14 AUG. 2020

# STEREOCHEMISTRY

## Lecture-13 , Degree-II (H)

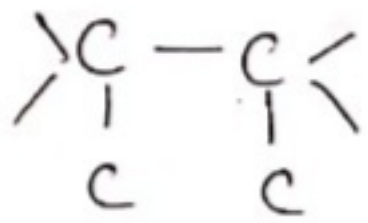
## Paper-IV ,Chapter-4

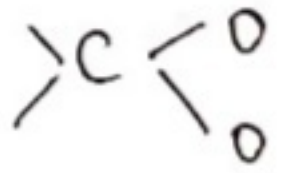
## SEQUENCE RULES CONTINUED..

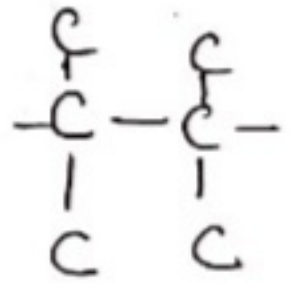
Optical Isomerism
Continued..

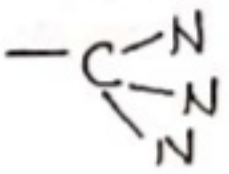
### Sequence Rule : 3

* A doubly or triply bonded atom 'X' is equivalent to two or three such atoms. Thus, if we compare the priority order of $-\overset{H}{\underset{|}{C}}=O$ and $-CH_2OH$, the form having C, O, D & H gets higher priority order than the $-CH_2OH$ (having C, O, H and H atoms). Since the 3rd atom in $-CHO$ is 'O' (atomic no. 6) while it is H (Atomic no. 1) in $-CH_2OH$.

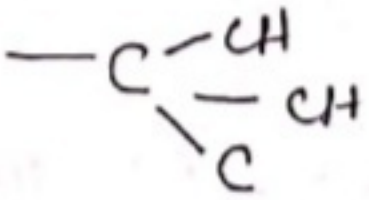
$>C=C<$ becomes 

$>C=O$ becomes 

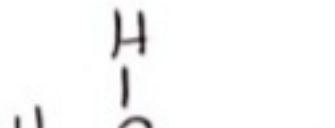
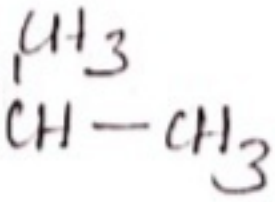
$-C\equiv C-$ becomes 

$-C\equiv N$ becomes 

By:-Dr.Rinky

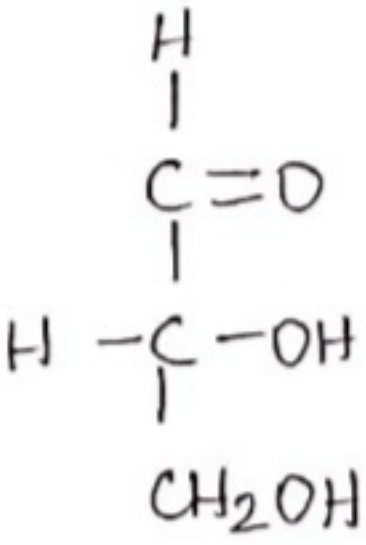
$-C_6H_5$ becomes 

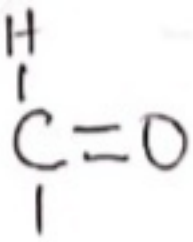
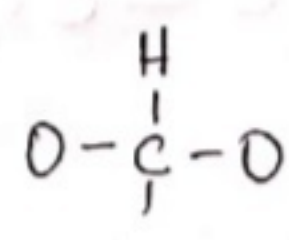
* However, if in a group two or three atoms of 'x' are separately linked to some atom through single bonds, such a group would get priority over the group containing doubly or triply bonded X, for examples, among the groups.

 and 

the latter gets higher priority order over the former although both have C, C, C and H atom.

Let us consider the case of glyceraldehyde in which $-OH$ group has the highest priority. The second priority goes to O, O, H of CHO, the third to H, H, O of $-CH_2OH$ and the last to $-H$.



 equals 

* Thus, the complete sequence of priority is

$-OH$, $-CHO$, $-CH_2OH$ and $-H$.

* Similarly, the order of priority in lactic acid is $-OH$, $-COOH$, $-CH_3$ & H.

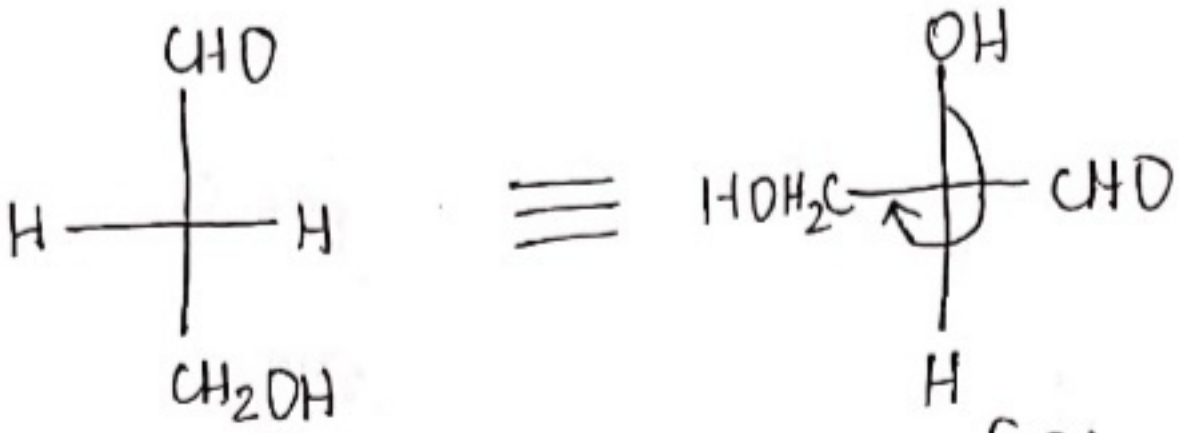
# Sequence Rule : 4

* In case of geometrical stereomeric groups the cis group precedes trans group. similarly, in case of Optical isomers ( enantiomers) the (R-) group precedes the (S-) group. In case of pseudosymmetric centre the symbol (R) and (S) are replaced by (r) and (s).

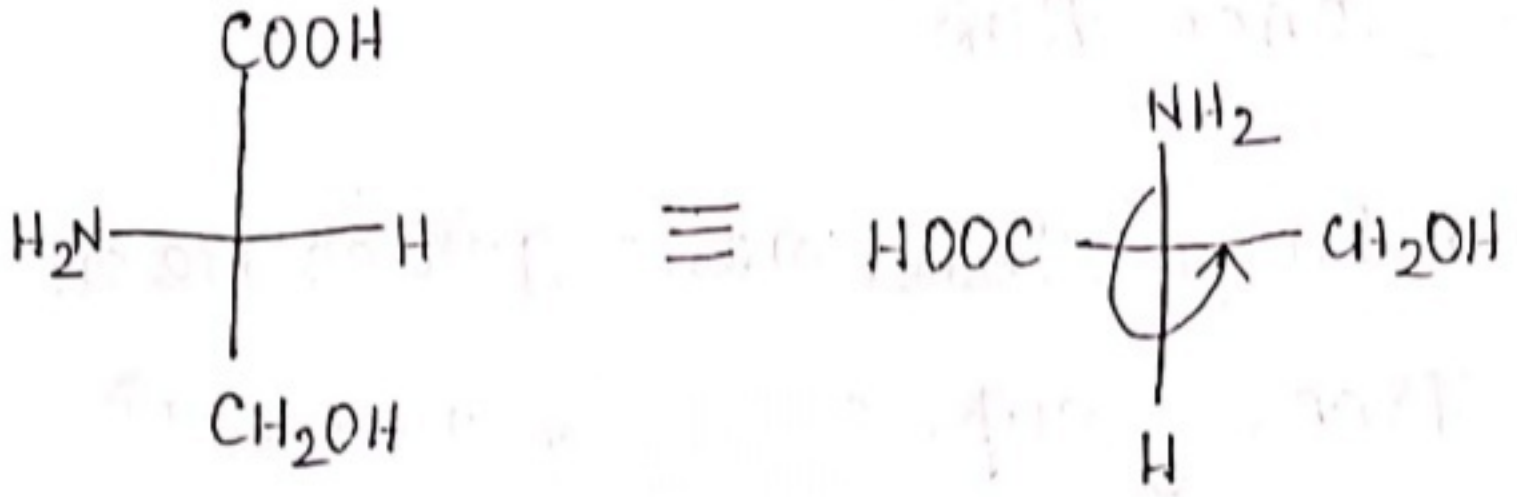
* By the application of these rules, some common substituents are given the following priority.

I, Br, Cl, $SO_3H$, SH, F, COR, OR, OH, $NO_2$, $NR_2$, NHCOR, NHR, $NH_2$, $CH_3$, COCl, COOR, COOH, $CONH_2$, CHO, $CH_2OH$, CN, $CR_3$, $C_6H_5$, $CHR_2$, $CH_2R$, $CH_3$, D, H.

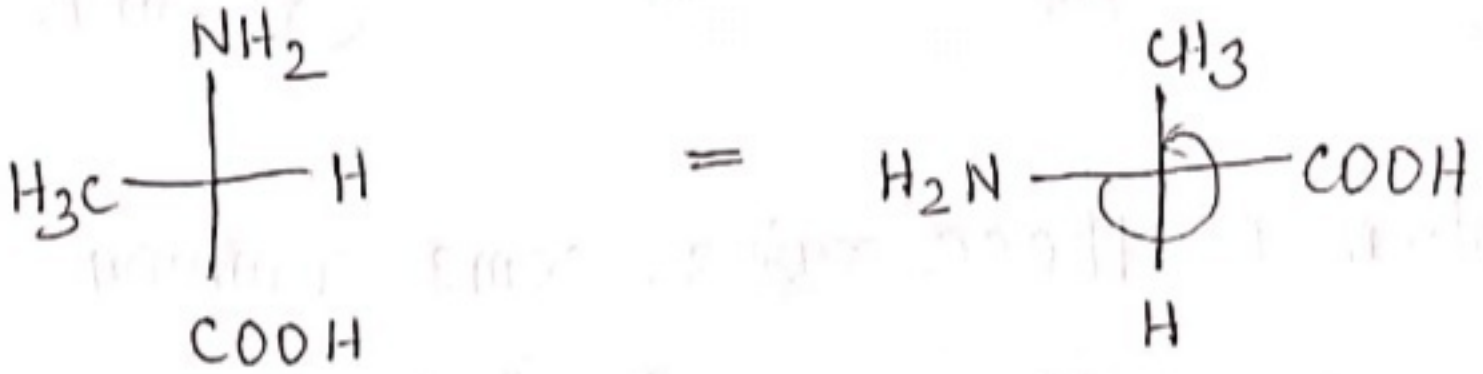
* On the basis of above discussion the configurational symbols 'R' and 'S' can be given to the following compounds.



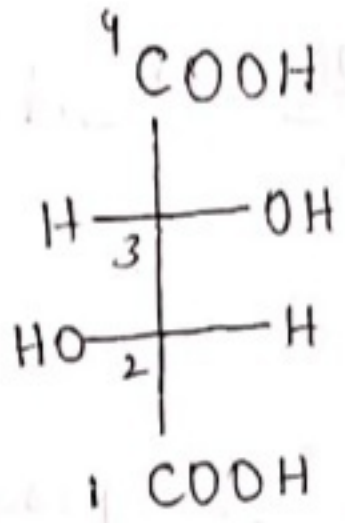

(R) - Glyceraldehyde



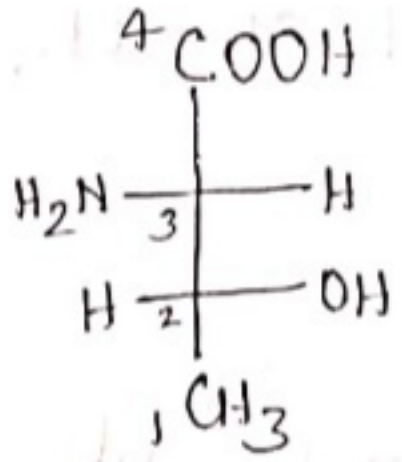

(L) - serine (S) - serine




α-aminopropionic acid (S)




(2R, 3R) - Tartaric acid




(2S, 3R) - Threonine.

**Note :** There is no relation between D, L and R, S-configurations. In other words, all the D- compounds may not have R- configuration and all the L- compounds may not have S- configuration.