Few important Terms of Conformational analysis :-

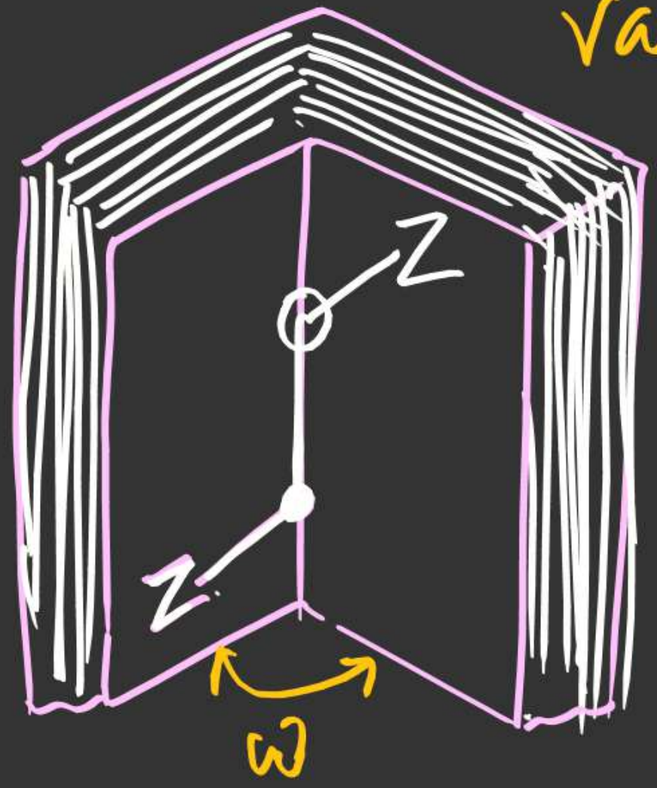
MF ⇒ molecular formula

(1) **Conformations**: Various interconvertible representations of any compound with same MF & same SF are known as **Conformations**

- **Stable Conformation**
  - $Z = H$ ⇒ Staggered Conformation
    - Anti Conformation
    - Gauche Conformation
  - $Z \neq H$
- **Unstable Conformation**
  - Eclipsed Conformation
    - P. Eclipsed Conf.
    - F. Eclipsed Conf.

(2) Di Hedral Angle: (ω)

Angle b/w Two intersecting planes containing front & Back atom valencies.



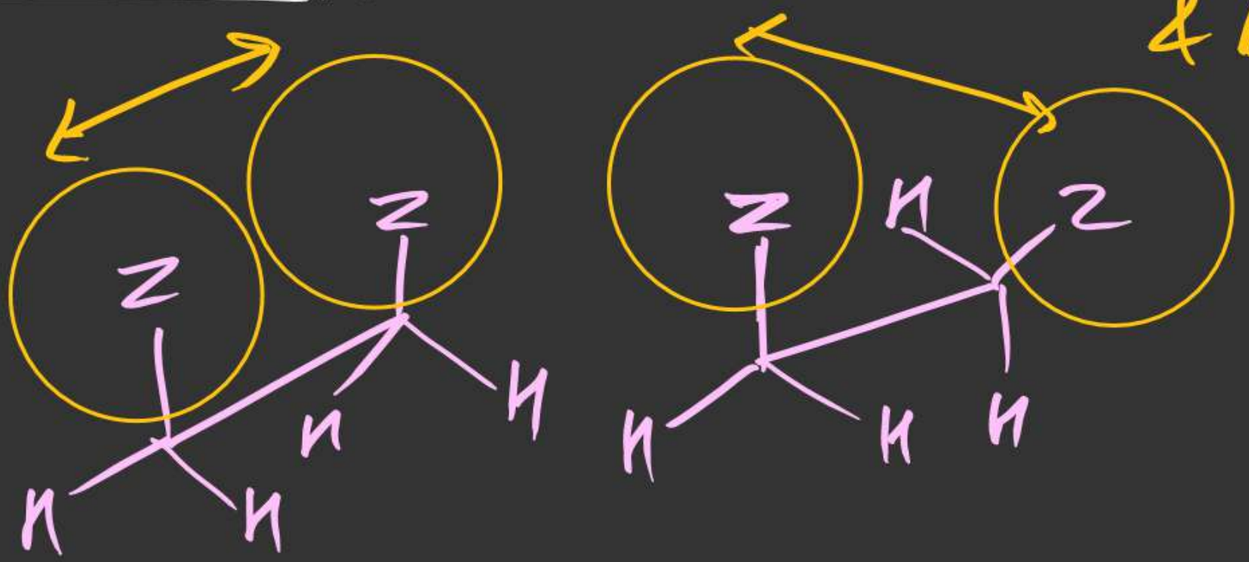
$\omega = 0 \Rightarrow$ Fully Eclipsed

$\omega = 60° \Rightarrow$ Gauche

$\omega = 120° \Rightarrow$ P. Eclipsed

$\omega = 180° \Rightarrow$ Anti

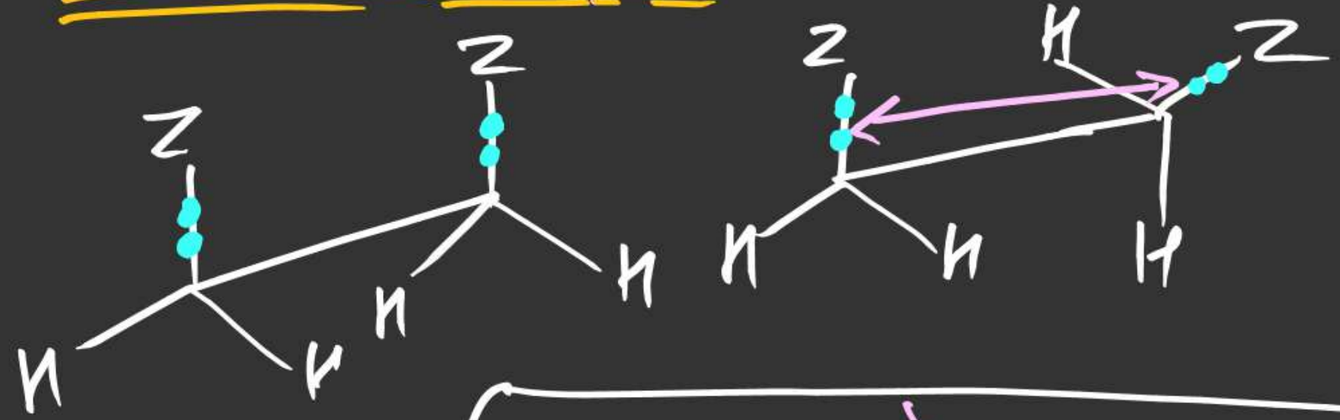
(3) Vanderwaal strain :- strain due to Repulsion b/w front & Back atom Valences due to their steric factor (size).



Fully Eclipsed Gauche

$$V_{FE} > V_{PE} > V_g > V_{anti}$$

(4) Torsional Strain:- Strain due to Repulsion b/w Bond pair e⁻s of front atom & Back atom Bonds are known as Torsional Strain



$$T_{FE} = T_{PE} > T_g = T_{Anti}$$

(5) Skew Conformation! All Conformations for which $\omega \in (0, 60°)$

Ex:

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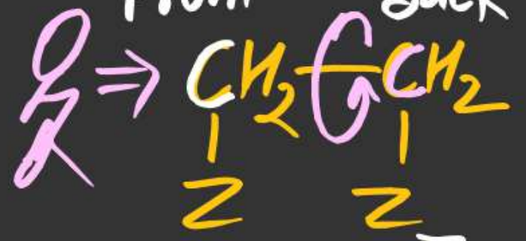
Ex-1: Draw Extreme Conformation for following Compound.

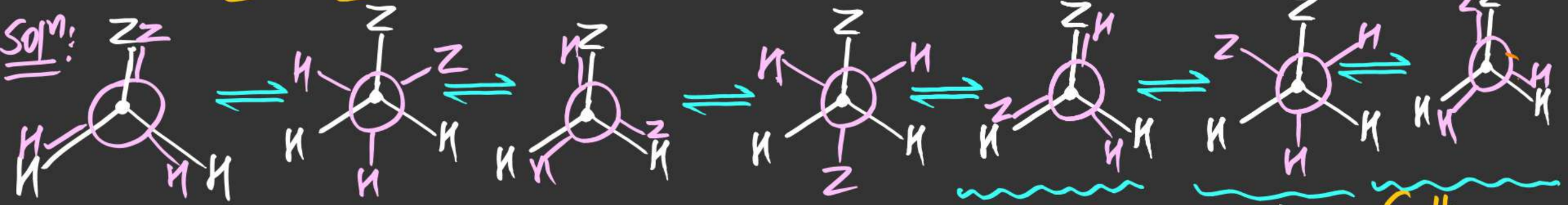
Front Back



& also draw it's potential energy diagram.

where Z is either Alkyl/Aryl.

Sol:



Fully Eclipsed Conformation

Gauche Conform.

Partial Eclipsed Conformation

Anti Conformation

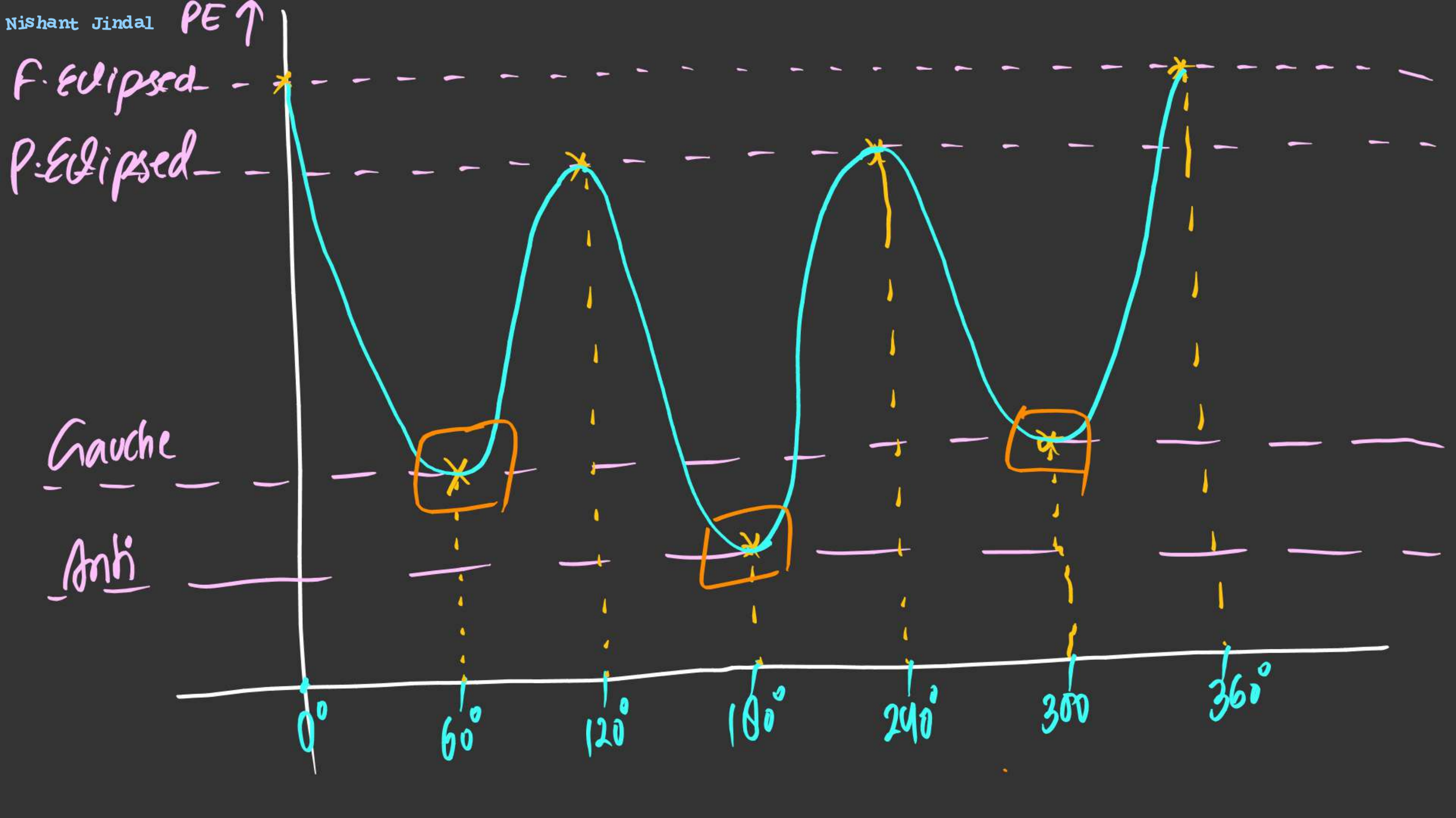
Partial Eclipsed Conformation

Gauche Conform.

Fully Eclipsed Conformation

Stability order: Anti > Gauche > P.Eclipsed > F.Eclipsed.

Potential Energy order: F.Eclipsed > P.Eclipsed > Gauche > Anti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PE ↑
F. Eclipsed
P. Eclipsed
Gauche
Anti
0°
60°
120°
180°
240°
300
360°

Note (i) Total possible conformation = ∞

(ii) Total stable conformation ≤ Potential Energy minima

= 3 (1 Anti + 2 Gauche)

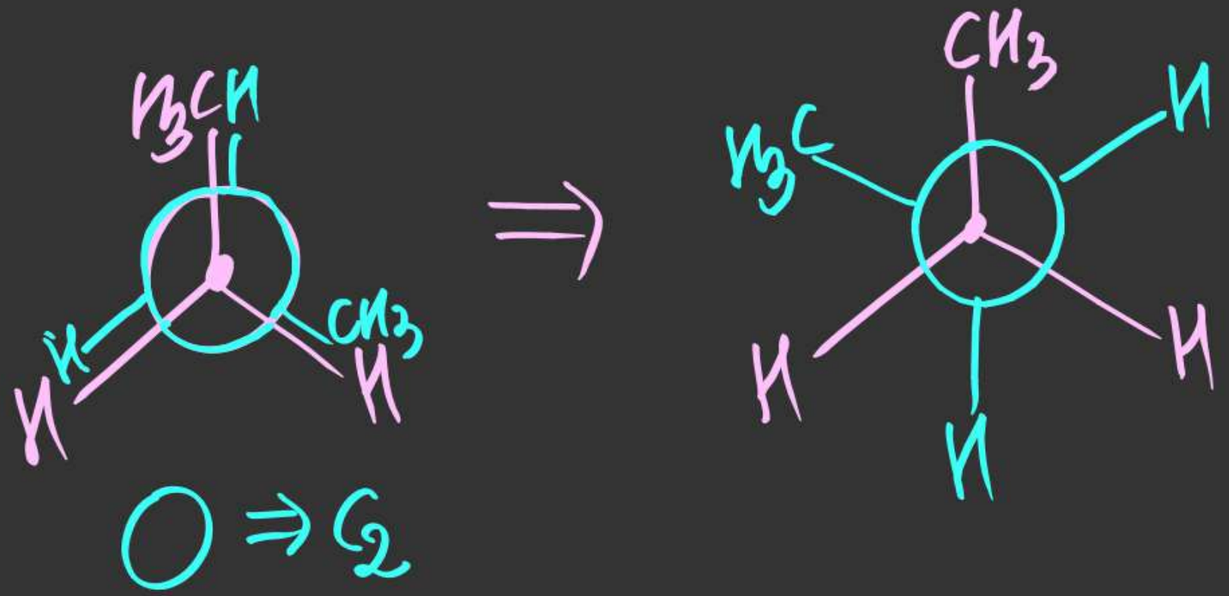
Ex-2: Draw Extreme Conformation of following & also draw its P. Enrgy Diagram.

(i) CH_2-CH_2 (H, H)

(ii) CH_2-CH_2 (CH_3, H)

(iii) 

Ex-3: Find Conformation obtained when C_2 Carbon is Rotated **clockwise** By **180°** in following Conformation



$O \Rightarrow C_2$

Gauche.

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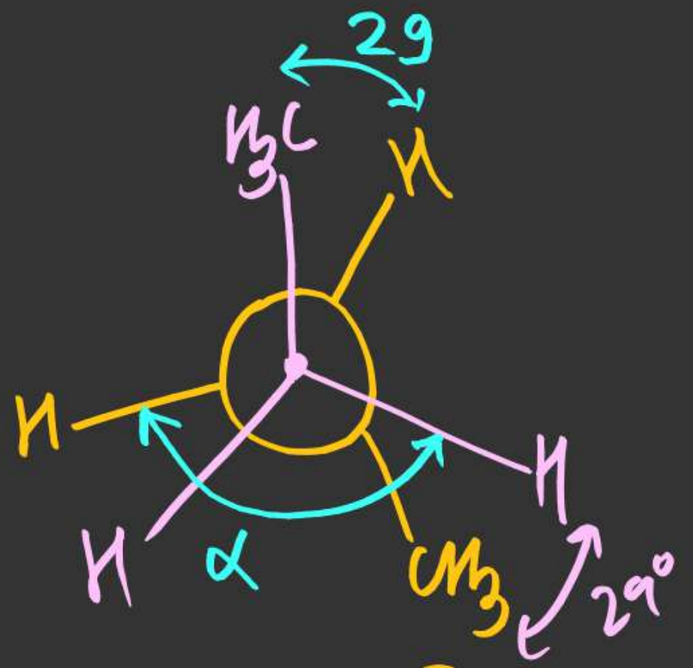
Ex-4: Find "α"

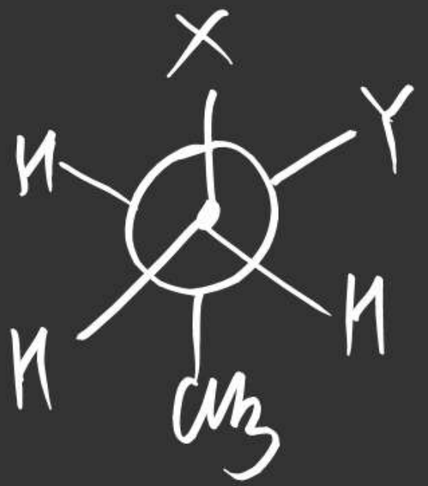


$$\alpha = \angle HOCH_3 + \angle CH_3OH$$

$$= 120^\circ + 29^\circ$$

$$= 149^\circ$$

Ex-5 Find all possible pair of (X, Y) so that following is a conformation of isopentane.



$\Rightarrow$