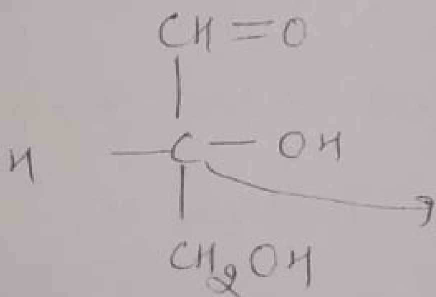
Polarization of light

The compounds which rotates the plane of polarized light are called optical isomers and phenomenon is known as optical isomerism.

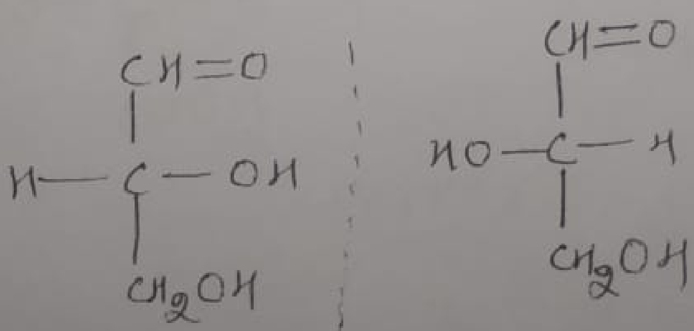
Critaria for optical activity →

1) compound should have at least one chiral centre.

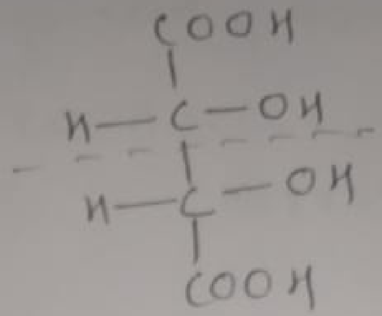


chiral centre

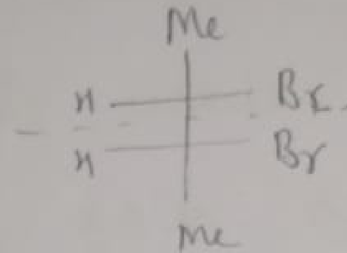
2) The mirror image of compound should not superimpose on it.

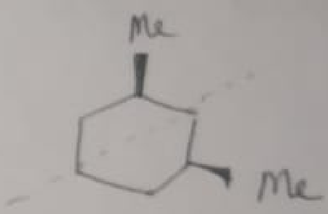


3) compound should not have a plane of symmetry.

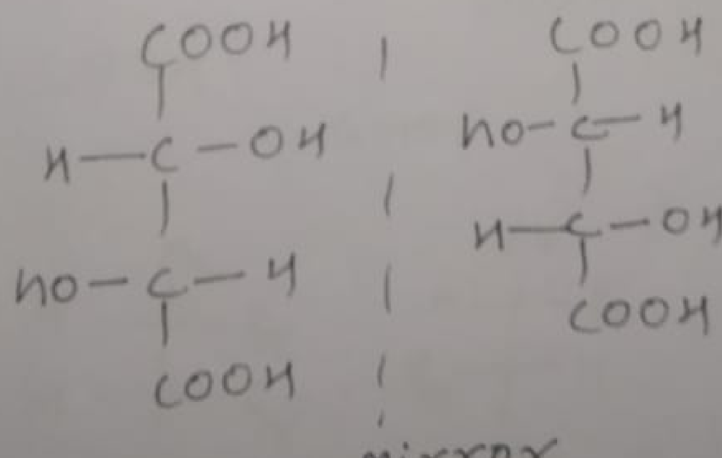


Plane of symmetry

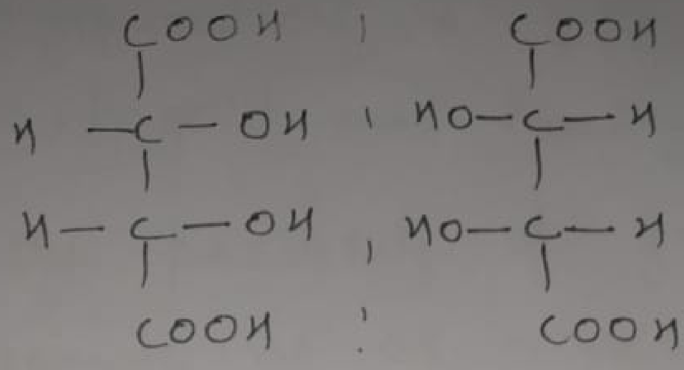




• Enantiomers → Non super imposable mirr image ~~w~~ is called enantiomer.

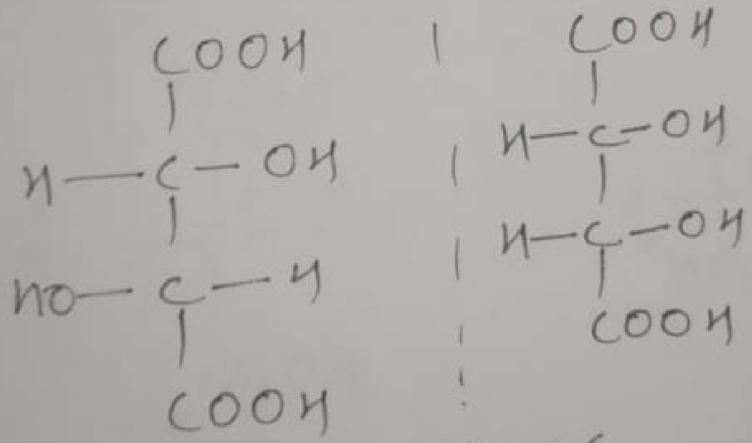


mirror

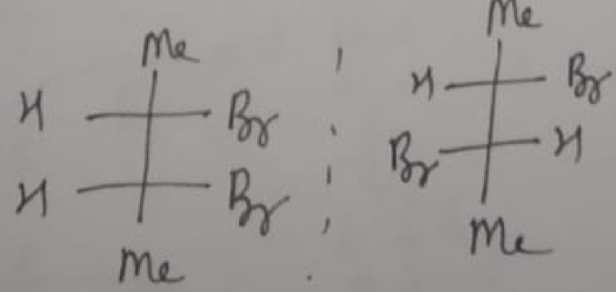


Mirror

Diasteriomers → Non-superimposable compounds which are not mirror image of each other are called diasteriomers.



Mirror



Mirror

nd S configuration or CIP rule
(Cahn, Ingold and Prelog's rule) :-

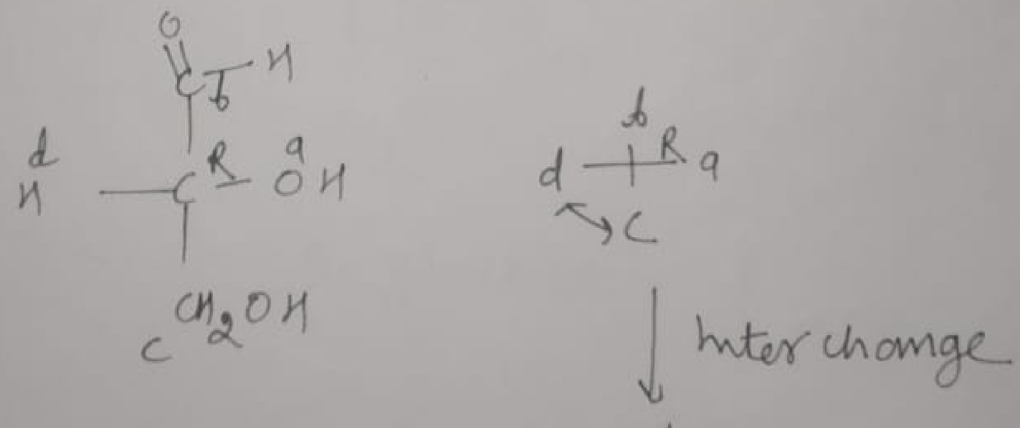
1) Select the periority of group according to atomic no or mass no.

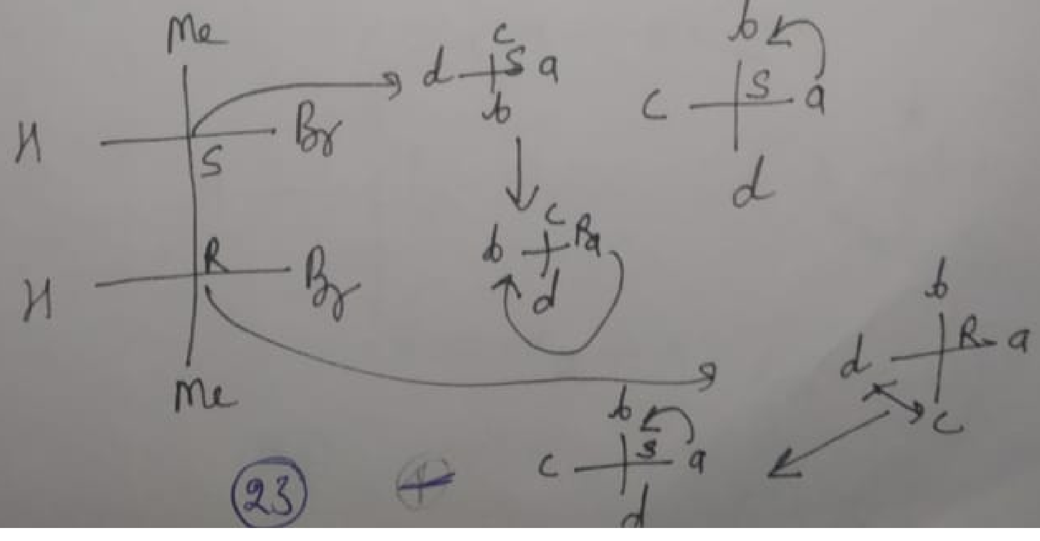
2) The group of lowest periority should be away from observor.

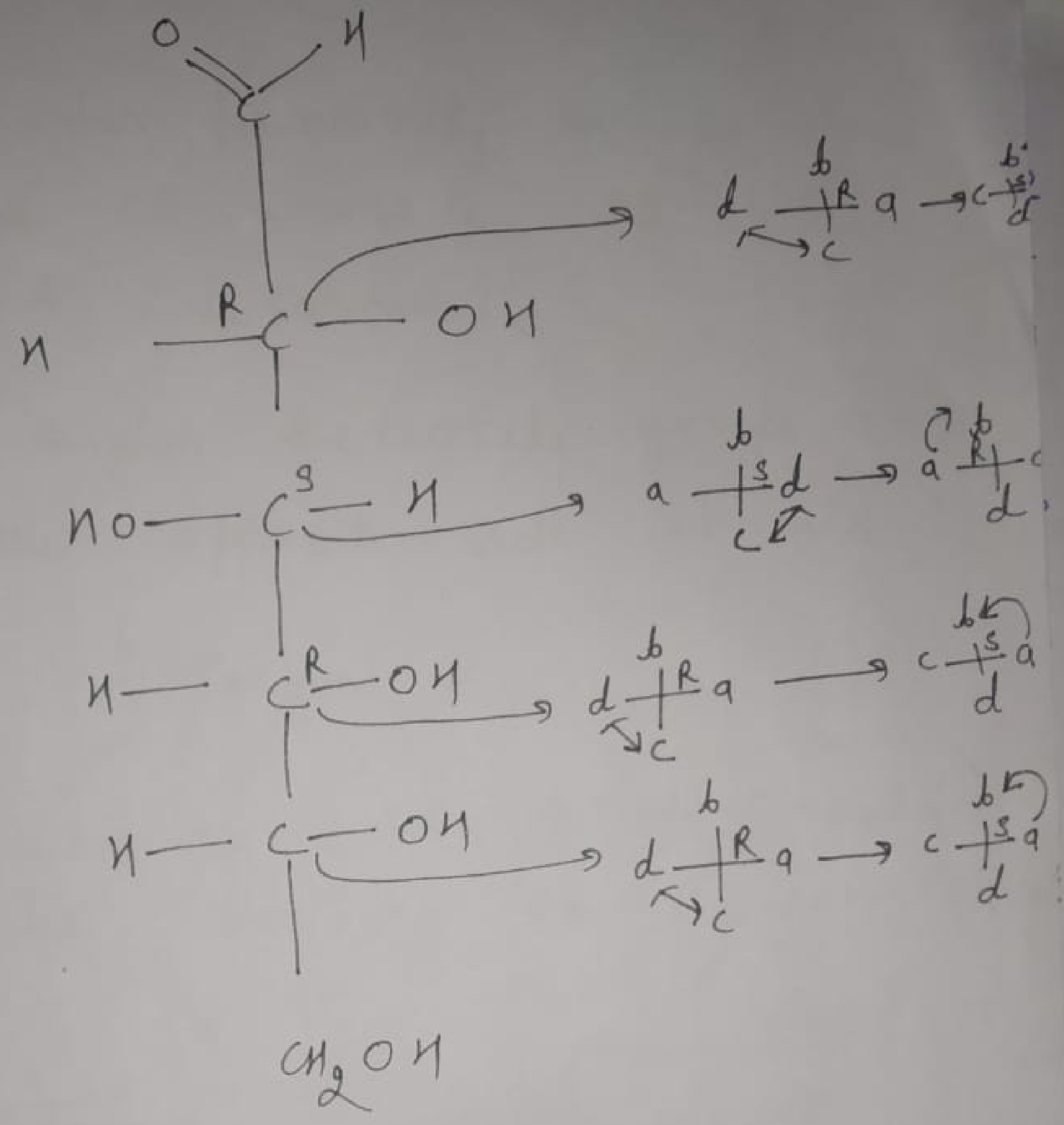
3) observe the rotation from a to b

i) clock wise ⟶ R (Rectus)

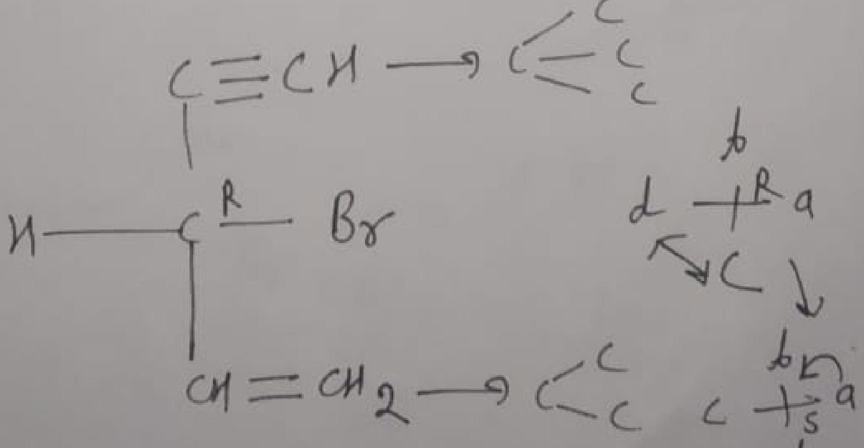
ii) Anticlockwise ⟶ S (Sinsister)







D-glucose

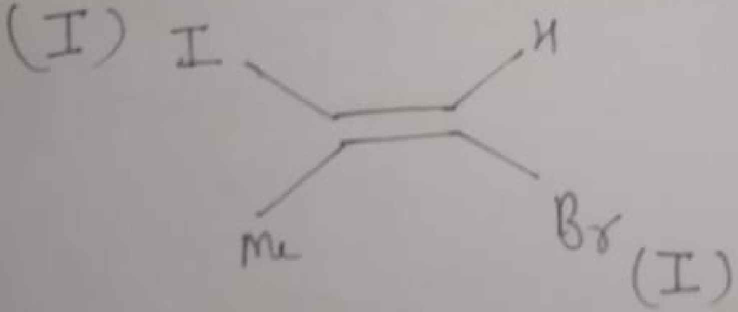


E and Z configuration →

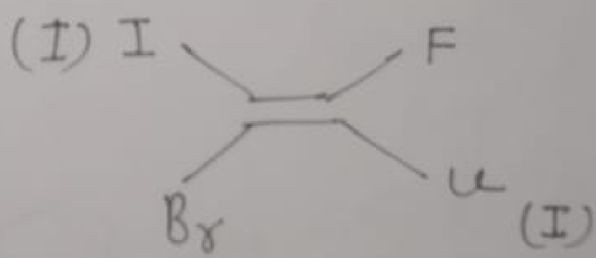
- when higher periority groups are on the same side. It is Z (Zussamen)

- when higher periority groups are on the opposite side. It is E (Entgegen)

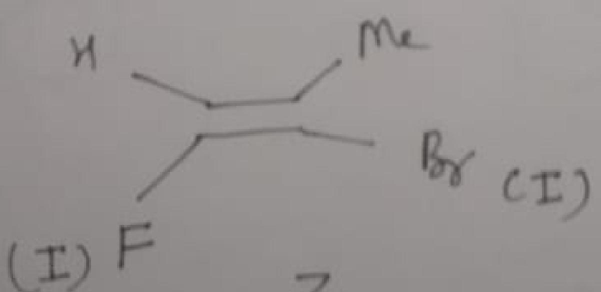
Note: Periority of the group should be according to R,S configurat



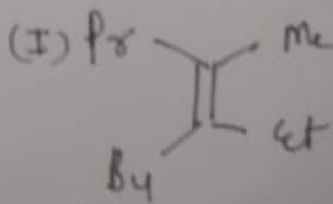
E



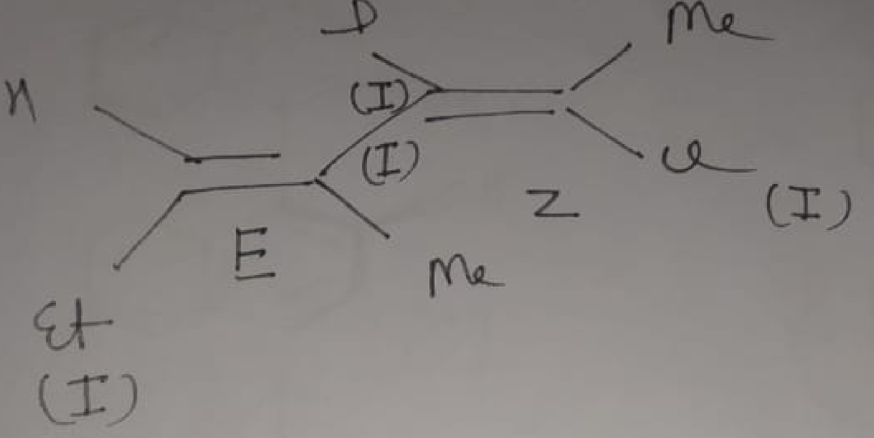
E



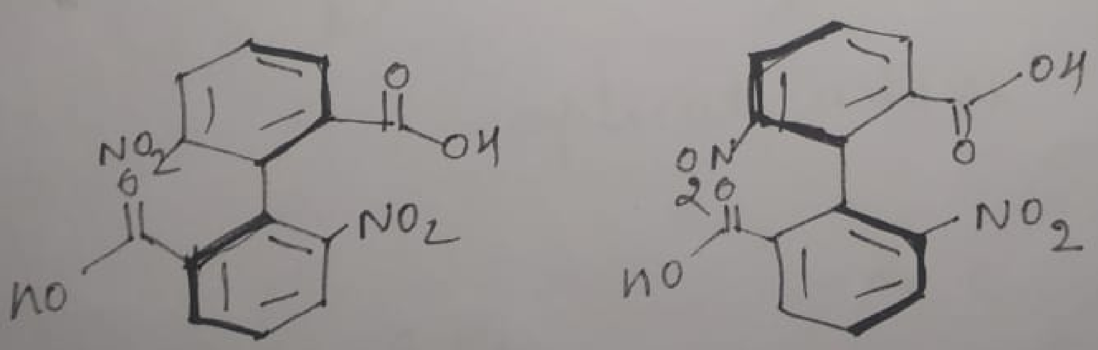
Z

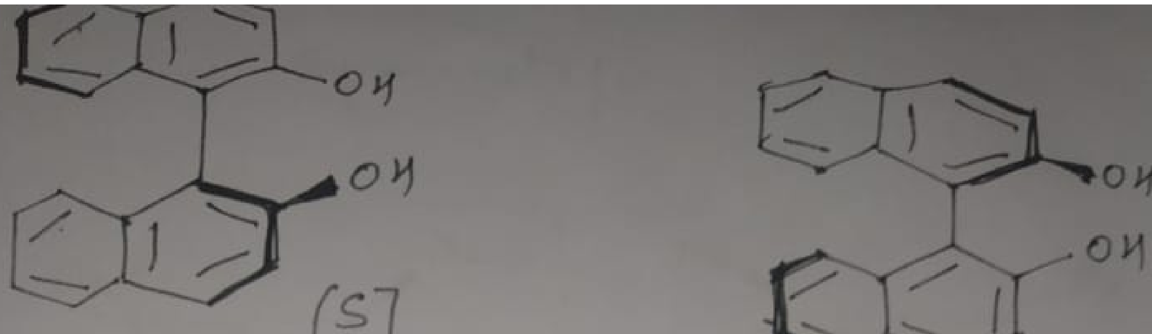


(I) Z



Atropisomerism → Atropisomerism is arising from hindered rotation about a single bond, where energy difference due to steric strain or other contributors create a barrier to rotation that is high enough to allow for isolation of individual conformers

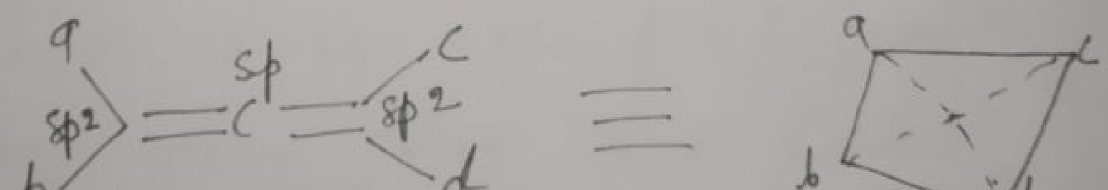




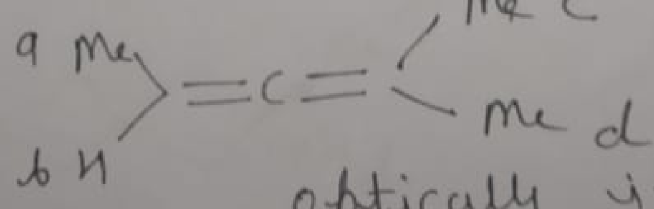
[S] [R]

optical ~~acti~~ isomerism in Allenes →

Allenes show optical ~~acti~~ isomerism
if $a \neq b$ and $c \neq d$



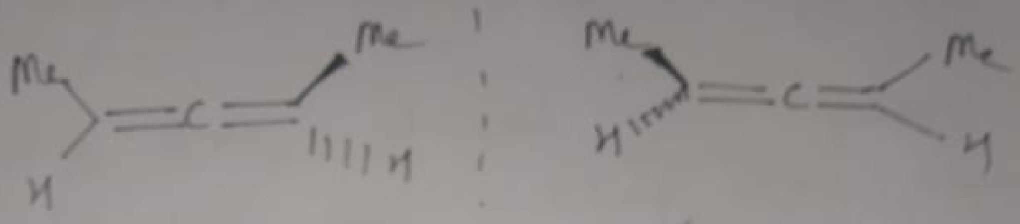
optical active



optically inactive

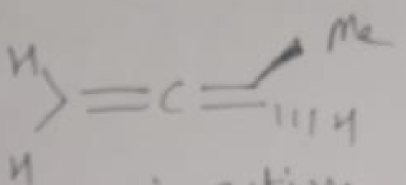
because $c = d$

It is totally asymmetric molecule and it has C_1 symmetry.

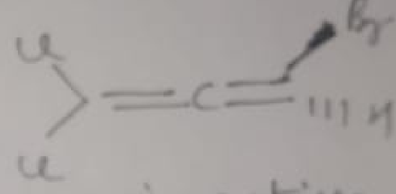


mirror

Non super imposable



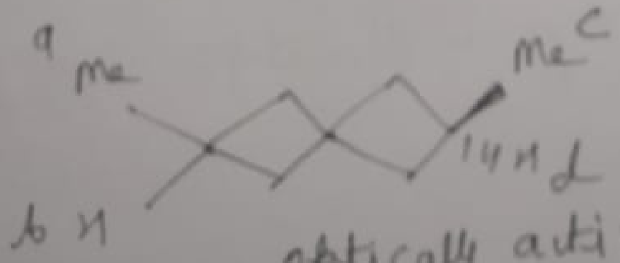
inactive



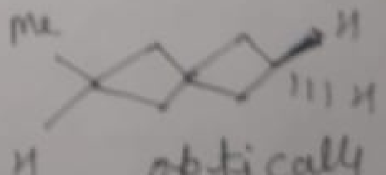
inactive

optical isomerism in spiranes →

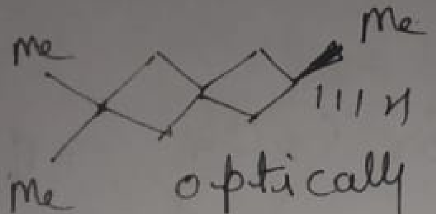
When two rings are fused with one carbon atom. They are called spiranes. spiranes are optically active if they do not have $a \neq b$ and $c \neq d$.



optically active

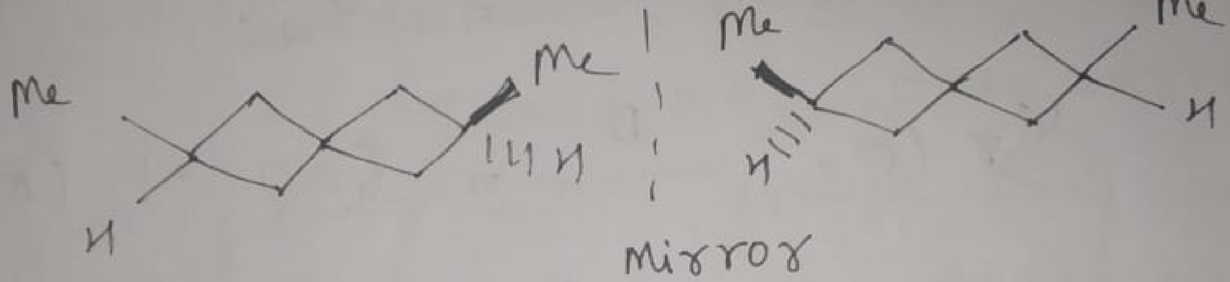


optically inactive



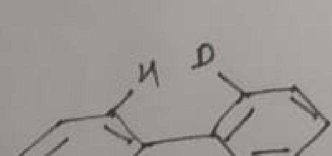
optically inactive

Spiranes are chiral and posses C_1 symmetry. They are asymmetric molecules.

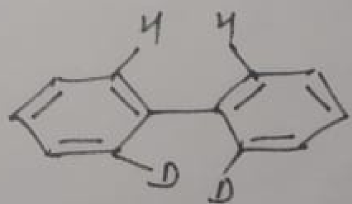


Optical isomerism in biphenyl.

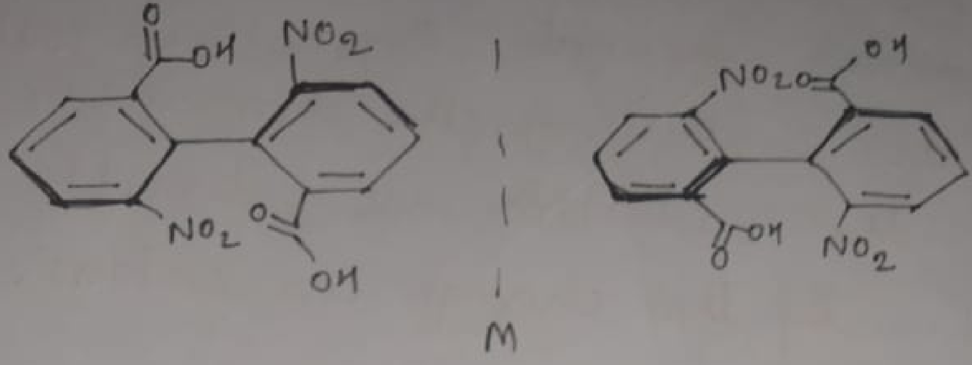
Optical isomerism ~~is a arises~~ in biphenyl arises from restricted rotation or hinderance.



free rotation
optically inactive

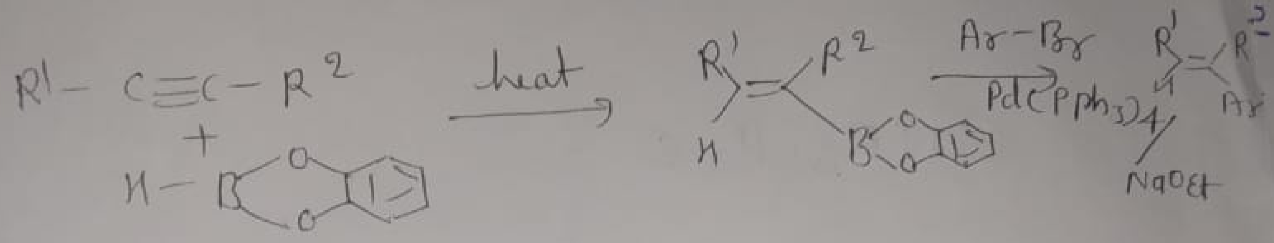


free ratation because H and D are very small atoms

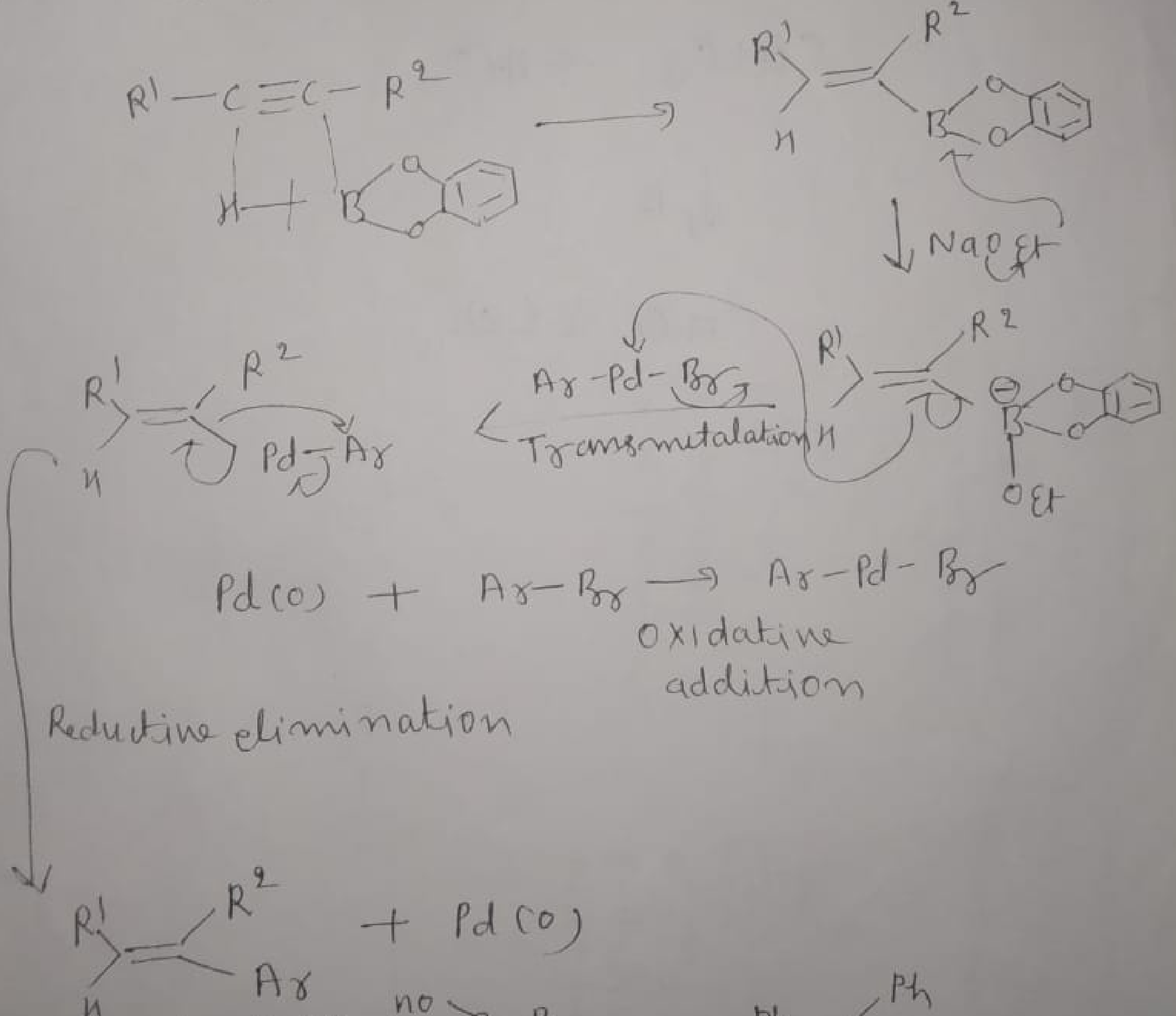


No free rotatation is possible.
They are optically active.
$-COOH$ and NO_2 are large and bulky groups, they will not allow free rotation of two rings.

Suzuki Reaction → Alkylation or arylation of alkynes with boronic ester and alkyl halide in presence of Pd(0) and NaOEt is known as Suzuki reaction



~~Mechanism~~ Mechanism →



Applications

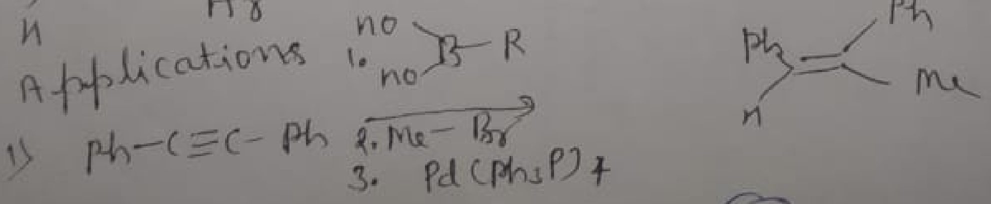
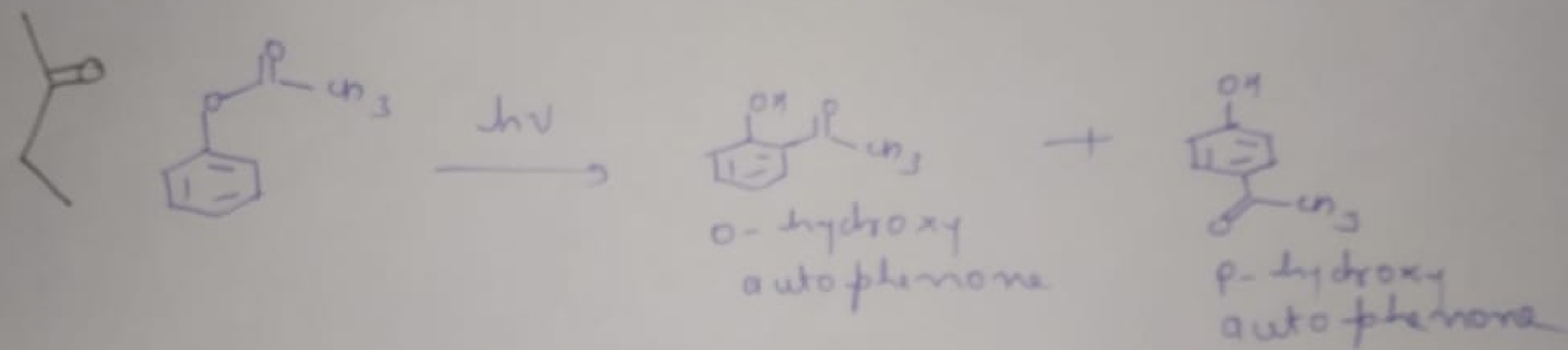
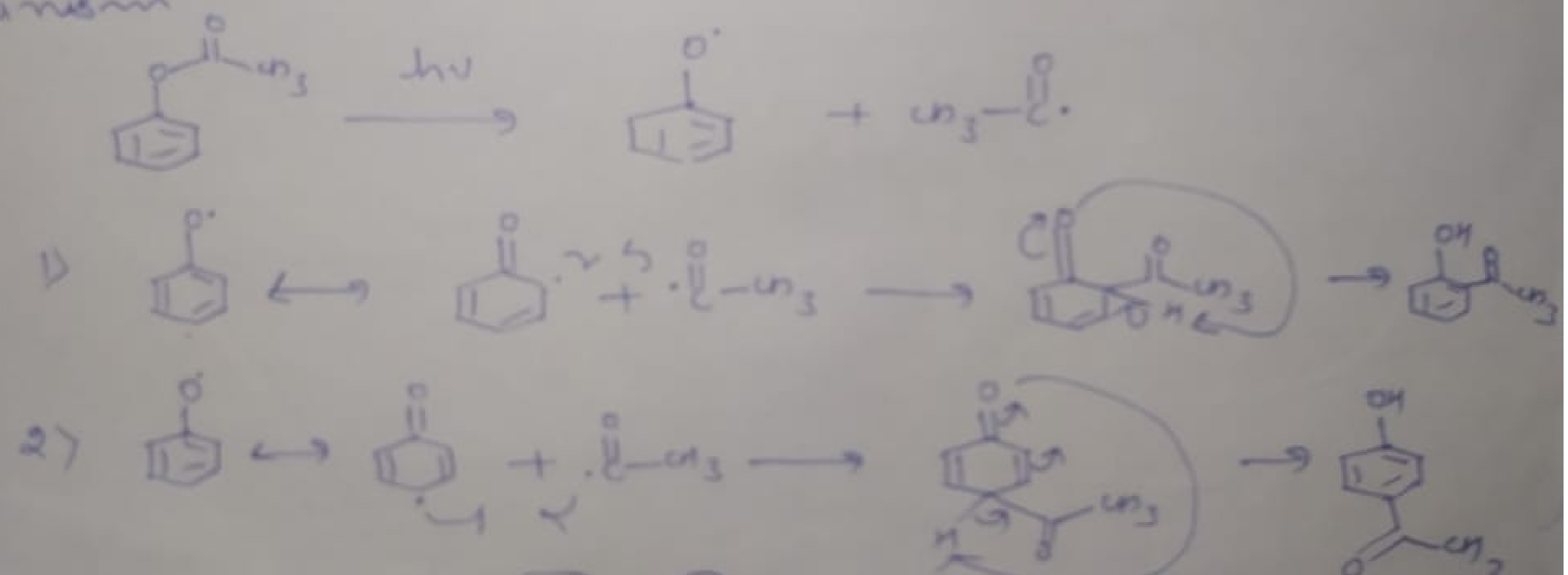


Photo Friss Rearrangement → when Friss rearrangement takes place in presence of light. It is called Photo Friss rearrangement.



Mechanism



CH_3-CH-C