Prostereoisomerism, Prochirality & Topicity

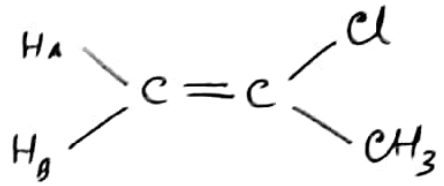
class - 4

For- SEM-2

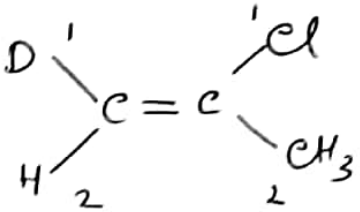
Pro-E and Pro-Z :

Label the H's :

(HA/HB).

① 

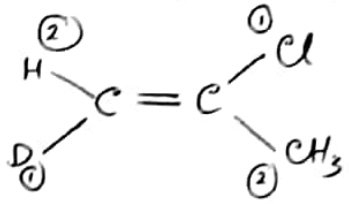
HA → D



'Z' isomer.

Therefore HA → Pro-'Z'

HB → D

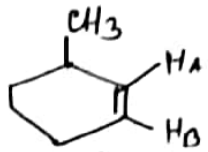


'E' isomer.

Therefore HB → Pro-'E'

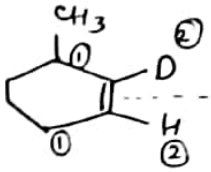
Here E and Z- isomers are diastereomers

∴ HA/HB → diastereotopic H's

② 

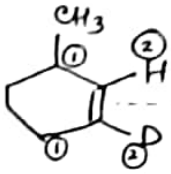
(HA/HB)

HA → D



Z- isomer

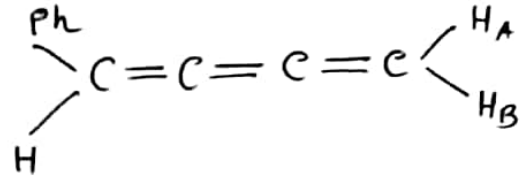
HB → D



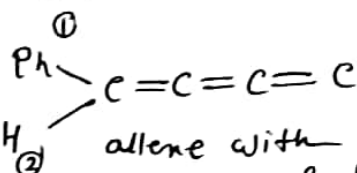
Z-isomer.

(but constitutional isomer).

So Here Pro-E and Pro-Z labelling is not applicable.

③ 

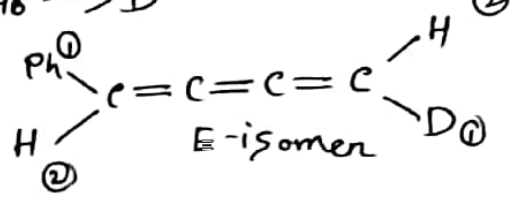
HA → D



Z-isomer

allene with odd no. of db.

HB → D



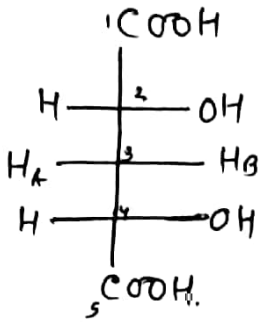
E-isomer

So { HA → Pro-Z ligand
HB → Pro-E ligand.

Pro-r and Pro-s

This is given for those H's or ligands where changing these H's or ligands makes the molecule Pseudoasymmetric instead of Pure asymmetric. Pseudoasymmetric molecules have stereogenic centre but the molecule is optically inactive because of σ-plane symmetry.

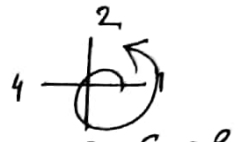
eg.

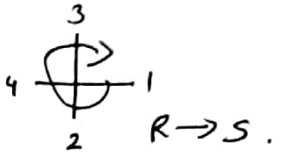


H_A/H_B = ?

C-2 → centre is R

C-4 → " " S

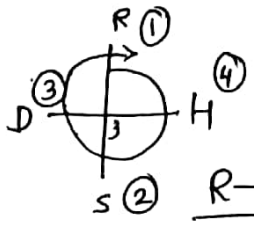




(As in both cases 4 is at horizontal).

Now C-3 is apparently achiral, but when H_A/H_B ligand is replaced by 3rd atom then it (C-3) will be stereogenic.

$H_A \rightarrow D$



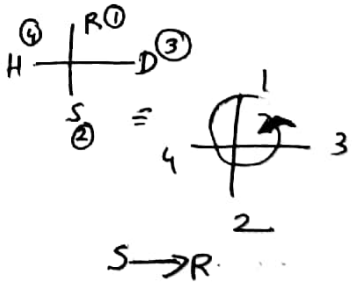
R → S.

C-2 and C-3 are same. Group so differentiate by R and S.

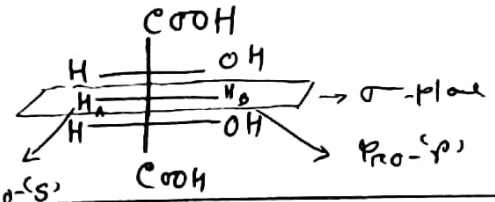
R > S.

So $H_A \rightarrow$ Pro-'S' → small 's'.

Since the molecule is OI. C-3 bond is a σ plane; now if $H_B \rightarrow D$ then



So $H_B \rightarrow$ Pro-'r'



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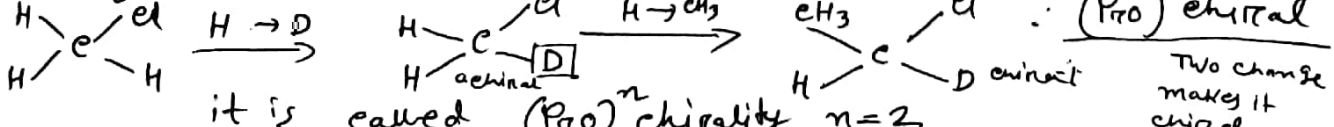
* CH_3Cl → Indicate the nature of chiral centre.



∴ $(Pro)^2$ chiral

Two change make it chiral

it is called $(Pro)^n$ chirality $n=2$

H·W CH_2Cl_2, CH_4 - Find nature of chirality