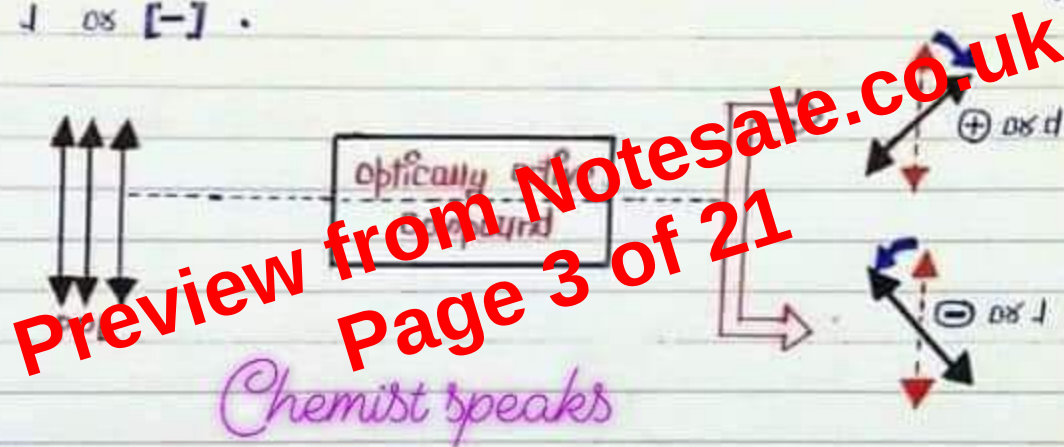


Optical activity

Tendency to rotate plane of PPL in a particular direction.

If a compound rotates plane of PPL in clockwise direction then it will be dextrorotatory or d or $[+]$ and if a compound rotates plane of PPL in anticlockwise direction then it will be levorotatory or l or $[-]$.



* CONDITIONS OF OPTICAL ACTIVITY :-

1. Molecules should be chiral.

CHIRAL $\Rightarrow$ unsymmetrical = which can not be divided into two equal part.

chiral object :-



- 2 = equal part
- symmetrical
- Achiral object

- Mirror image of chiral object can be superimposed on that object.

$$\begin{aligned} \text{ccc. } [O] &= [R] + [M] \\ &= 16 + 0 \\ &= 16 \end{aligned}$$

$$\text{div.} \text{ RACEMIC mixture} = \frac{[R]}{2} = \frac{16}{2} = 8$$

Chemist speaks

[b]. If molecule has one symmetrical plane

[i]. If n is even $\therefore$

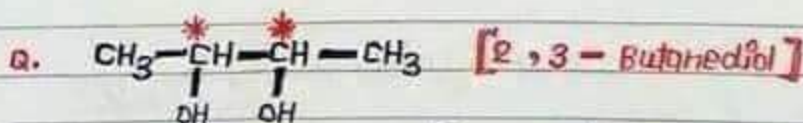
$$\bullet [R] = 2^{n-1}$$

$$\bullet [M] = 2^{n/2-1}$$

$$\bullet [O] = [R] + [M]$$

$$\bullet [R] = \frac{[O]}{2}$$

III
eg:



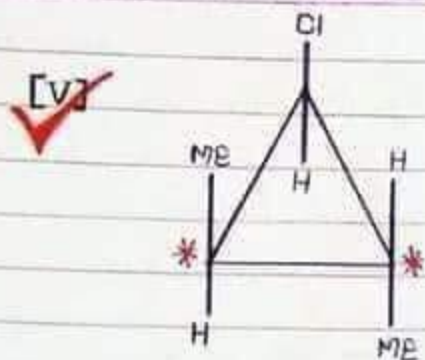
Sol: $n = 2$ [Symmetrical or even]

$$\text{[i]. } [R] = 2^{n-1} = 2^{2-1} = 2$$

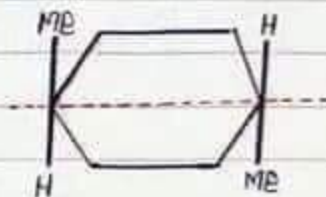
$$\text{[ii]. } [M] = 2^{\frac{2}{2}-1} = 2^{1-1} = 2^0 = 1$$

$$\text{[iii]. } [O] = 2 + 1 = 3$$

$$\text{[iv]. } [R] = \frac{2}{2} = 1$$



[vi]



- No chiral carbon
- Achiral molecule
- Optical inactive

Chemist speaks

* Number of optical isomers ::

[i]. If molecule has no symmetrical plane

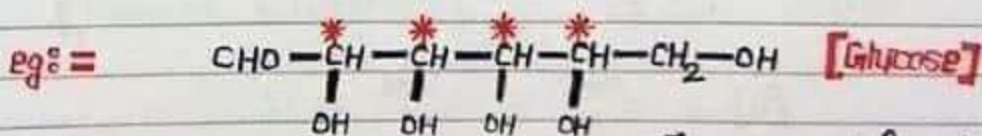
• Number of optically active isomers $[A] = 2^n$

$n = \text{no. of chiral carbon / centres.}$

• Number of meso compounds $[M] = 0$ [zero]

• Number of stereoisomers / optical isomers $[O] = [A] + [M]$

• Number of racemic mixture $[R] = \frac{[A]}{2}$



[No. symmetrical plane]

Sol: = $n = 4$

i.e. $[A] = 2^n = 2^4 = 16$

ii. $[M] = 0$