

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.

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

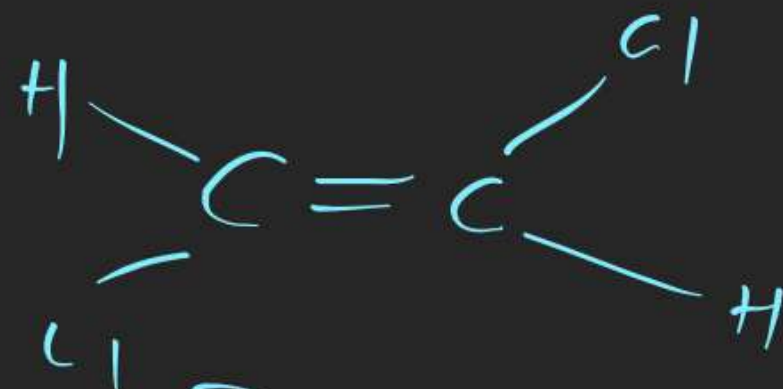
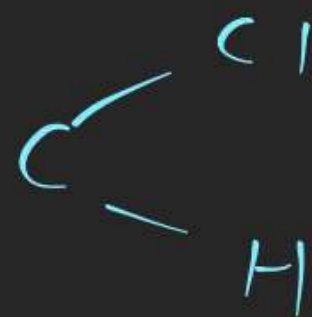
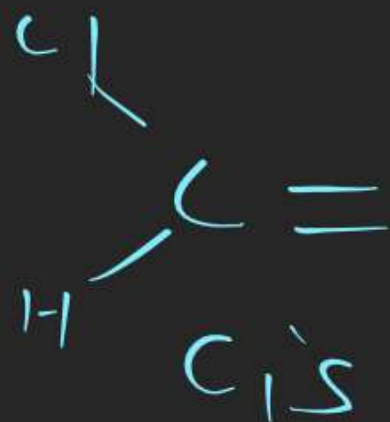
(A) cis > trans (B.P.)

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

(C) cis > trans (solubility)

~~(D) all of these~~

Packing



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

Trans
 $\mu = 0$, non polar
 L.D.F

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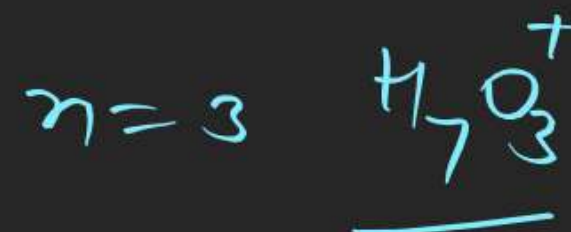
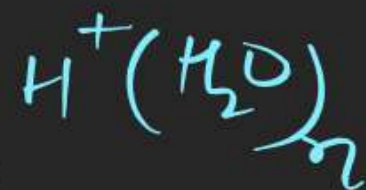
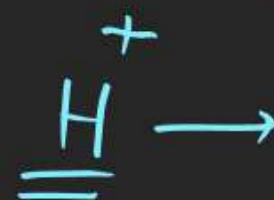
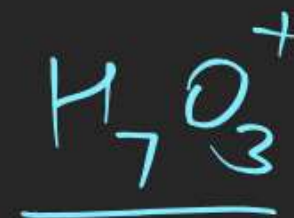
Q. Which of the following force of attraction is observed in H_7O_3^+

(A) dipole-dipole

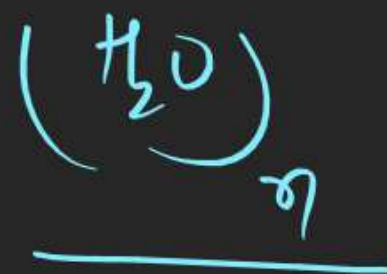
(B) ion-dipole

(C) H-bonding

(D) all of these



Ion-dipole



dipole-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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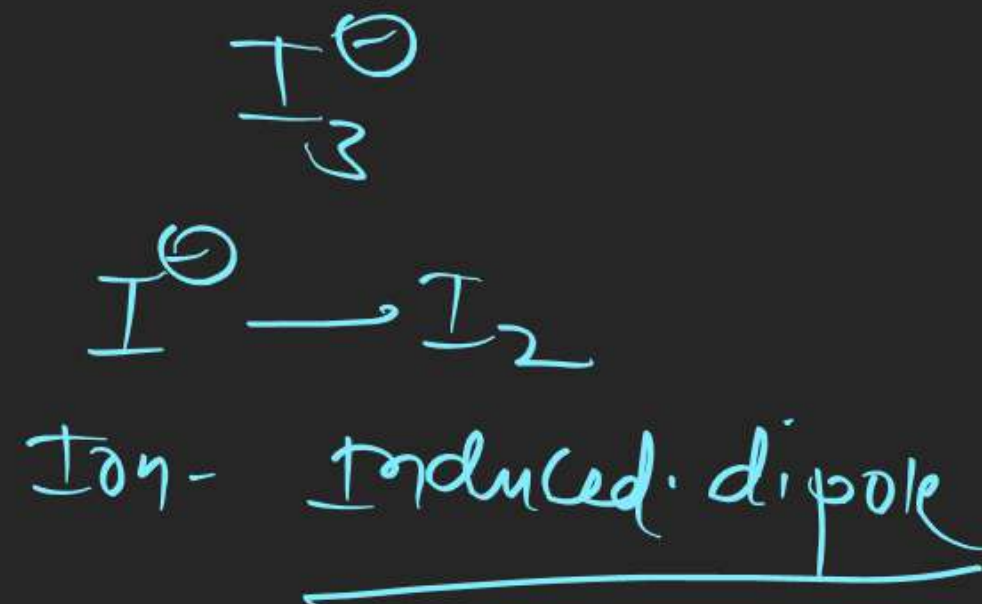
Q. The stability sequence of $\underline{\text{I}_3^-} > \underline{\text{Br}_3^-} > \underline{\text{Cl}_3^-}$ can be explained by

(A) Keesom force

(B) Debye force

(C) instantaneous dipole-induced dipole

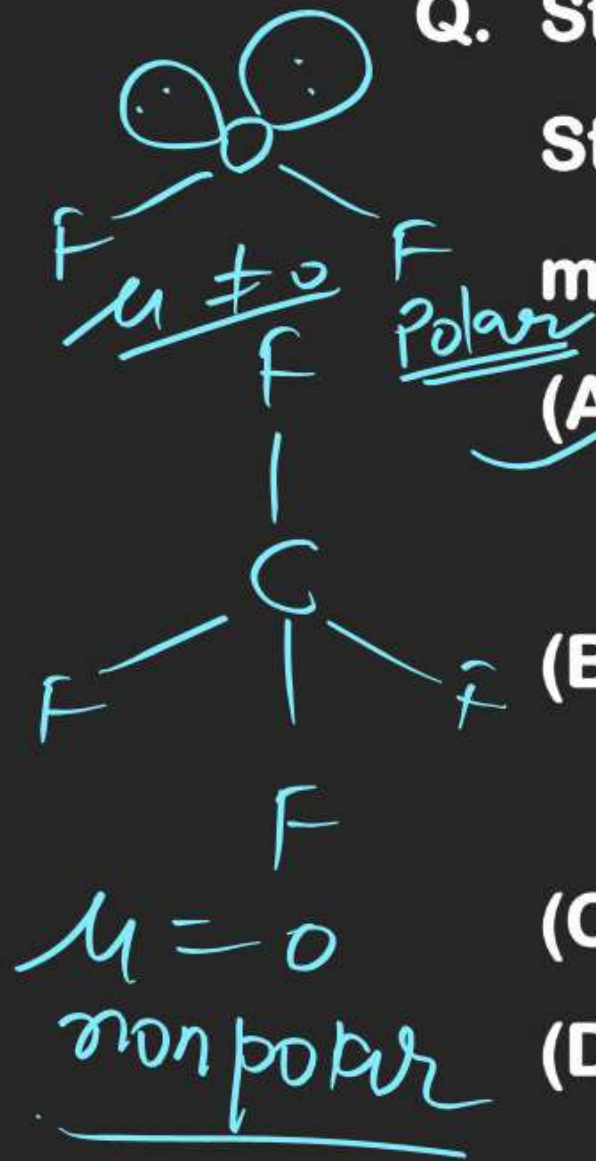
✓ (D) ion-induced dipole



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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 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.

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

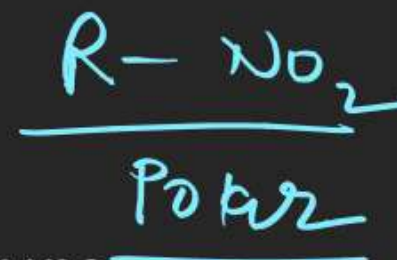
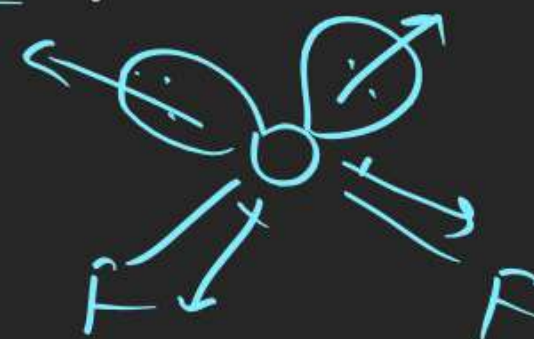
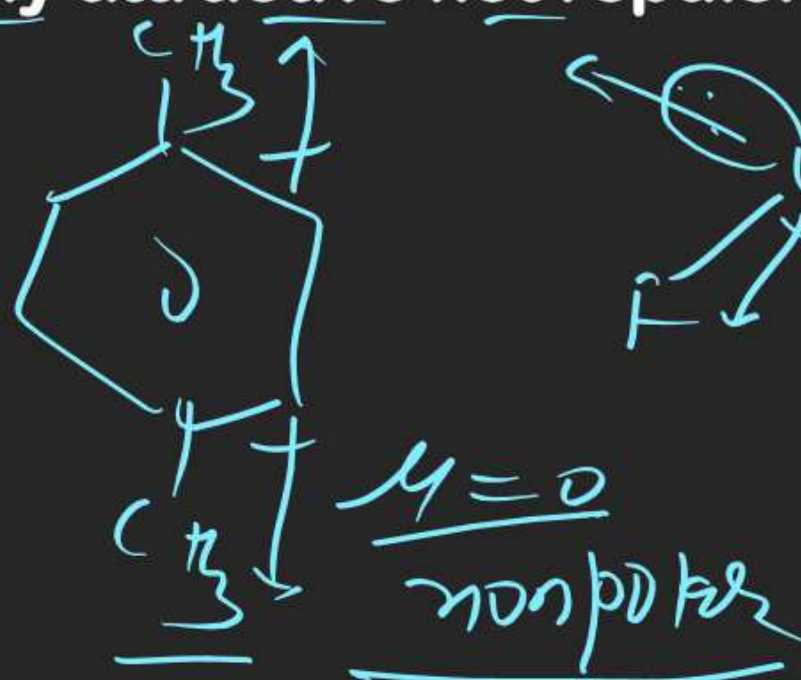
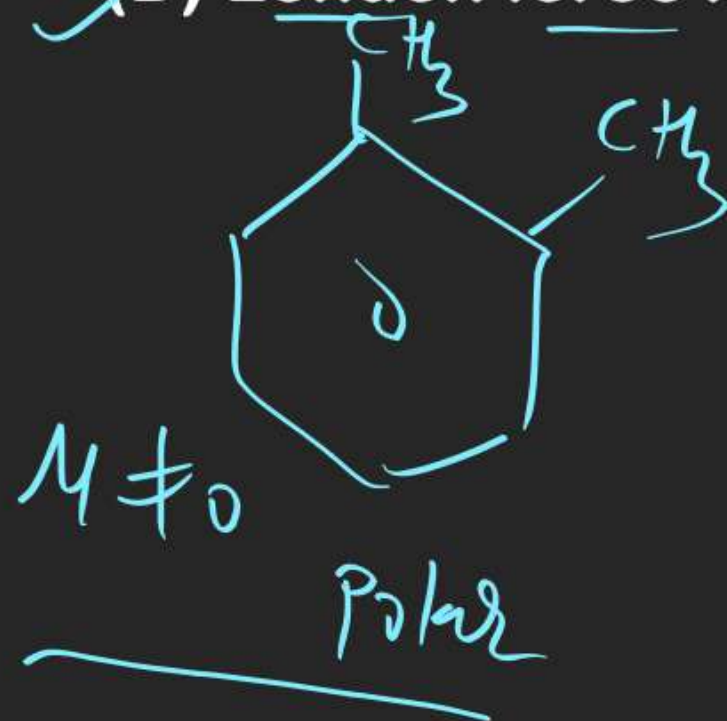
(D) Statement-1 is false, statement-2 is true.

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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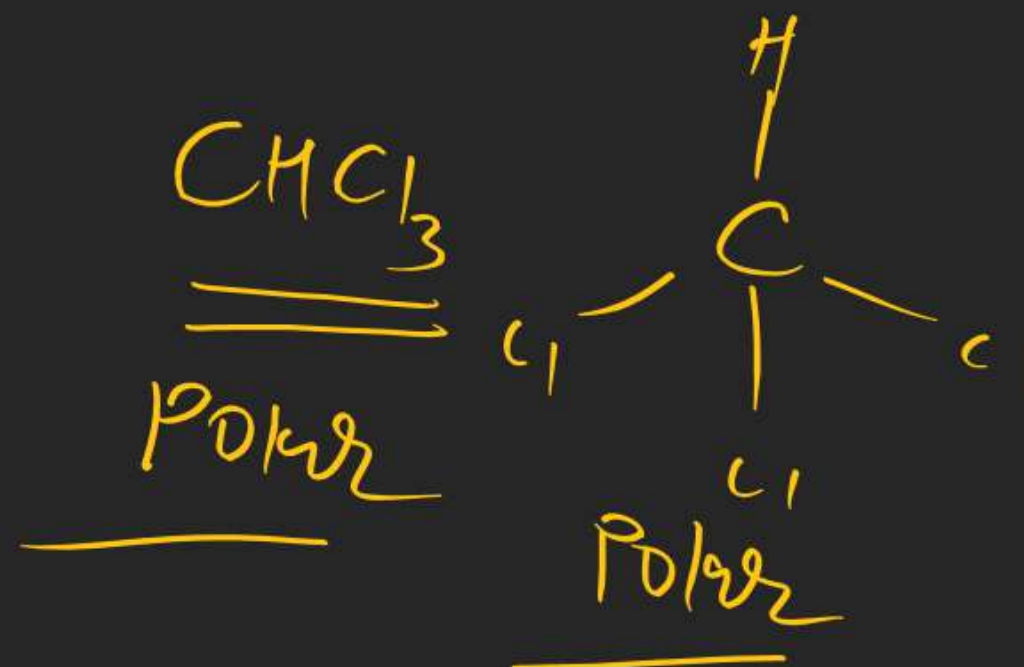
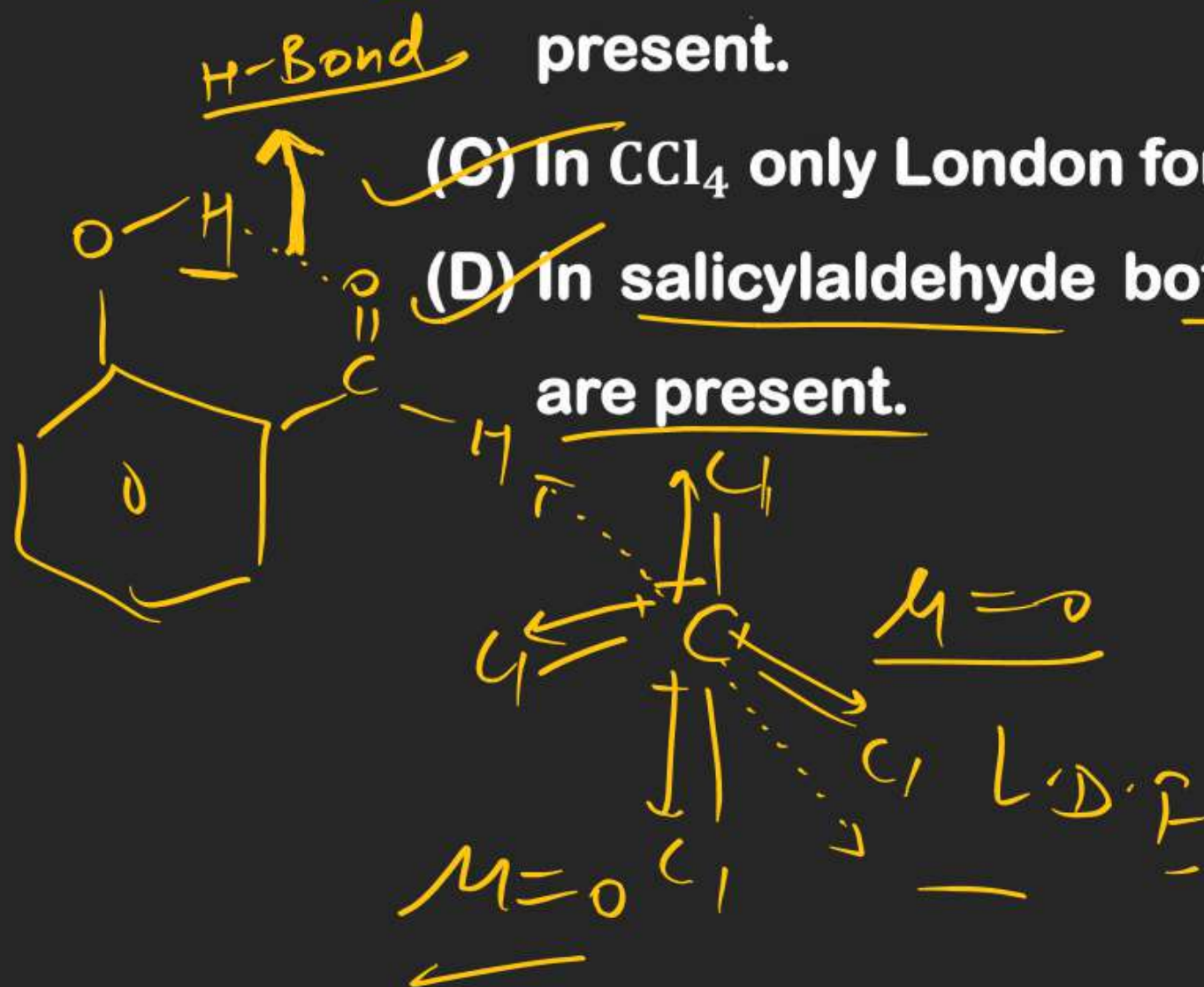
Q. Which of the following statement is CORRECT?

(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.



CHEMICAL BONDING

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



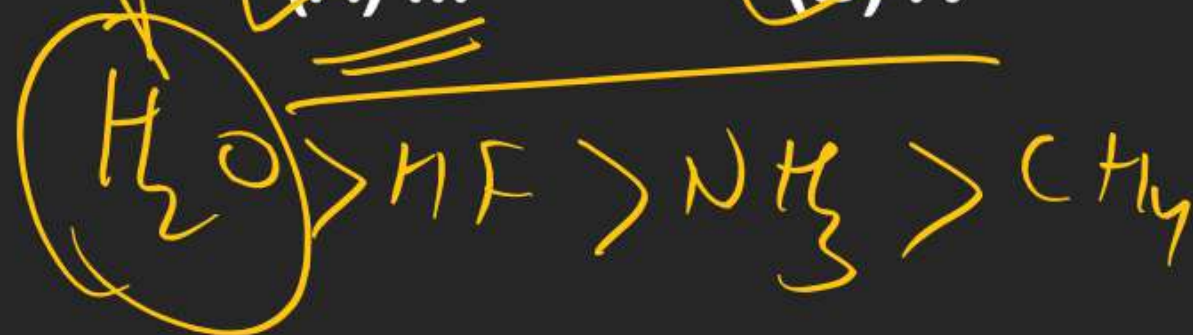
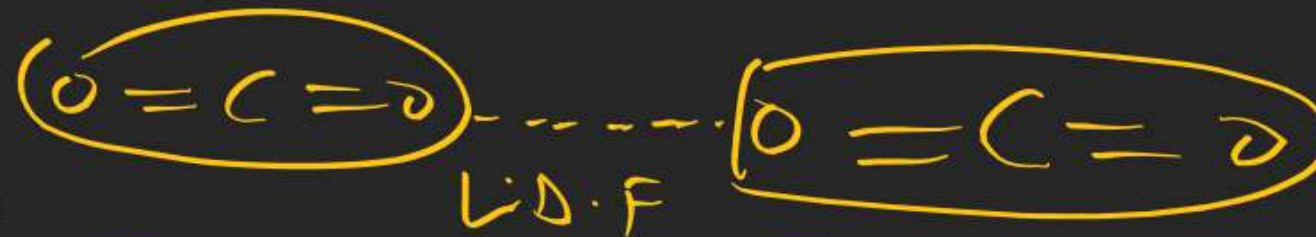
INCORRECT statement(s) out of the above will be

(A) III

(B) IV

(C) II

(D) I



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

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 $\propto \frac{1}{r^6}$

CHEMICAL BONDING

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

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

(B) $\text{H}_2 < \text{He}$ ✗

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

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

A C D

Ques What is the % of
s character in
 H_2O

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

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

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

$$s\% = 20\%$$

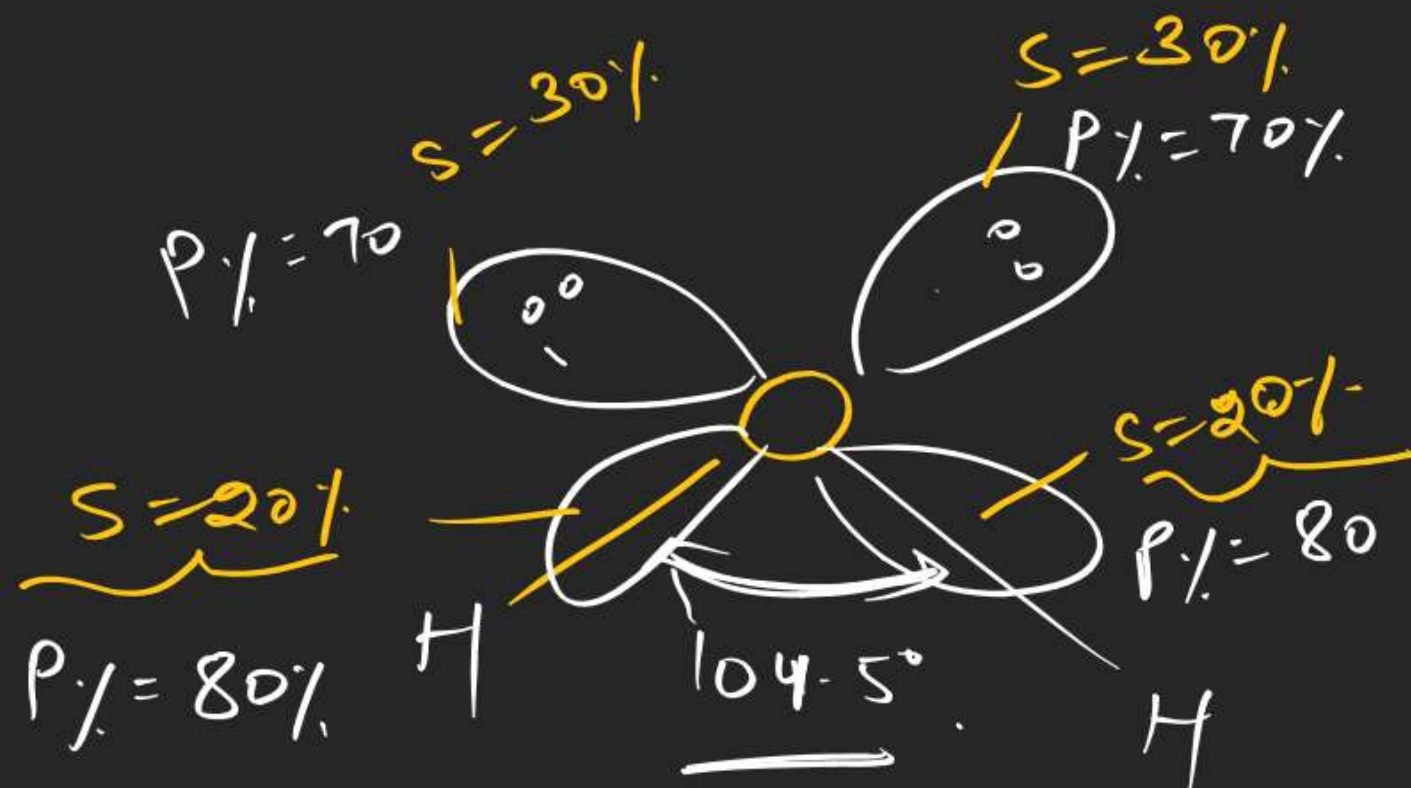


Ans What is
the hybridisation
of H_2O



$$s\% = 25\%$$

$$\cos 104.5^\circ = -0.25$$



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

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

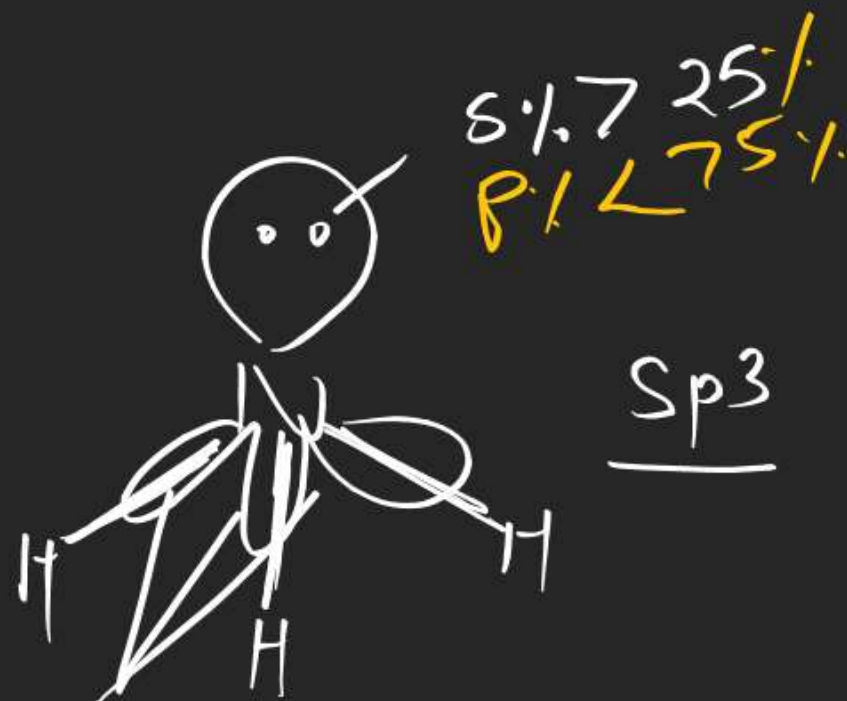
$$s = 20\%$$



l.p \rightarrow has higher s% character than bond pairs

$$\left\{ \frac{sp^3}{1} \times 100 \right\} = 25\%$$

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



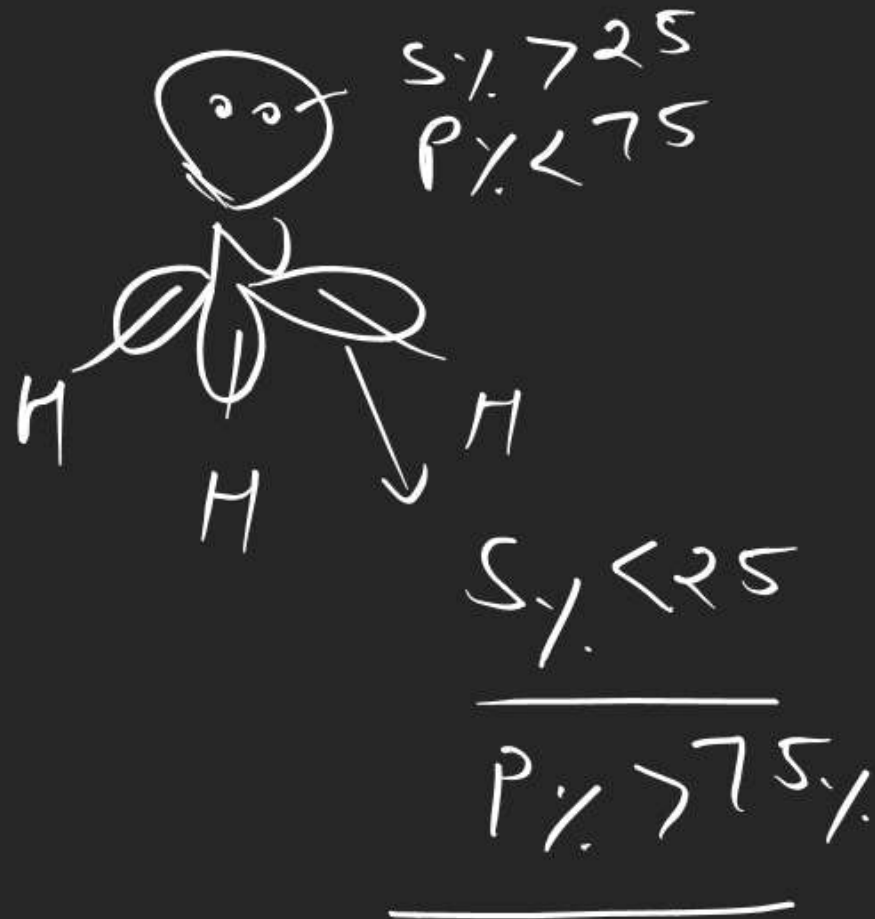
$$\underline{sp^4}$$

Ques What is the type of orbital of NH_3 having
l.p

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

Q. What is the hybridisation of orbital of NH_3 having bond pairs.

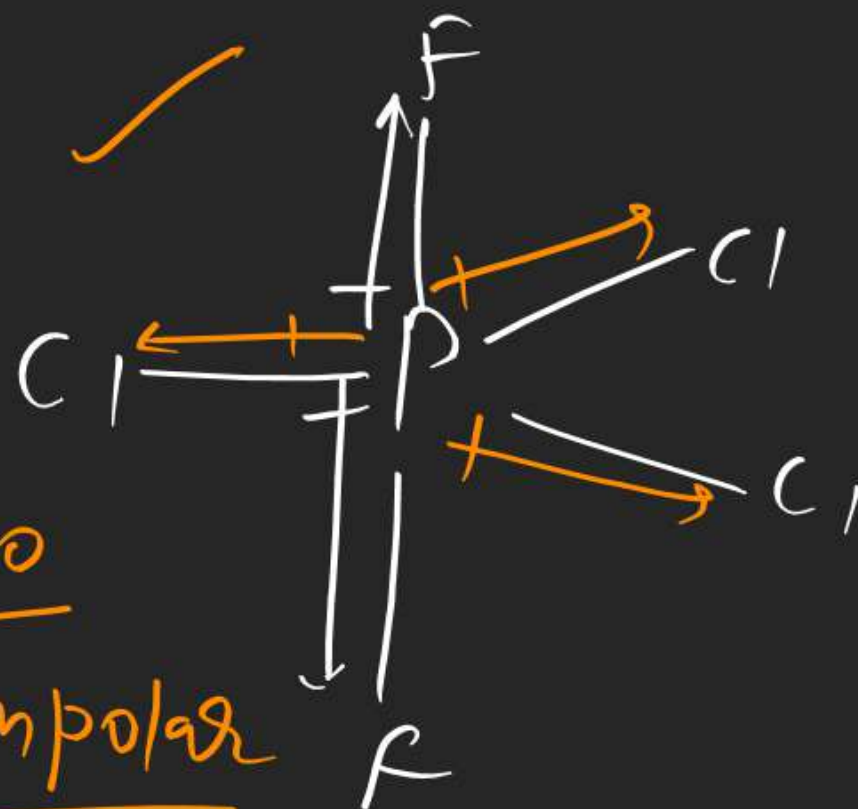
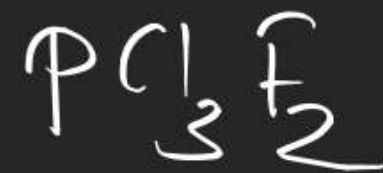
- (1) sp^2 (2) sp^3 (3) $sp^{3.14}$ (4) $sp^{2.86}$



Statement of Bent's Rule

When all surrounding atom attached with Central atom through single bond, then more s - p surrounding atom prefer to attach that Hyb. orbital which has less s character,

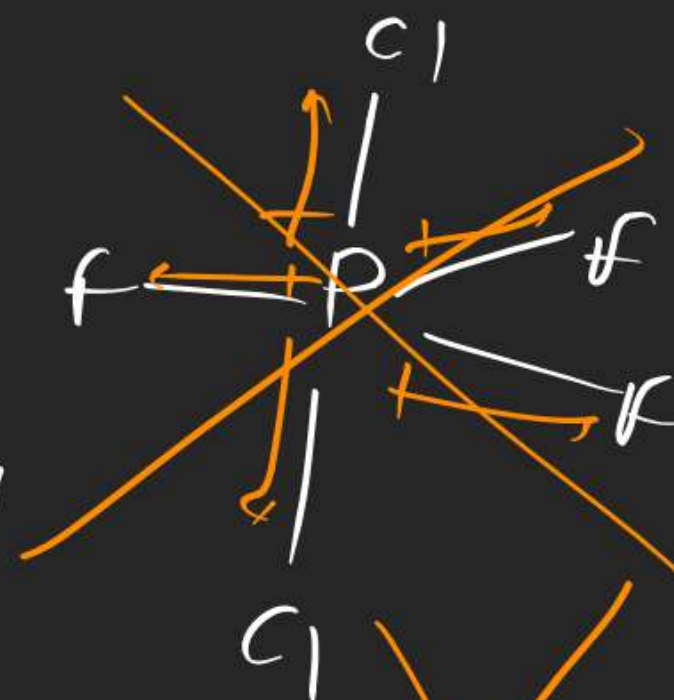
Note:- $l.p$ and multiple bond prefer to stay with that hybrid orbital which has $l.p$ has slightly more s character.



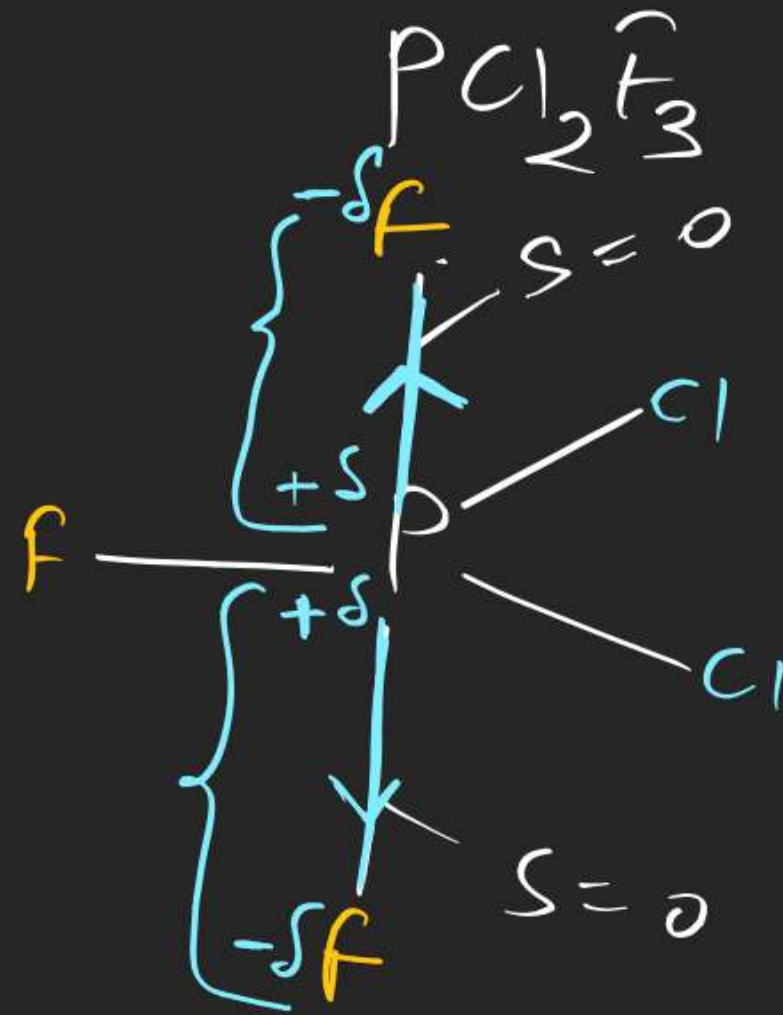
$$\mu = 0$$

non polar

$$\mu = 0$$

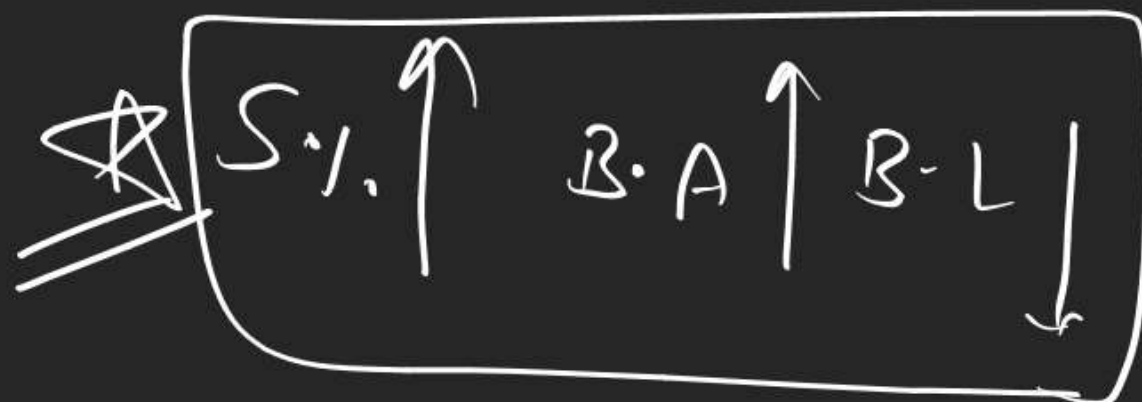
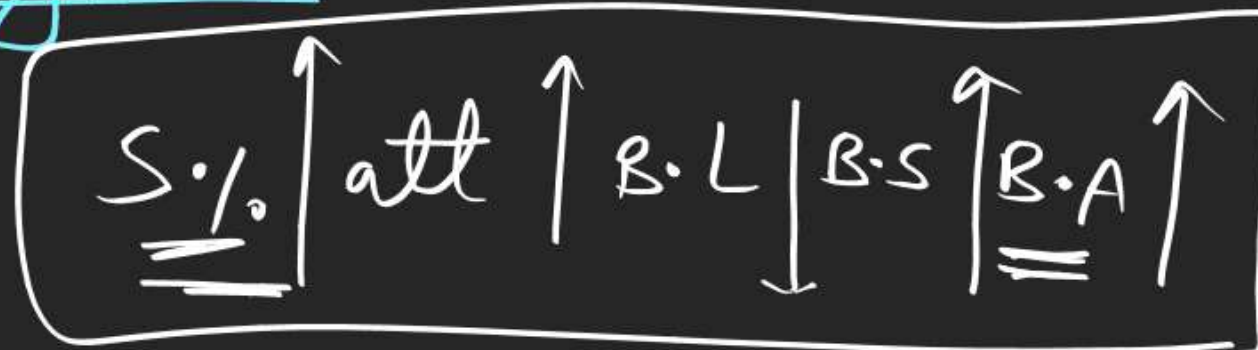


~~$\mu = 0$ non polar~~



Application of Bent's Rule

Key point \Rightarrow



$$\cos 0^\circ = \frac{s}{s-1}$$

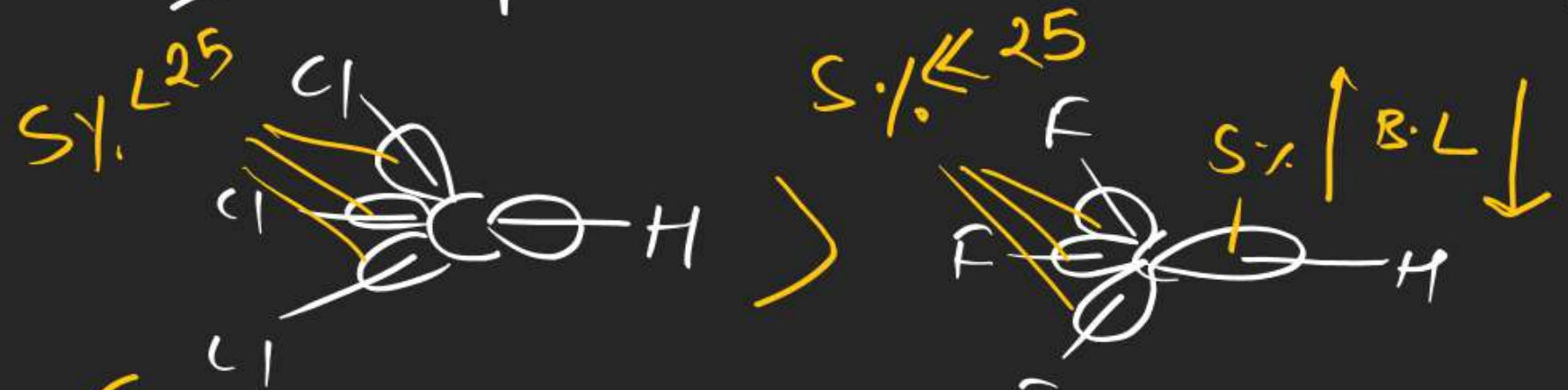
$$\cos 90^\circ = \frac{s}{s-1}$$

$$s = 0$$

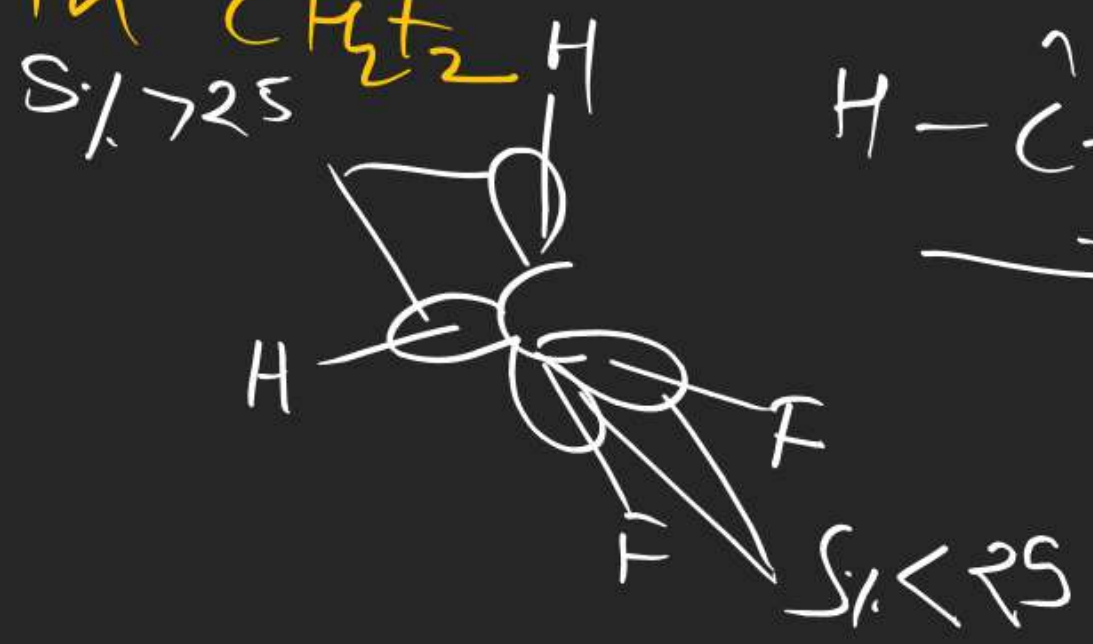
$$\cos 120^\circ = \frac{s}{s-1}$$

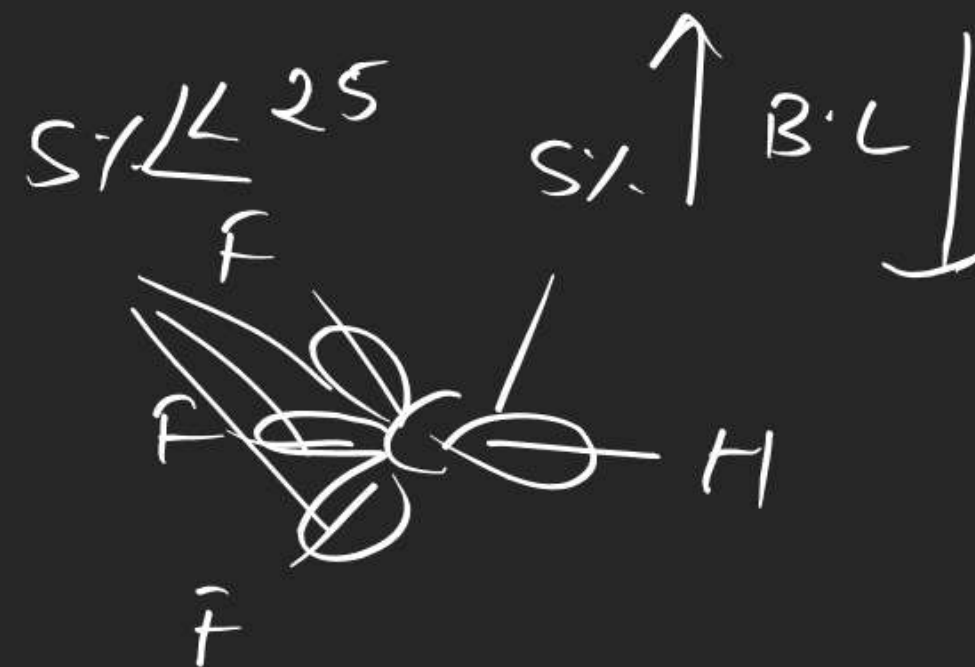
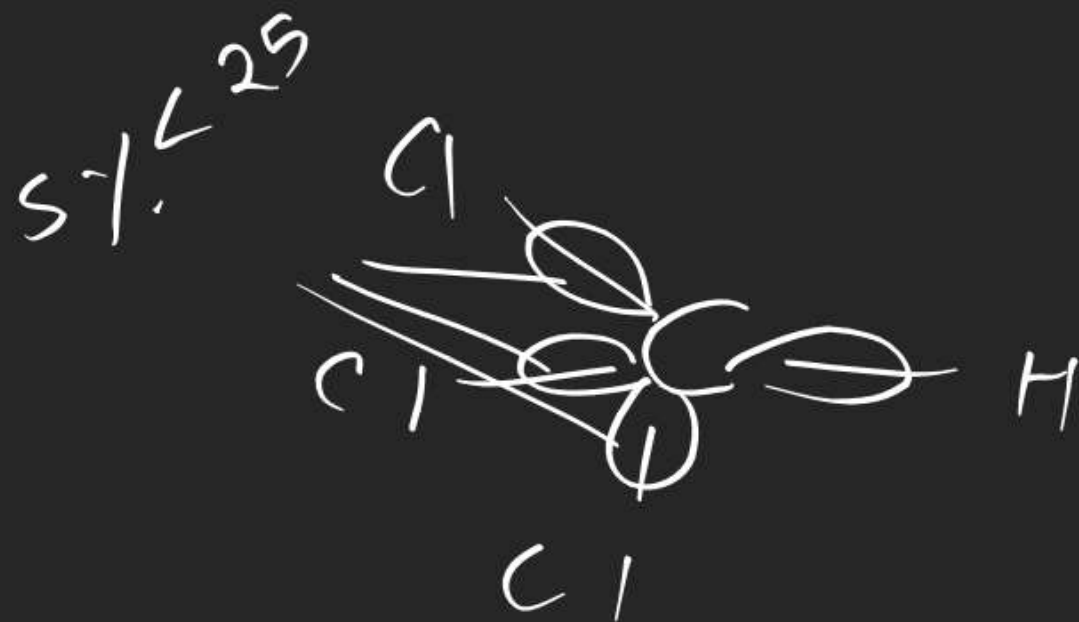
$$s = 33.33$$

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

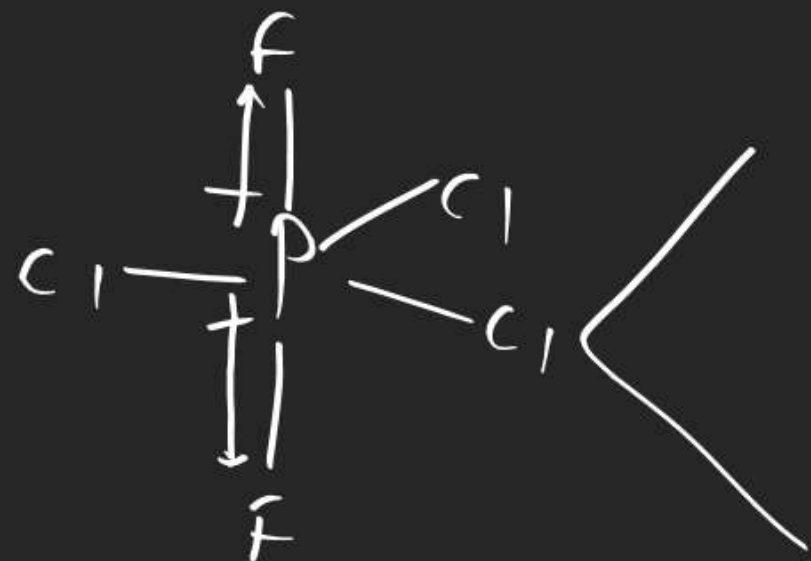


one Compare B.A in CHF_2



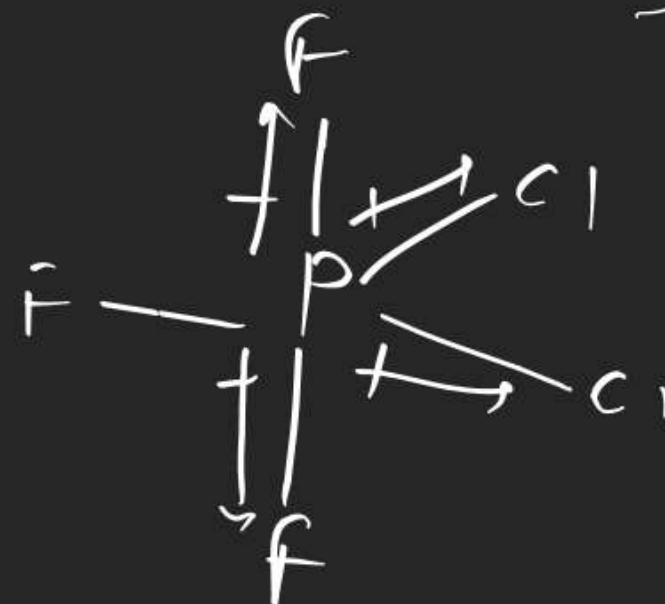


Ques Compare dipole moment of
 PCl_3F_2 and FCl_2F_3



$$\mu = 0$$

Non polar



$\mu \neq 0$ polar
