

CHEMICAL BONDING

Only one correct

Q. BF_3 and BCl_3 are gaseous, BBr_3 is volatile liquid while BI_3 is solid. It is due to

- (A) increased number of electrons, enhance the polarisability of the molecules.
- (B) increased number of electrons, diminish the polarisability of the molecules.
- (C) decreased number of electrons, enhance the polarisability of the molecules.
- (D) decreased number of electrons, diminish the polarisability of the molecules.

CHEMICAL BONDING

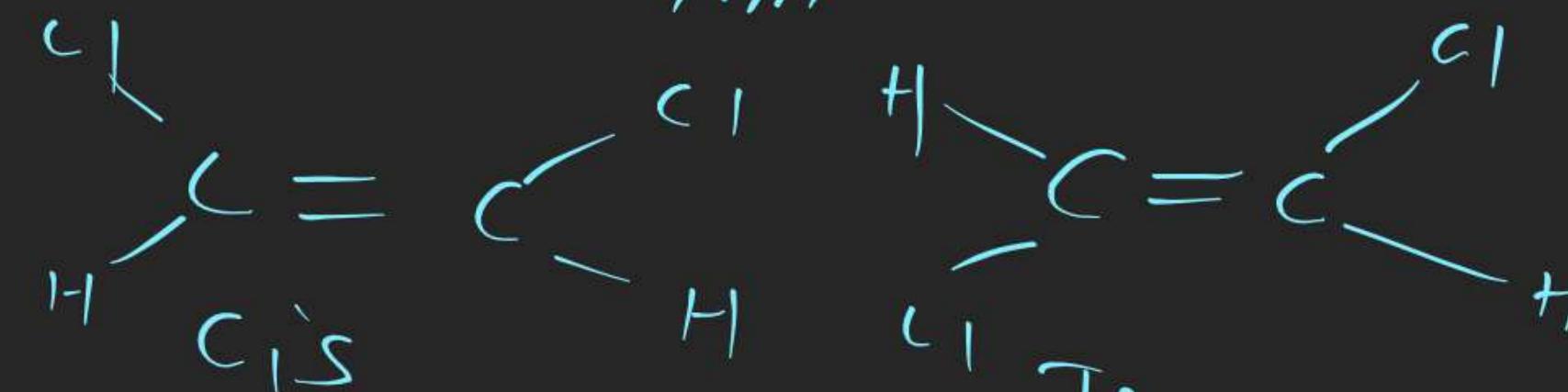
Q. Which of the following option is CORRECT about 1,2-dichloroethene

(A) cis > trans (B.P.)

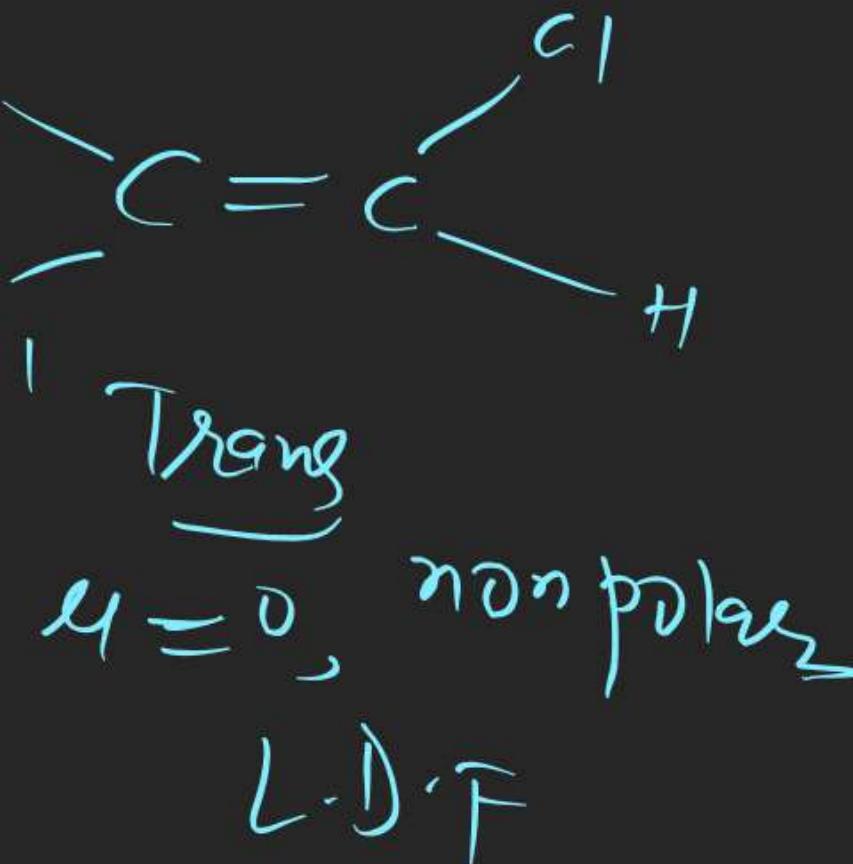
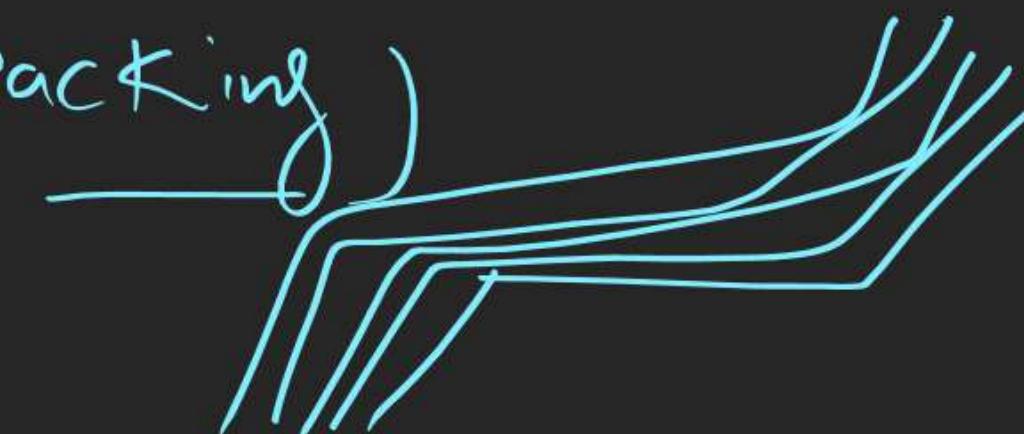
(B) cis < trans (M.P.)

(C) cis > trans (solubility)

~~(D) all of these~~



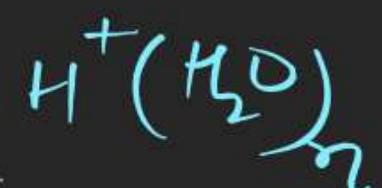
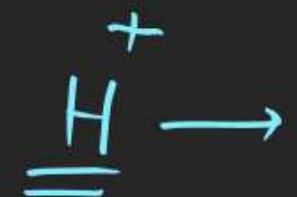
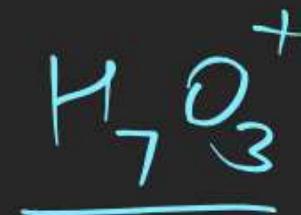
$\mu \neq 0$, polar
dipole - dipole



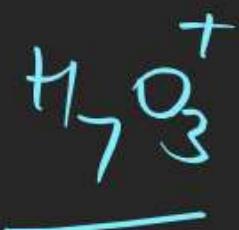
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Q. Which of the following force of attraction is observed in H_7O_3^+

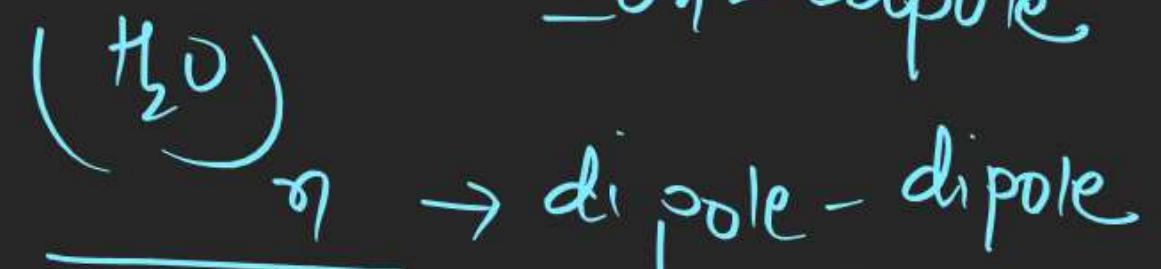
- (A) dipole-dipole
- (B) ion-dipole
- (C) H-bonding
- (D) all of these



$n=3$

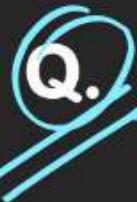


Ion-dipole



H-Bonding

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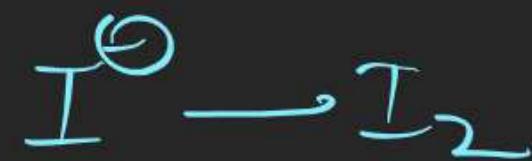
 Q. Statement-1: He and Ne do not form clathrate with phenol due to their small size

Statement-2: Ne can form clathrate with hydroquinone

- (A) Statement-1 is true, statement- 2 is true and statement- 2 is correct explanation for statement- 1.
- ~~(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.~~
- (C) Statement-1 is true, statement- 2 is false.
- (D) Statement-1 is false, statement-2 is true.

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- Q.** The stability sequence of $\underline{\text{I}_3^-} > \underline{\text{Br}_3^-} > \underline{\text{Cl}_3^-}$ can be explained by
- (A) Keesom force
 - (B) Debye force
 - (C) instantaneous dipole-induced dipole
 - (D) ion-induced dipole**



Ion - Induced dipole

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Q. Statement 1: CF_4 has lower boiling point than OF_2 .

Statement 2 : Lower boiling point of CF_4 arises from its zero dipole



~~Polar~~ moment

(A) Statement-1 is true, statement- 2 is true and statement- 2 is correct explanation for statement- 1.



(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

$\mu = 0$

(C) Statement-1 is true, statement- 2 is false.

non polar

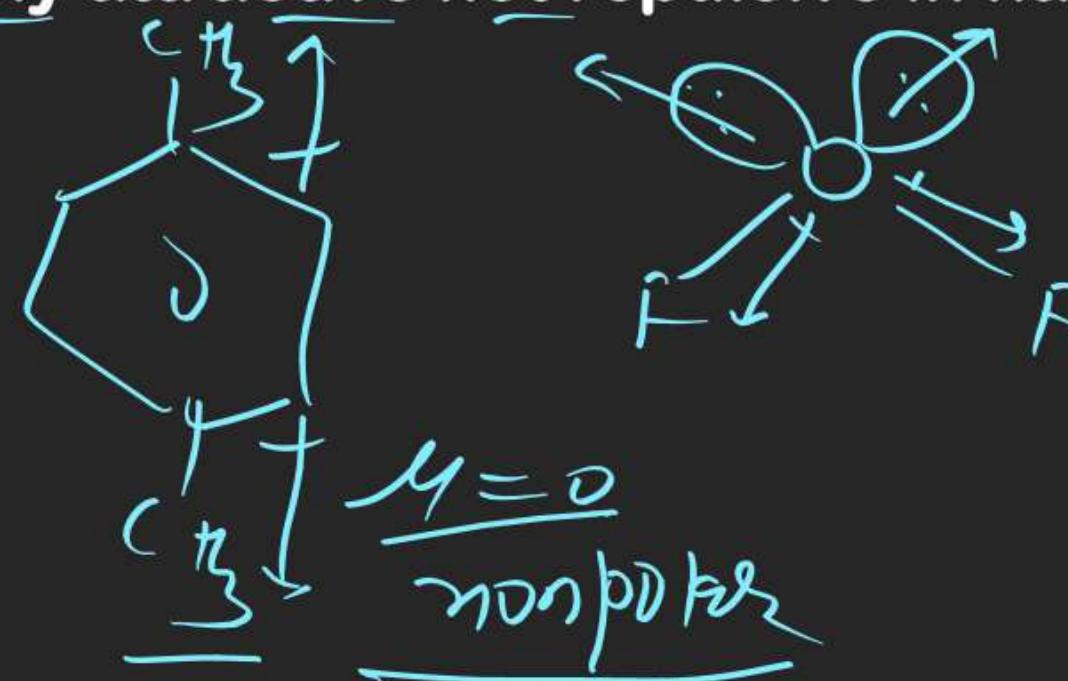
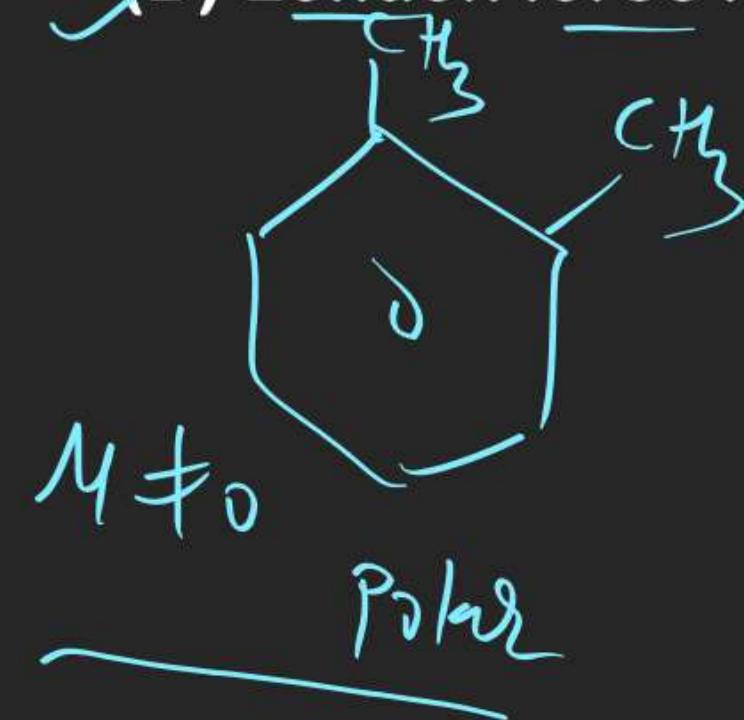
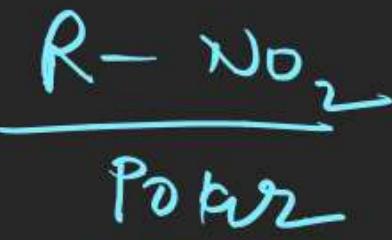
(D) Statement-1 is false, statement-2 is true.

CHEMICAL BONDING

Multiple Choice

Q. Select the correct statement(s)

- (A) Ortho-xylene has higher boiling point than para-xylene
- (B) Nitro-alkanes show higher B.P. as compared to alkanes of comparable molecular mass.
- (C) London forces are present in both NF_3 and in NH_3 .
- (D) London force is purely attractive not repulsive in nature.



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- Q. The explanation of various intermolecular forces indicates
- (A) the unusual (anomalous) behaviour of H_2O , NH_3 and HF in terms of the relationship between molecular weight and boiling points is due to London forces. non polar
- (B) ion-dipole forces account for the solvation energy which plays an important role in dissolving of ionic solids.
- (C) for non-polar molecules in the liquid state, an important force acting is magnetic attraction
- (D) London forces are dominating in non-polar molecules

B, D



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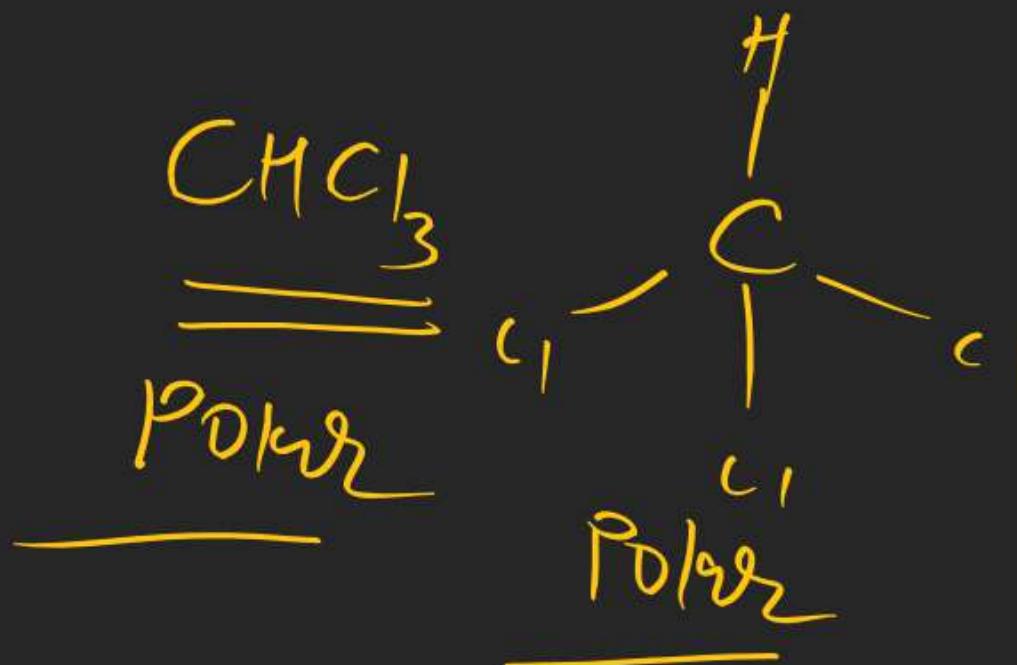
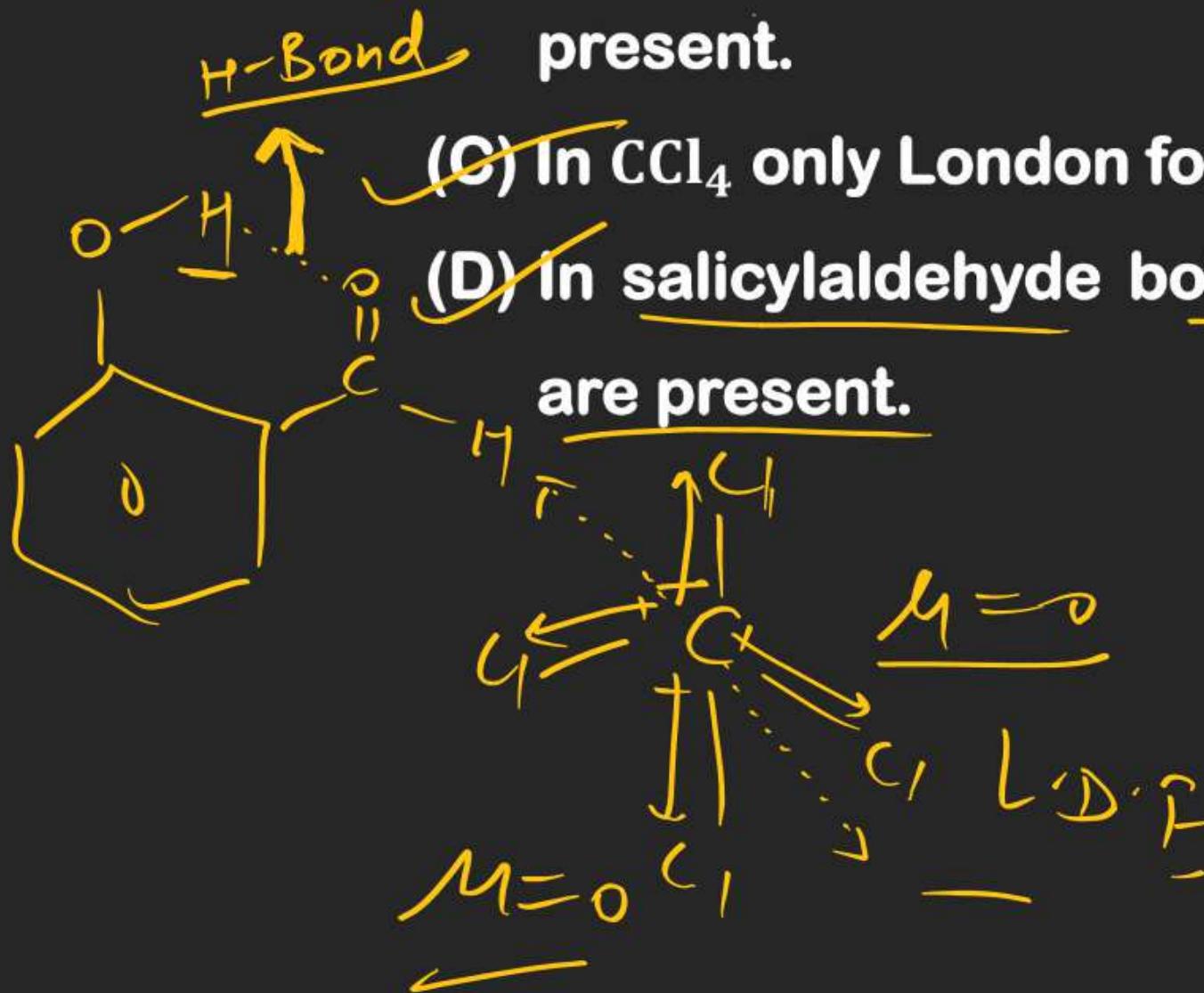
Q. Which of the following statement is CORRECT?

(A) In CHCl_3 molecule both dipole forces as well as London forces exist.

(B) In H_2O molecule both hydrogen bonds as well as London forces are present.

(C) In CCl_4 only London forces exist.

(D) In salicylaldehyde both hydrogen bonds as well as London forces are present.

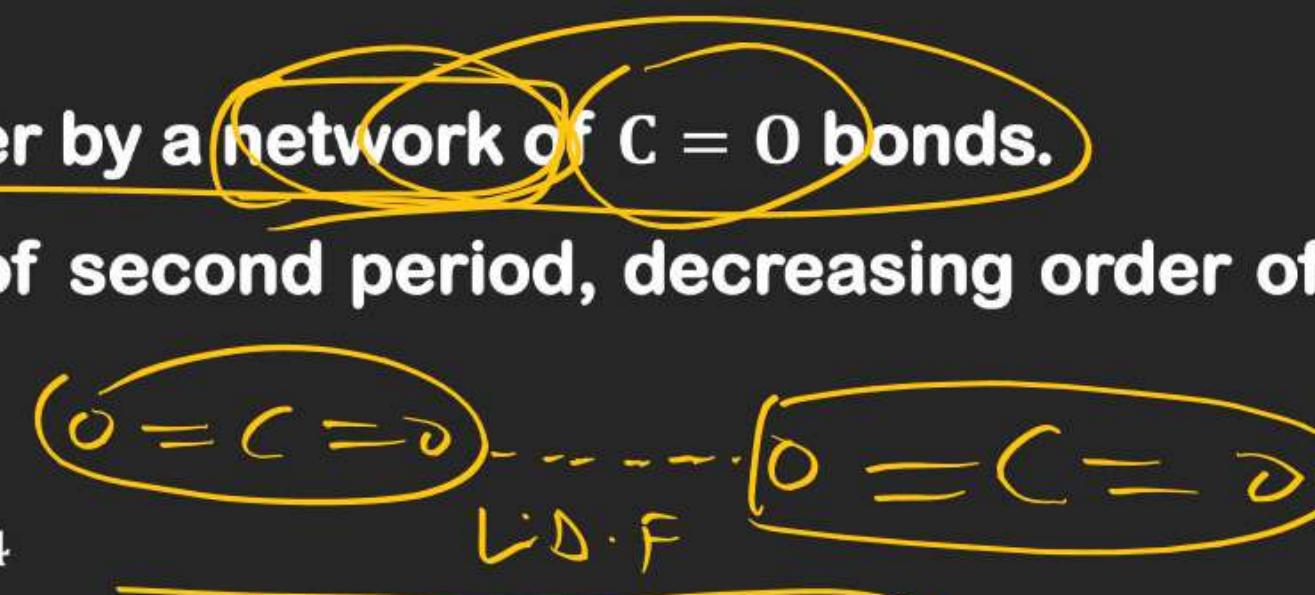


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Q Consider the following statements

- I. Dispersion forces exist between all atoms, molecules and ions.
- II. The extent of ion induced dipole interaction depends on the charge on ion.
- III. Dry ice is held together by a network of C = O bonds.
- IV. Among the hydrides of second period, decreasing order of boiling points is

points is



INCORRECT statement(s) out of the above will be

- (A) III (B) IV (C) II (D) I



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Q. Which of the following option(s) is/are CORRECT? (PYQS)

Type of interaction distance-energy function

(A) dipole-dipole $\propto \frac{1}{r^3}$

(B) H-bonding $\propto \frac{1}{r^3}$

(C) Ion-dipole $\propto \frac{1}{r^2}$

(D) London force $\propto \frac{1}{r^6}$

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Q. The correct order of the boiling point is/are -

(A) $\text{He} < \text{Ne} < \text{Ar} < \text{Kr} < \text{Xe}$

(B) $\text{H}_2 < \text{He} \times$

(C) $\text{H}_2 < \text{D}_2 < \text{T}_2$

(D) $\text{BF}_3 < \text{BMe}_3$

A \cup D

one What is the % of s character in H₂O



$$\cos 104.5^\circ = \frac{s}{s-1}$$

$$-0.25 = \frac{s}{s-1}$$

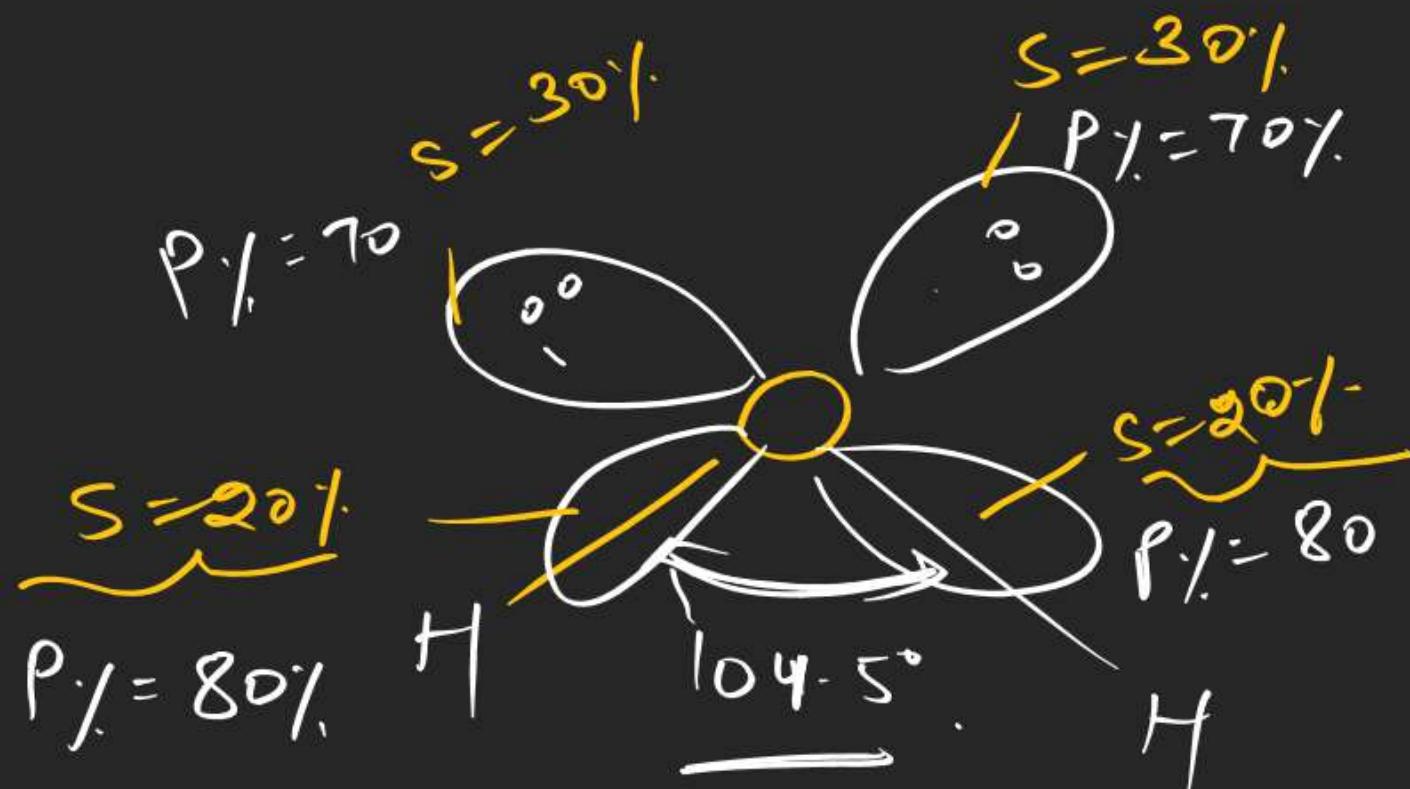
$$s\% = \frac{20}{50} \times 100 = 20\%$$

one What is the hybridisation of H₂O

sp³

$$s\% = 25\%$$

$$\boxed{\cos 104.5^\circ = -0.25}$$

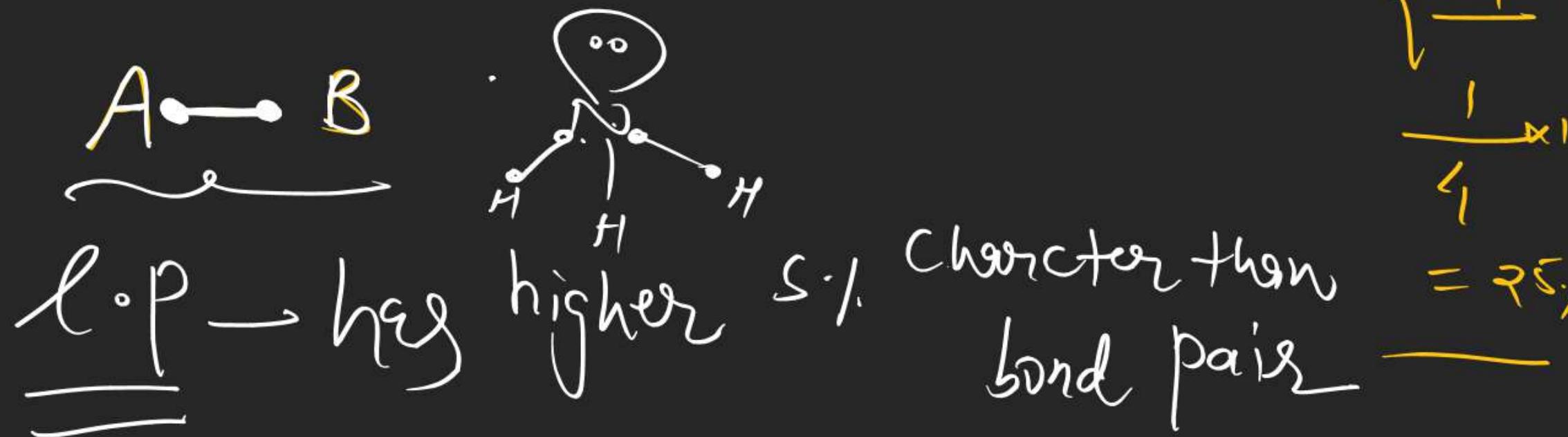


$$\cos \theta = \frac{S}{S-1}$$

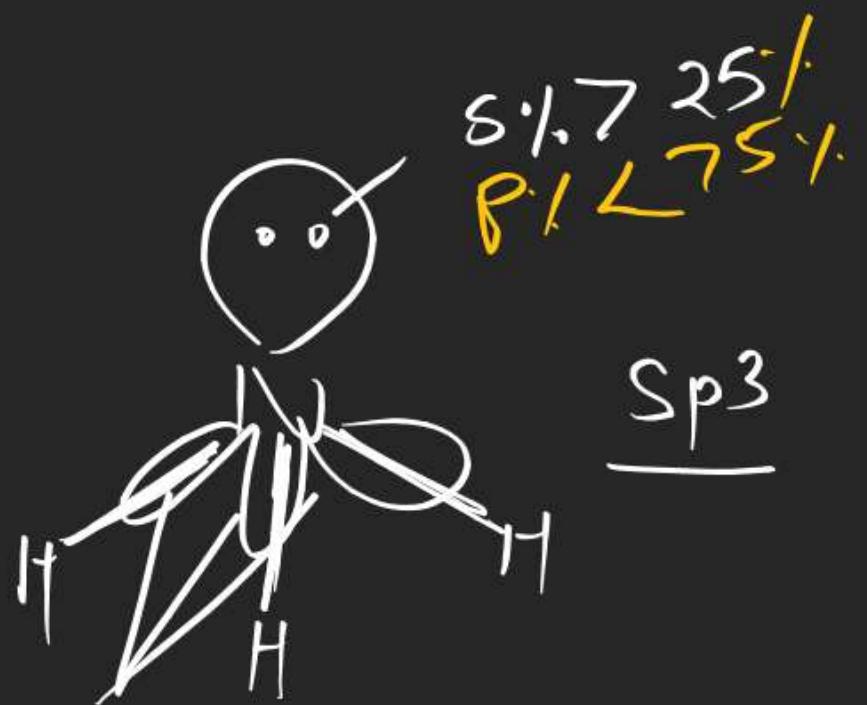
$$\cos 104.5^\circ = \frac{S}{S-1}$$

$$S\% = 20\%$$

$$\left\{ \begin{array}{l} SP^3 \\ \frac{1}{4} \times 100 \end{array} \right.$$



$$\begin{array}{r}
 \text{sp}^3 \\
 \hline
 1+3=4 \\
 \hline
 25+25+25+25 \\
 \hline
 100
 \end{array}$$



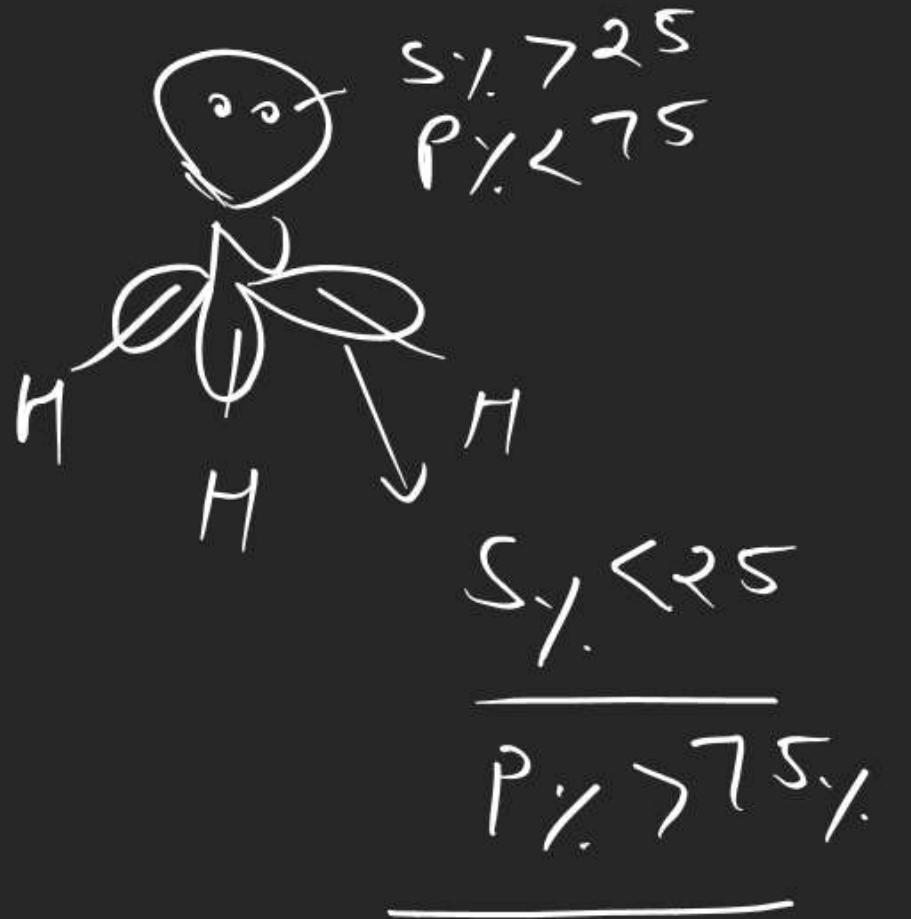
$$\text{sp}^4$$

Ques $\text{S}/\text{C}_2\text{H}_5$ What is the type of orbital of NH having
 S/P

① sp³ ② sp^{3.14} ③ sp^{2.86} ④ sp²

~~Ques~~ What is the hybridisation of orbital of NH_3 having bond pairs.

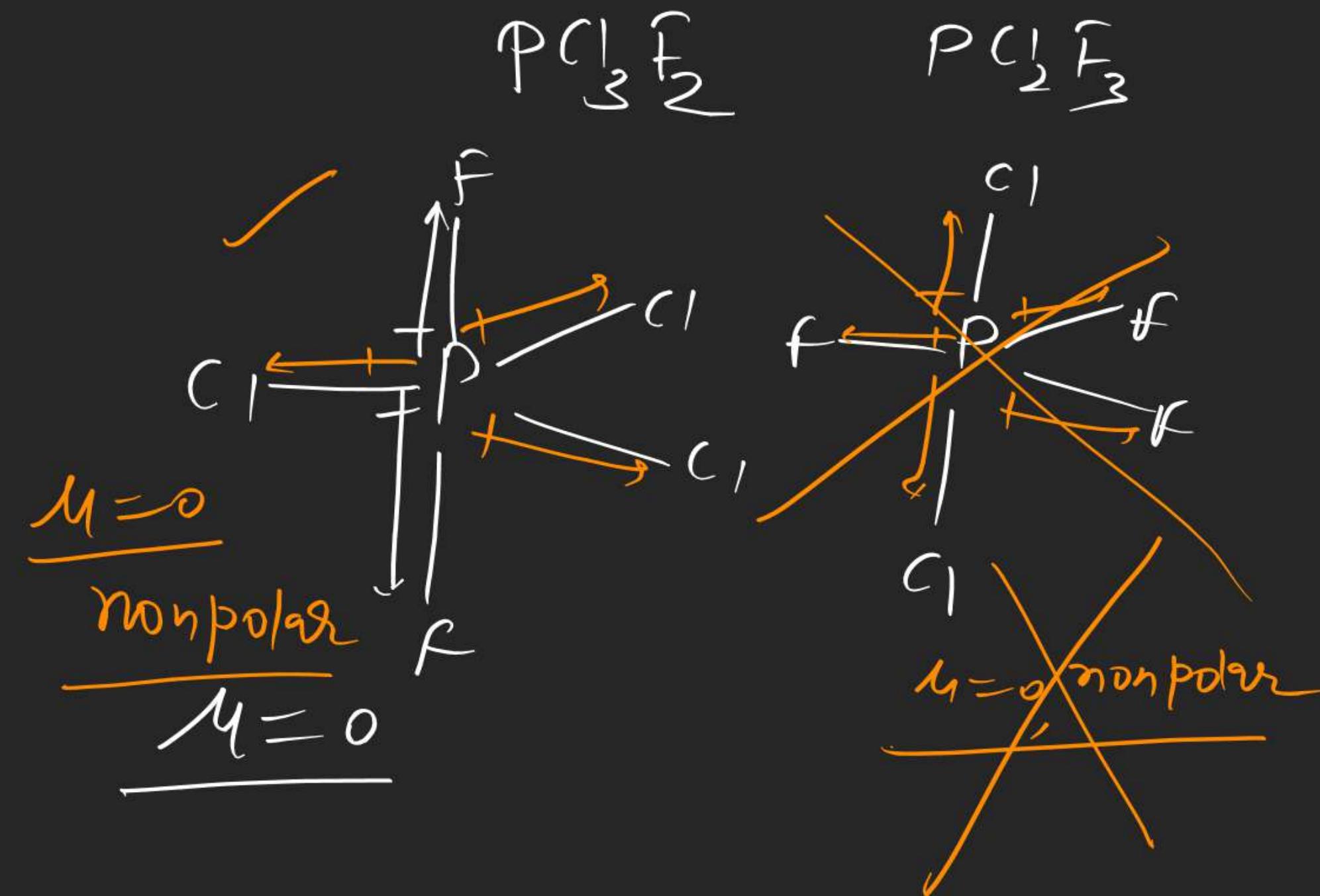
- ① sp^2
- ② sp^3
- ③ $\text{sp}^{3.14}$
- ④ $\text{sp}^{2.86}$

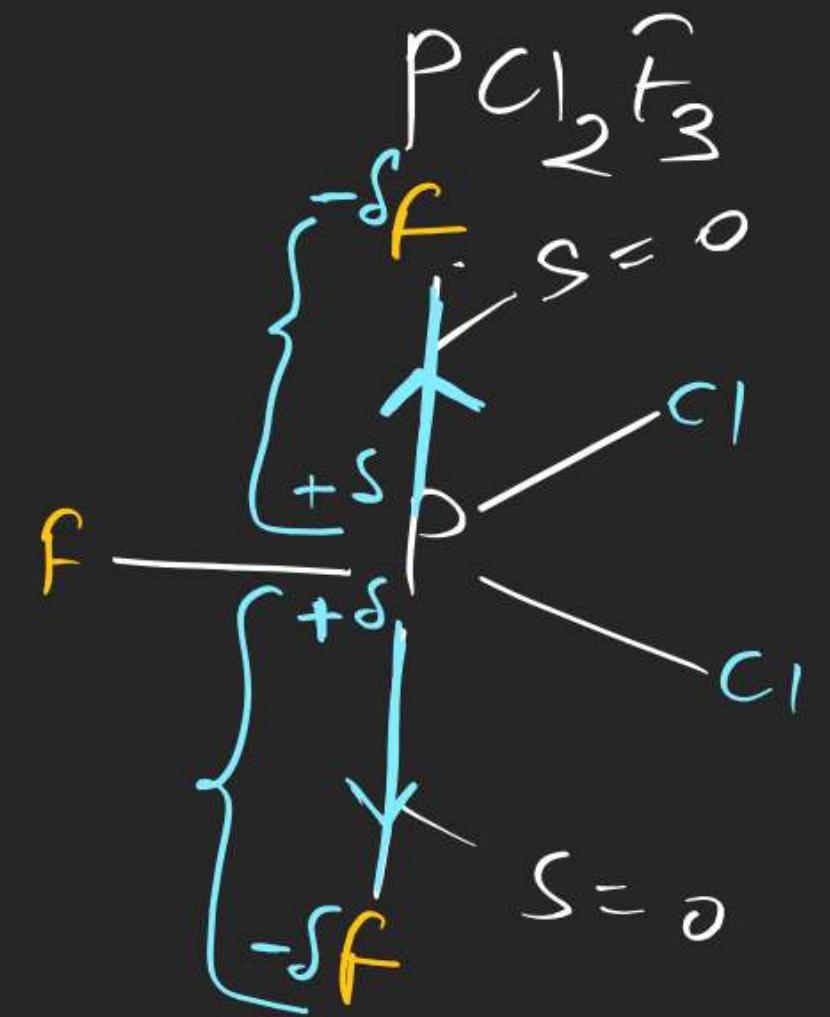


Statement of Bent's Rule

When all surrounding atom attached with central atom through single bond, then more E·N surrounding atom prefer to attach that Hyb. orbital which has less S character,

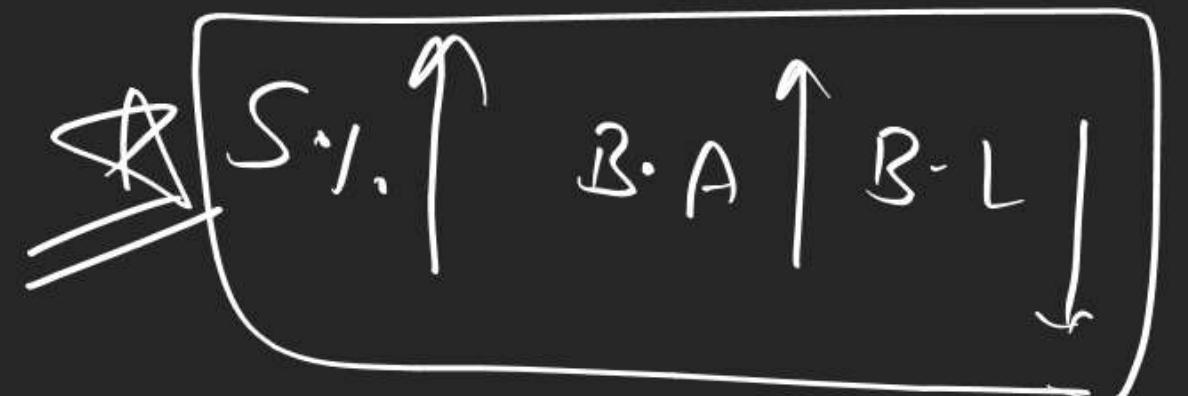
Note :- L·P and multiple bond prefer to stay with that Hybrid orbital which has L·P has slightly more S character and slightly more s. character.





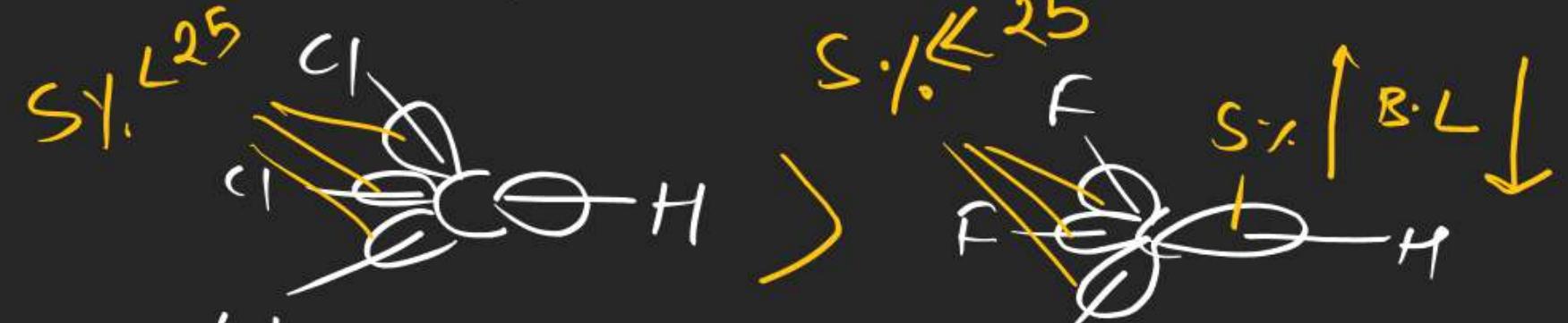
Application of Bent's Rule

Key point \Rightarrow



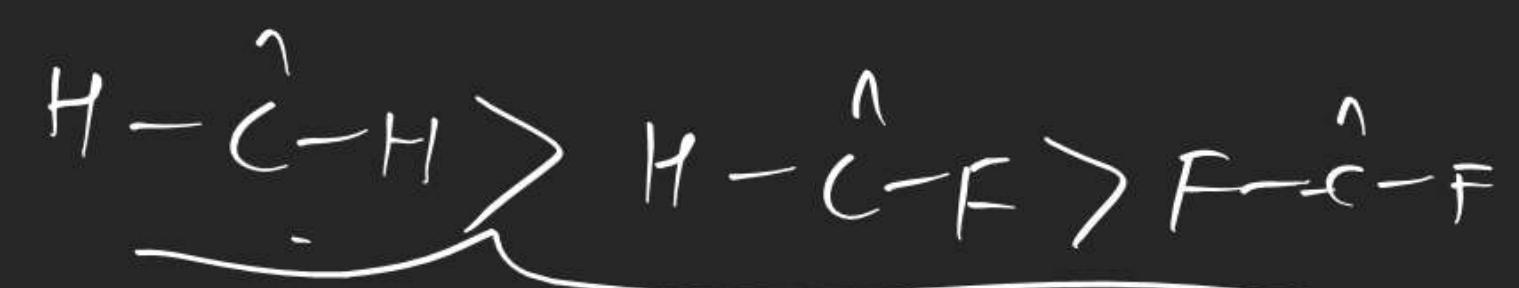
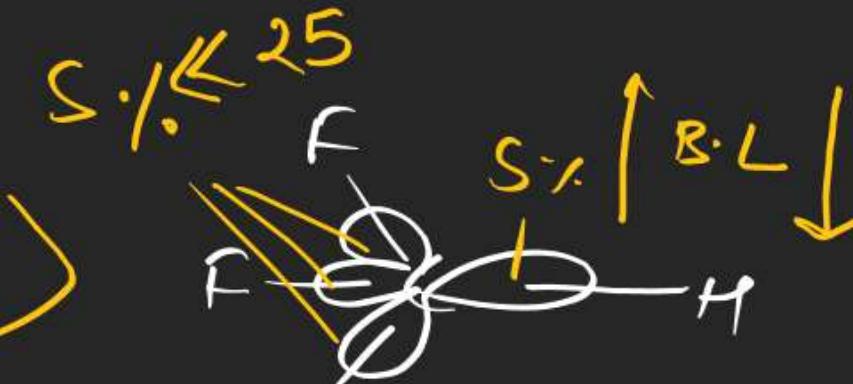
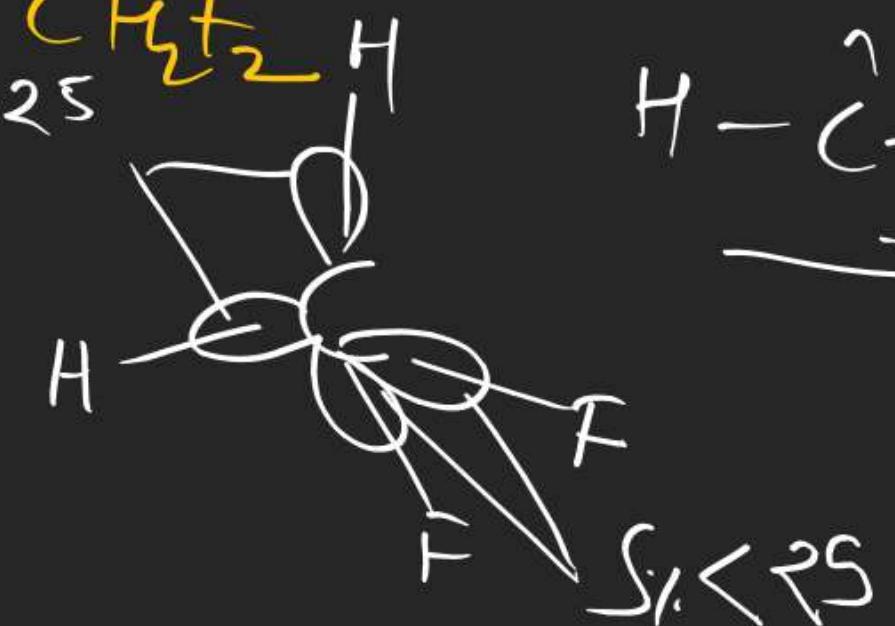
$$\left| \begin{array}{l}
 \cos Q = \frac{S}{S-1} \\
 \cos 90^\circ = \frac{S}{S-1} \\
 S = 0
 \end{array} \right| \begin{array}{l}
 \cos 120^\circ = \frac{S}{S-1} \\
 S = 33.33
 \end{array}$$

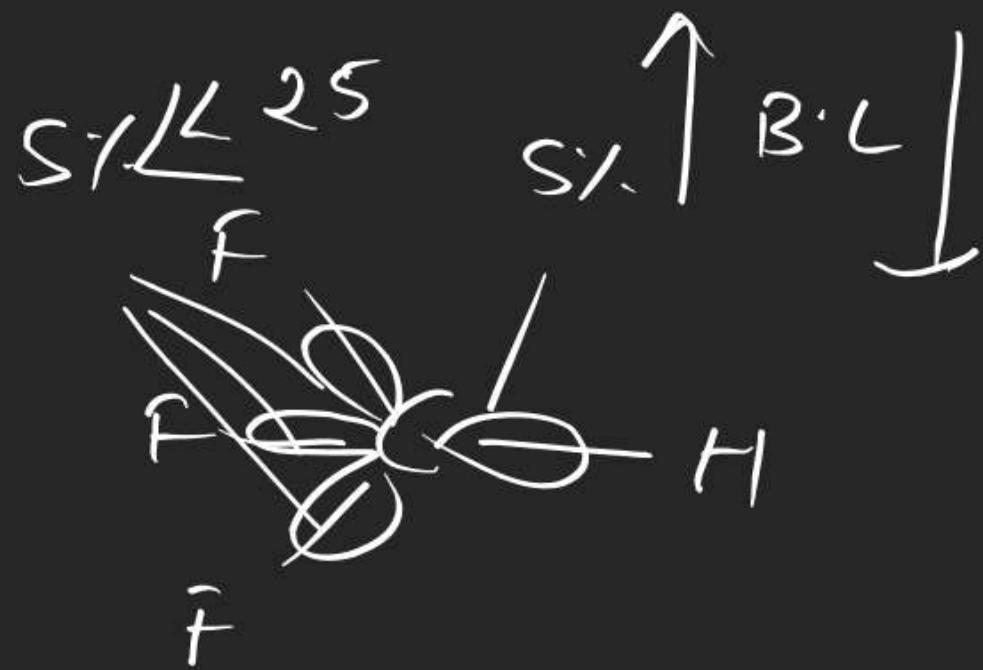
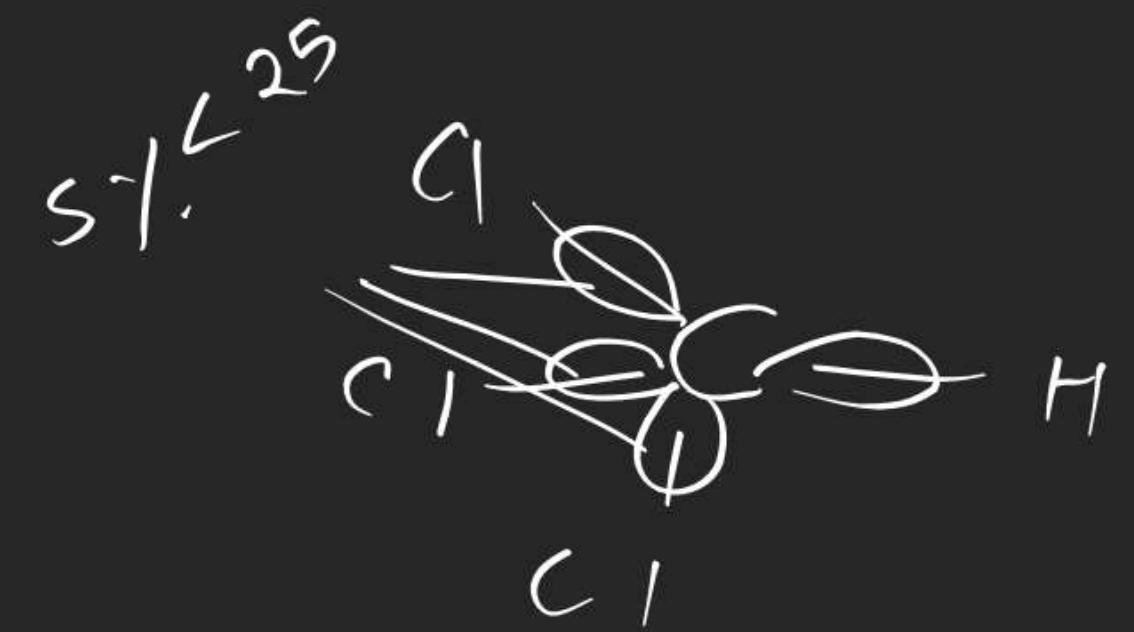
and Compare C-H B.L. in CHCl_3 and CHF_3



and Compare B.A.

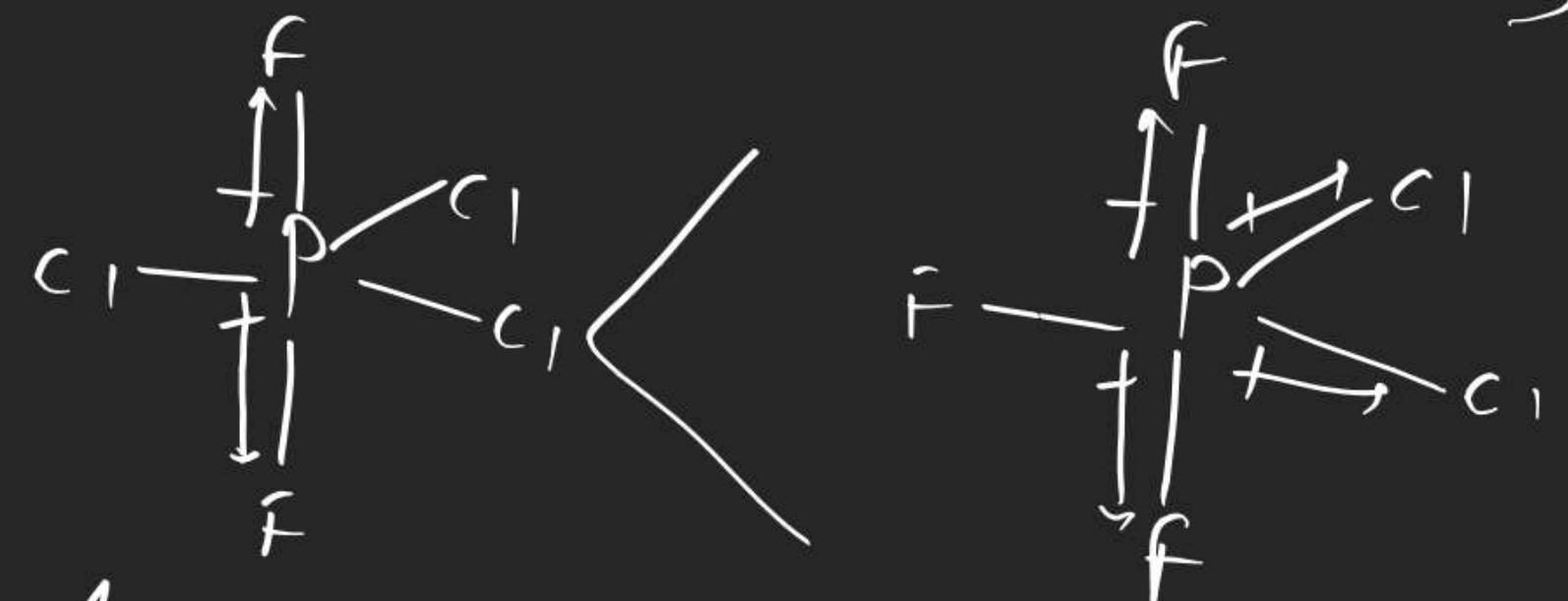
in CHF_2





one

Compare dipole moment of
 PCl_3F_2 and FCl_2F_3


$$\frac{\mu = 0}{\text{Non polar}}$$

$\mu \neq 0$ Polar