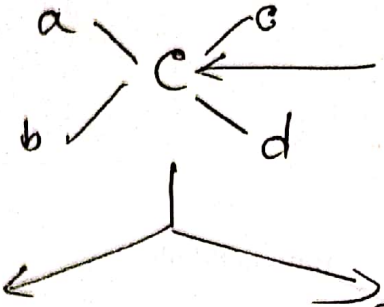
# Prochirality & Prostereoisomerism

## Topicity

You Know chiral molecule.

Initial concept based on chiral centre.



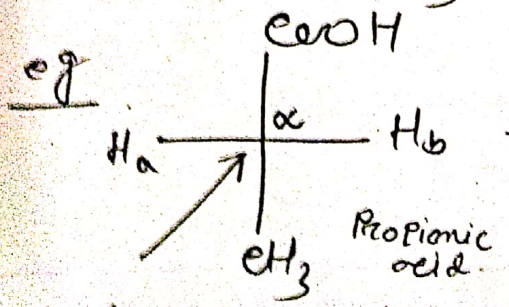

chiral $(a \neq b \neq c \neq d)$.

Enantiomer — Diastereomer } Already discussed in SEM-I.

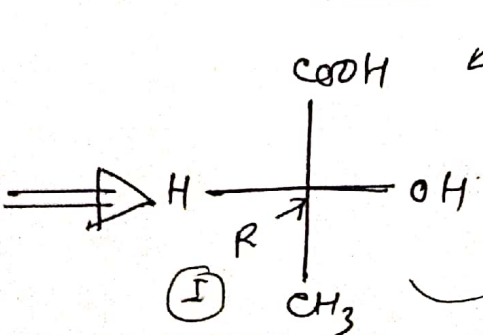
* Similarly Prochiral molecule should have Prochiral centre

Now, Prostereoisomerism or Prochirality is the Property of certain molecules due to which these can be converted into stereoisomerism (i.e enantiomer or diastereomer)

eg

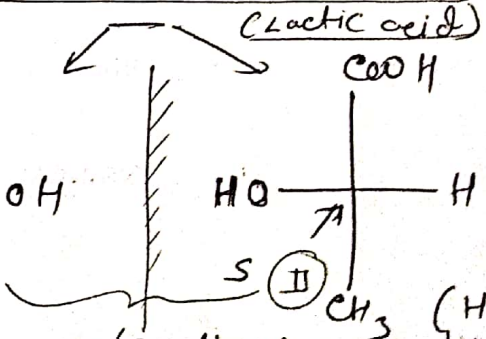



This non stereogenic centre is Prostereogenic centre




($H_a$ replaced by different ligand OH)

Now it become chiral → (R)



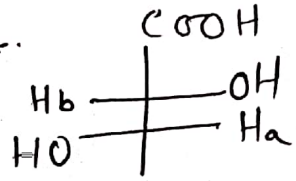

($H_a$ replaced by OH)

Now it is chiral → (S).

**Topicity:** It is defined as the relation between two similar atoms in a molecule, for example two H's in a molecule, and the structure to which they are attached.

Relation means here **stereochemical relationship**.

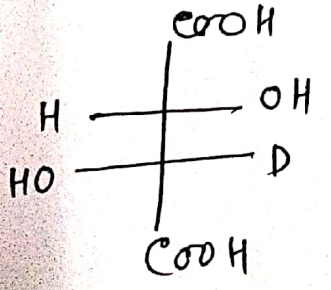
Depending upon relationship two atoms or two groups may be. homotopic or heterotopic. If found heterotopic then they may be either **enantiotopic** or **diastereotopic**.

eg. 


Find topic relation between Ha/Hb.

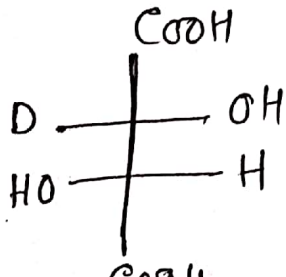
**How to determine?**

Ha → D.



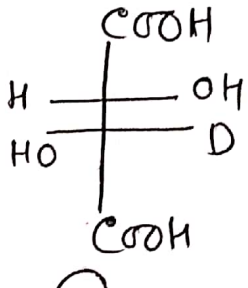

(I)

Hb → D




(II)

Rotate 180° on the plane of paper




(III)

I/II - Identical or Homomers

so Ha/Hb → Homotopic

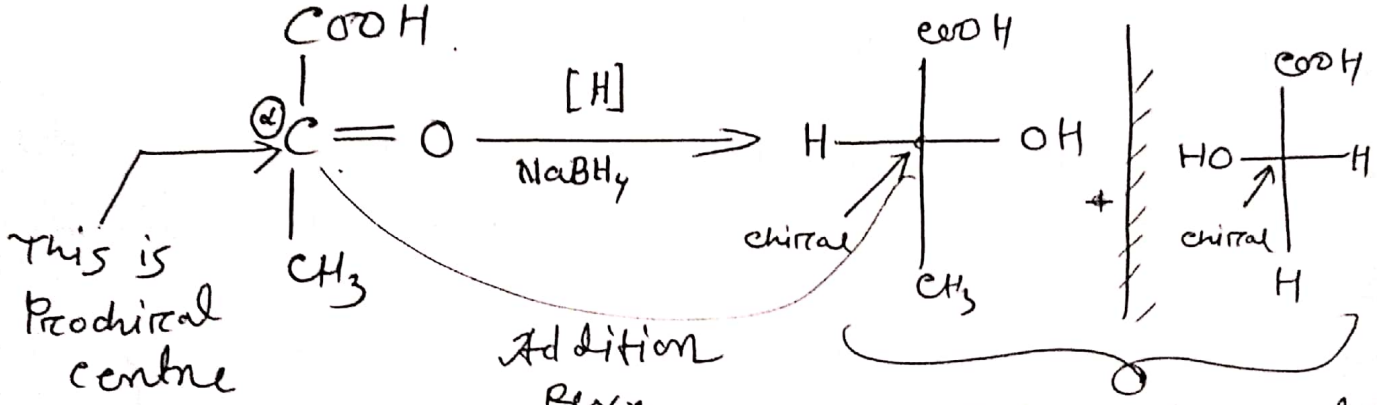
$C_\alpha$ is therefore Prochiral centre. and Propionic acid Prochiral molecule

$H_a$ ⟶ called Pro-'S' }
$H_b$ ⟶ called Pro-'R' }

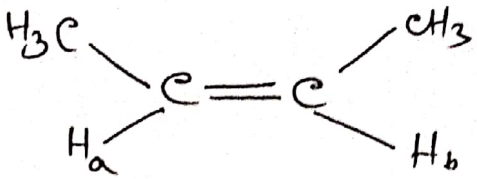
and relation between $H_a/H_b$ ⟶ Enantiotopic of (I) & (II) are enantiomers to each other.

* Another example :- In the above molecule we see that existence of Prochiral centre can be checked by replacing method i.e Substitution method.

But it can be checked by addition rexn method also. see below ↓




So here $C_\alpha$ is Prochiral centre and Pyruvic acid is Prochiral molecule. Therefore. we see that both $SP^3$ and $SP^2$ carbon can be Prochiral. in first example $C_\alpha$ was $sp^3$ and in 2nd example $C_\alpha$ is $sp^2$.



Find topic relation between $H_a/H_b$

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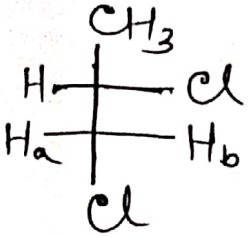
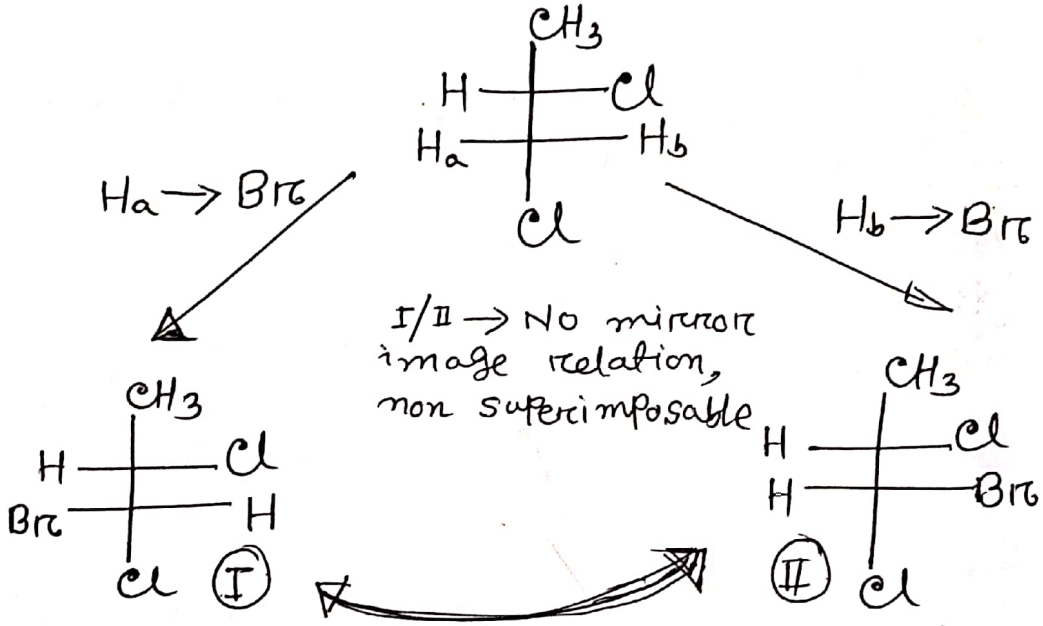
Find topic relation between $H_a/H_b$.



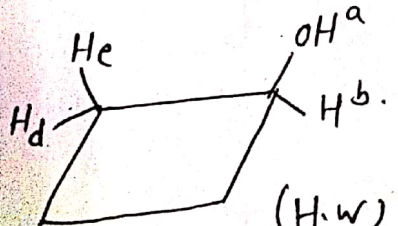
1,2-dichloropropane




(I)/(II) Diastereomer

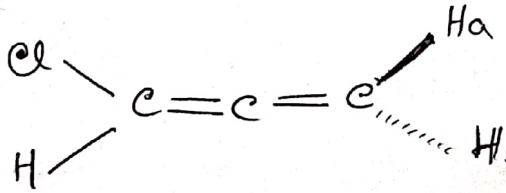
$H_a/H_b$ ⟶ Diastereotopic.

**Conclusion:** Geminal methylene H's adjacent to a stereocentre are usually diastereotopic.



Find topic relation betw $H_a/H_b$ and $H_c/H_d$.

(H.W).



(To be continued in next class)