By- SHAILENDRA SHUKLA SIR

Number of Optical Isomers-

(1) If the compound does not contain plane of symmetry

(a) No. of optically active forms- $a = 2^n$

Where, n = no. of chiral carbon atoms in the molecule

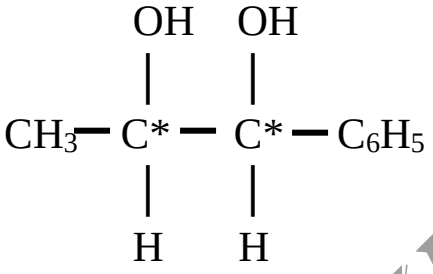
(b) No. of enantiomeric pairs $= \frac{a}{2}$

(c) No. of racimic pairs $= \frac{a}{2}$

(d) No. of meso forms, m = 0

(e) Total no. of configurations = (a + m)

For example, for following molecule,



No. of optically active forms- $a = 2^2$

$= 4$

No. of enantiomeric pairs $= \frac{a}{2}$

$= \frac{4}{2} = 2$

No. of racimic pairs $= \frac{a}{2}$

$= \frac{4}{2} = 2$

No. of meso forms, m = 0

Total no. of configurations = (a + m)

= (2 + 0)

= 2

(2) If the compound contains plane of symmetry and even no. of chiral carbon atoms-

(a) No. of optically active forms- $a = 2^{(n-1)}$

Where, n = no. of chiral carbon atoms in the molecule

(b) No. of enantiomeric pairs $= \frac{a}{2}$

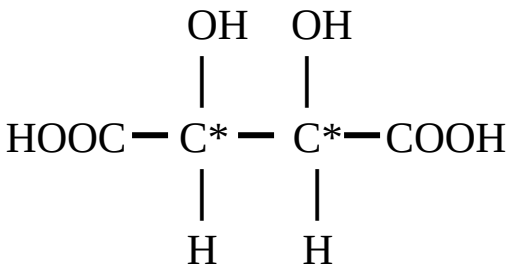
CHEMISTRYFORCOMPETITION.COM

(c) No. of racimic pairs $= \frac{a}{2}$

(d) No. of meso forms, m = $2^{\left(\frac{n}{2}\right)-1}$

(e) Total no. of configurations = (a + m)

For example, for following molecule,



No. of optically active forms- a = 2^{2-1}

= 2

No. of enantiomeric pairs $= \frac{a}{2}$

$= \frac{2}{2}$ = 1

No. of racimic pairs $= \frac{a}{2}$

$= \frac{2}{2}$ = 1

No. of meso forms, m = $2^{\left(\frac{2}{2}\right)-1}$

= 2^0

= 1

Total no. of configurations = (a + m)

= (2 + 1)

= 3

(3) If the compound contains plane of symmetry and odd no. of chiral carbon atoms-

(a) No. of optically active forms- a = $2^{(n-1)} - 2^{(n-1)/2}$

Where, n = no. of chiral carbon atoms in the molecule

(b) No. of enantiomeric pairs $= \frac{a}{2}$

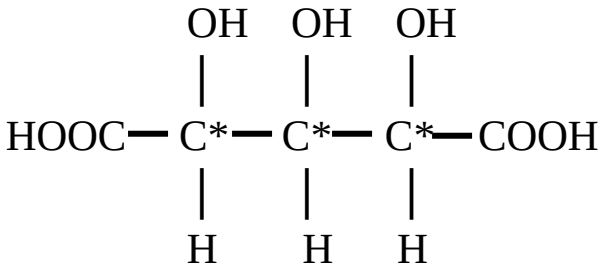
(c) No. of racimic pairs $= \frac{a}{2}$

(d) No. of meso forms, m = $2^{(n-1)/2}$

(e) Total no. of configurations = (a + m)

CHEMISTRYFORCOMPETITION.COM

For example, for following molecule,



No. of optically active forms- a = $2^{3-1} - 2^{(3-1)/2}$

$= 2^2 - 2^1$

$= 2$

No. of enantiomeric pairs $= \frac{a}{2}$

$= \frac{2}{2} = 1$

No. of racimic pairs $= \frac{a}{2}$

$= \frac{2}{2} = 1$

No. of meso forms, m $= 2^{(n-1)/2}$

$= 2^{(3-1)/2}$

$= 2$

Total no. of configurations = (a + m)

= (2 + 2)

= 4

CHEMISTRYFORCOMPETITION.COM