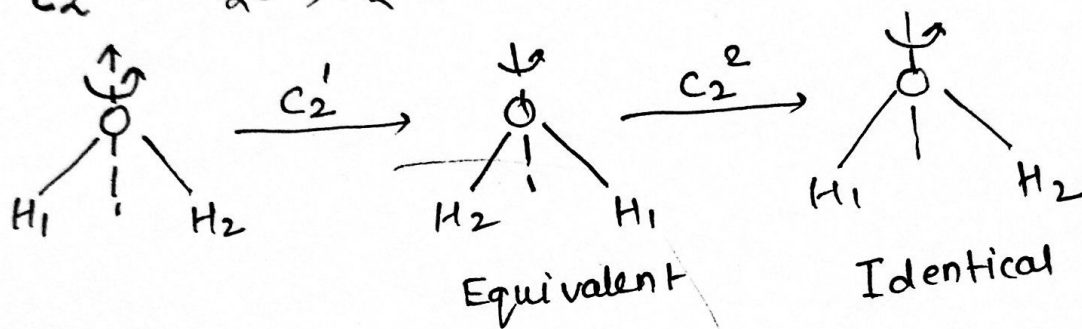


Proper axis of symmetry (C_n)

- Symmetry operation \rightarrow Rotation
- Symmetry element \rightarrow line
- C_n . Where $n =$ order of the axis
- $n = \frac{360^\circ}{\theta}$ where $\theta =$ angle of rotation.
- $C_n^n = E$ i.e. $C_2^2 = E$, $C_3^3 = E$

Examples

- $C_2 \rightarrow H_2O, H_2S$



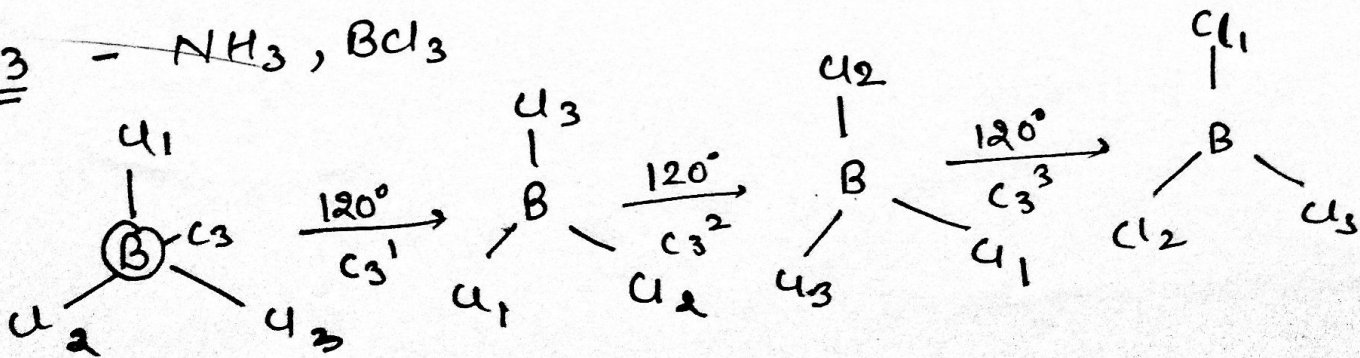
There are two types of axis

a) Principal axis

b) secondary axis

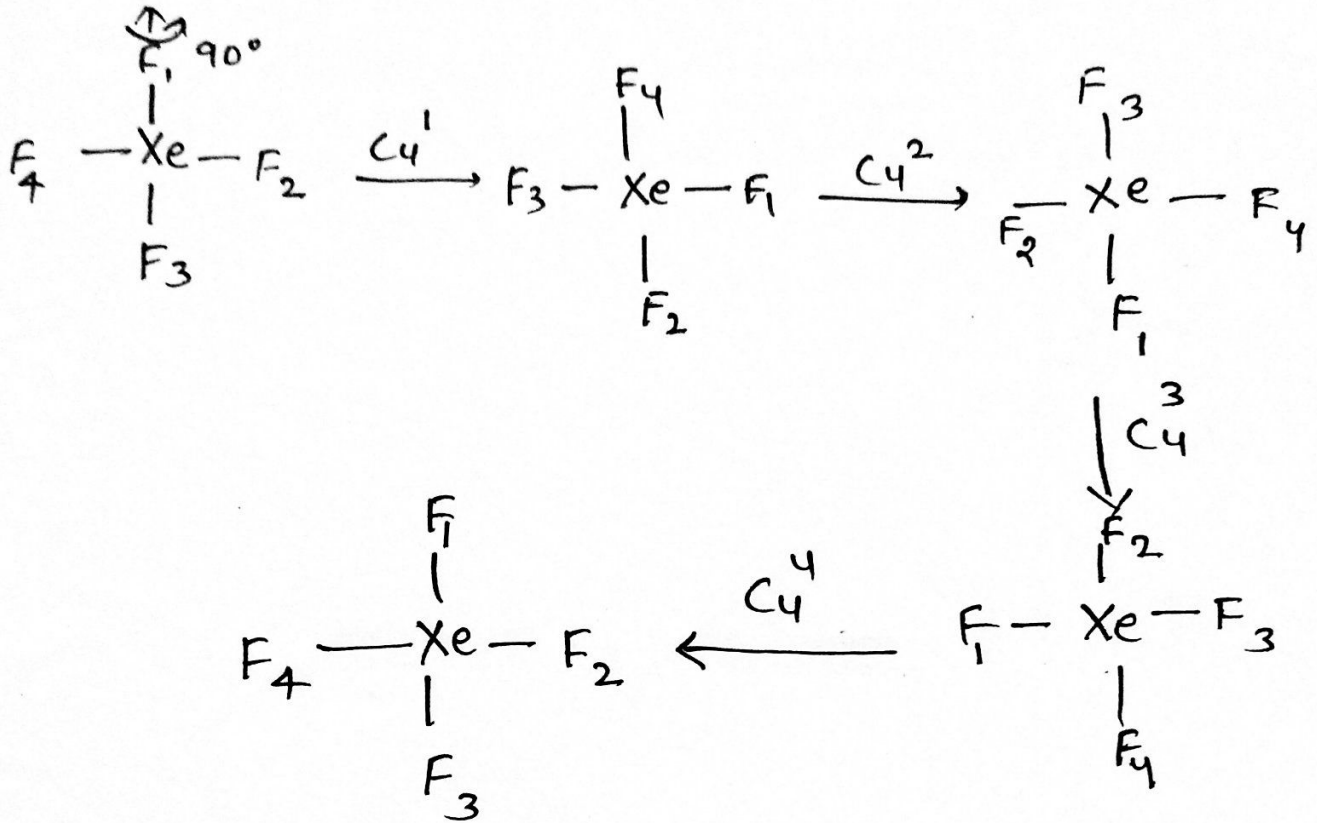
- If only one axis is present then the axis is principal axis.
- If more than one symmetry axis are present then the axis of higher order is called principle axis whereas the axis having lower order is called secondary axis.

- C_3 - NH_3, BCl_3



$C_3^3 = E$.

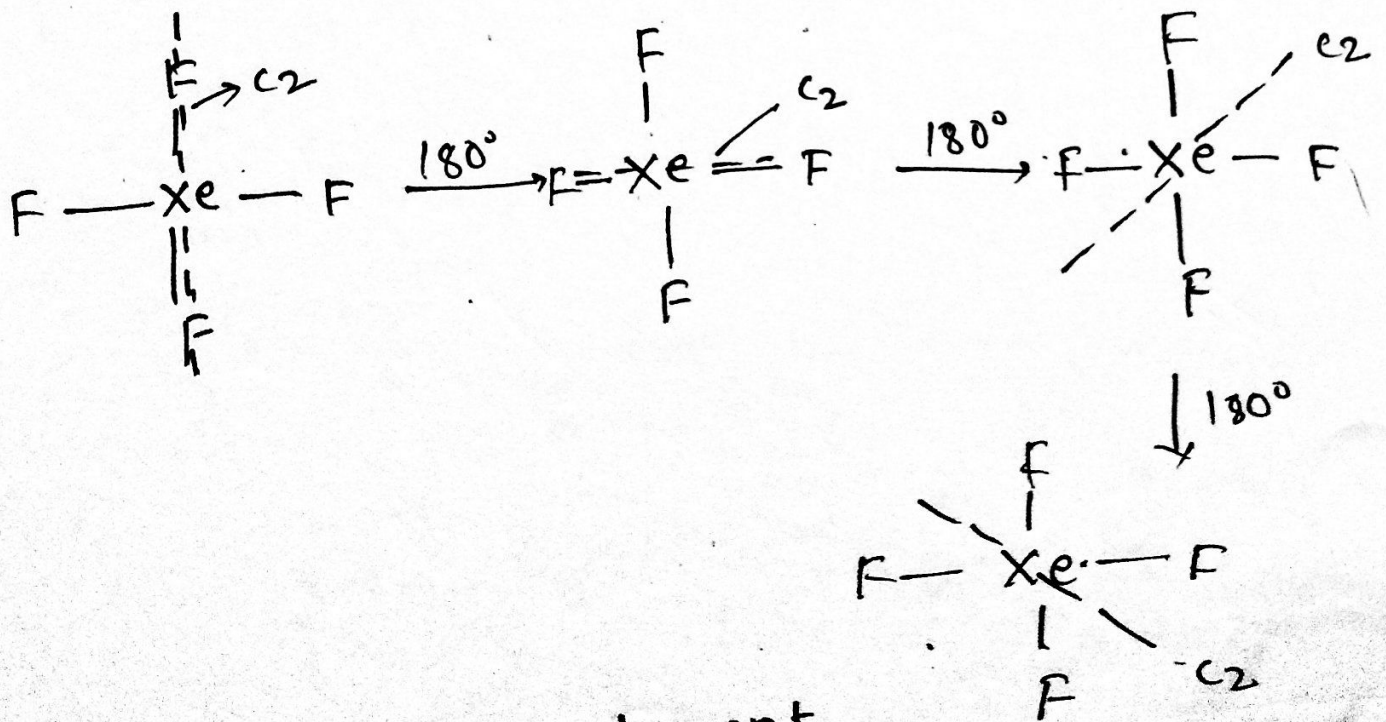
• C₄ axis XeF₄



• C₄⁴ = E

• C₄² = C₂

no. of C₂ present in XeF₄

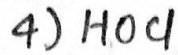
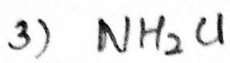
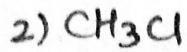
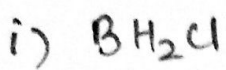


So, 4 C₂ axis are present

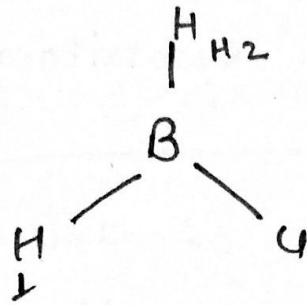
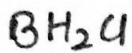
4 C₂ ⊥ C₄ axis.

Q. The molecule with C_2 axis of symmetry among the following.

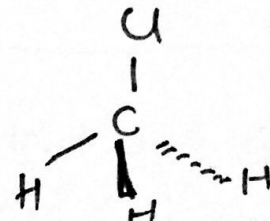
CSIR-NET.
Dec. 2017



(i) trigonal planar



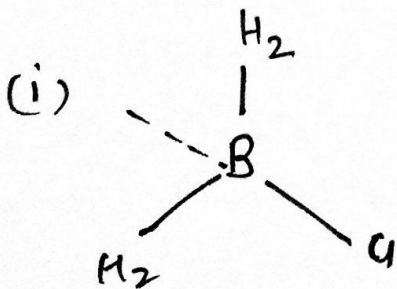
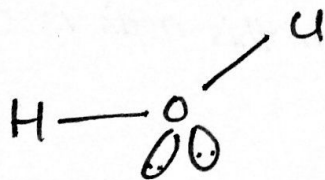
(ii) $CH_3Cl \rightarrow CH_4$ derivative tetrahedral



(iii) trigonal pyramidal (lone pair present on Nitrogen)

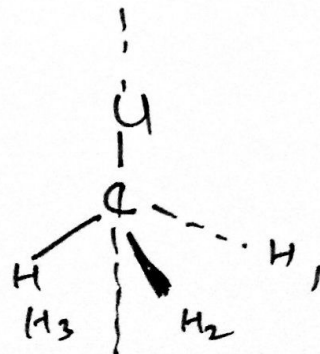


(iv) Bent structure due to 2 lone pair present on oxygen



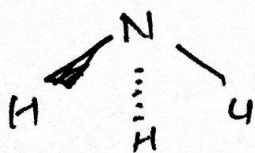
C_2

(ii)



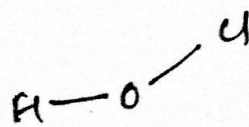
C_3

(iii)



Plane

(iv)



No axis, No plane.