System of relating the configuration has a basic defect that sometimes the configuration of the same molecule may be related to both D & L series.

This difficulty is removed by an unambiguous system devised by Cahn, Ingold and Prelog which is based on the actual three dimensional formula.

The three important features of the system are :—

1. The four different groups attached to the asymmetric carbon atom or atoms are arranged in a priority sequence in accordance with a set of rules known as sequence rules.

After assigning the priorities of the four groups or atoms attached to the chiral

carbon, the molecule is imagined to be in a position where the atom or group of the lowest priority is directed away from us.

Now the arrangement of the remaining three groups is viewed in decreasing order of their priorities.

In looking so, if the eye travels in a clockwise direction, the configuration is specified as 'R' while in case eye travels in the anticlockwise direction, the configuration is specified as 'S'.

2. 'R' (for rectus, Latin for right) and 'S' (for sinister, Latin for left) are used for corresponding D and L-series.

3. When the molecule contains more than one asymmetric centre, the same procedure is applied to each.

For making these point clear, let us study an example of the compound 'Xabcd.

Let,

Priority a > b > c > d

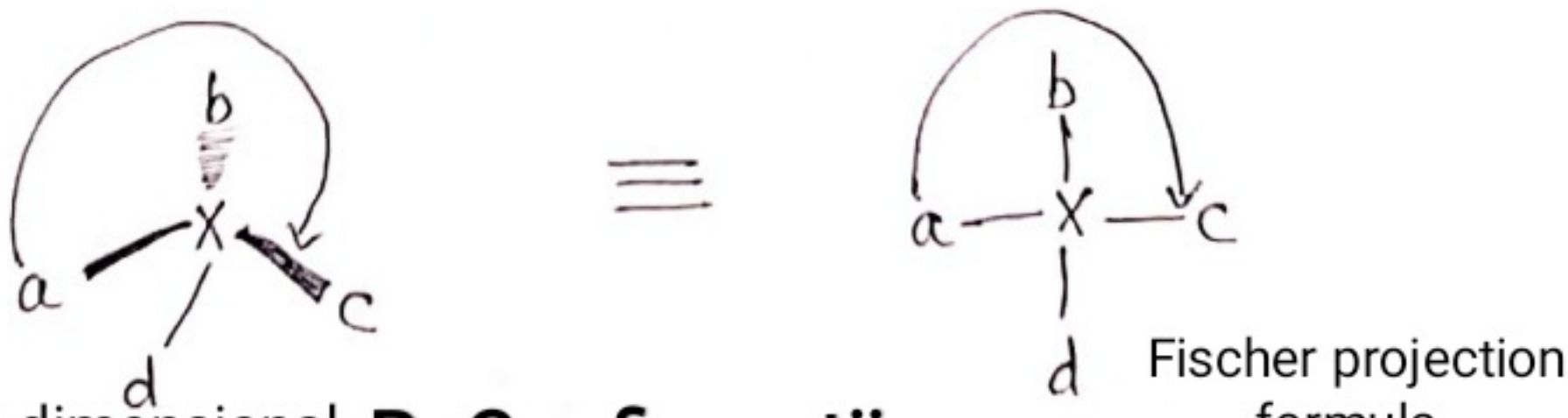
ie; lowest priority is given to 'd'.

Arrange the groups in a way that the substituent of lowest priority (d) is at the top or bottom.

The molecule is then viewed from the side opposite to the group of lowest priority (d) and the arrangement of rest of the group is observed.

If the arrangement of groups (a, b, & c) is in clockwise direction (ie. it starts from top priority to second and then to the third priority ie; a to c) the configuration is considered as 'R' or rectus configuration.

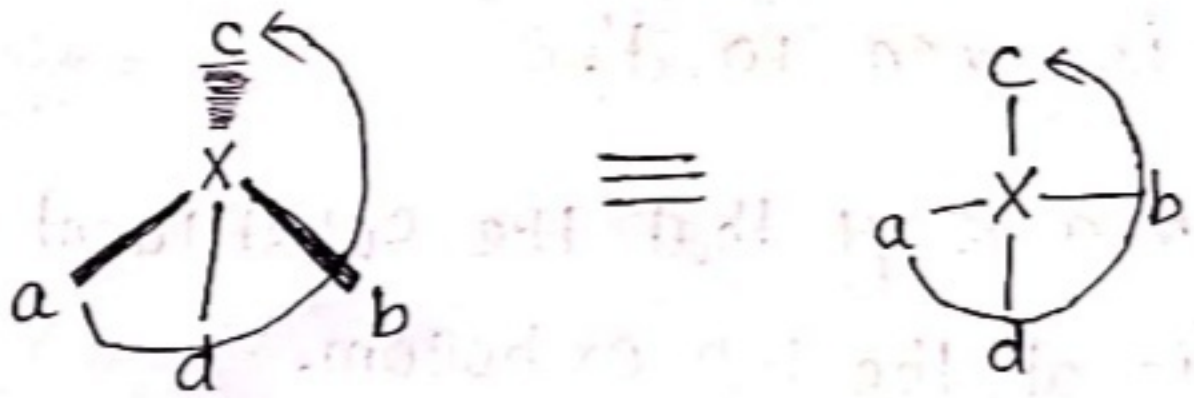
On the other hand, if this arrangement is in anticlockwise direction (ie; it starts from third priority and goes to first via the second priority (ie; c to a) the configuration is termed as 'S' or Similar configuration.



Three dimensional Formula

R -Configuratiin

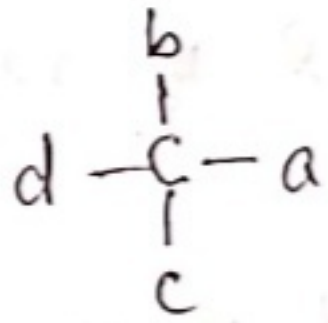
Fischer projection formula



S-configuration

It must be remembered that while using a fischer projection formula, it is necessary to carry out an even number of exchanges of pairs of groups so that the group of lowest priority is situated at the top o bottom.

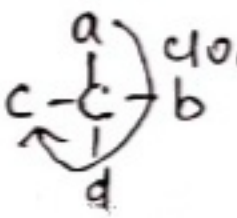
Let us take a general example of the compound



Let priority sequence

$a > b > c > d$

* Since in the fischer projection formula, the group 'd' of lowest priority is at the left hand side so we have to make an even number of exchanges to bring this group either at the top os at the bottom.

* Let us exchange positions of 'd' and 'c' and that of 'a' & 'b'. By carrying out these exchanges we get Fischer projection representation of the same enantiomers with the substituent of lowest priority 'd' at the bottom. 

* No see the molecule through the side remote from 'd' since arrangement of rest of three groups is in clockwise direction ,Hence configuration will be 'R'.