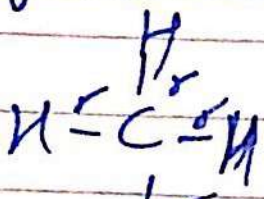
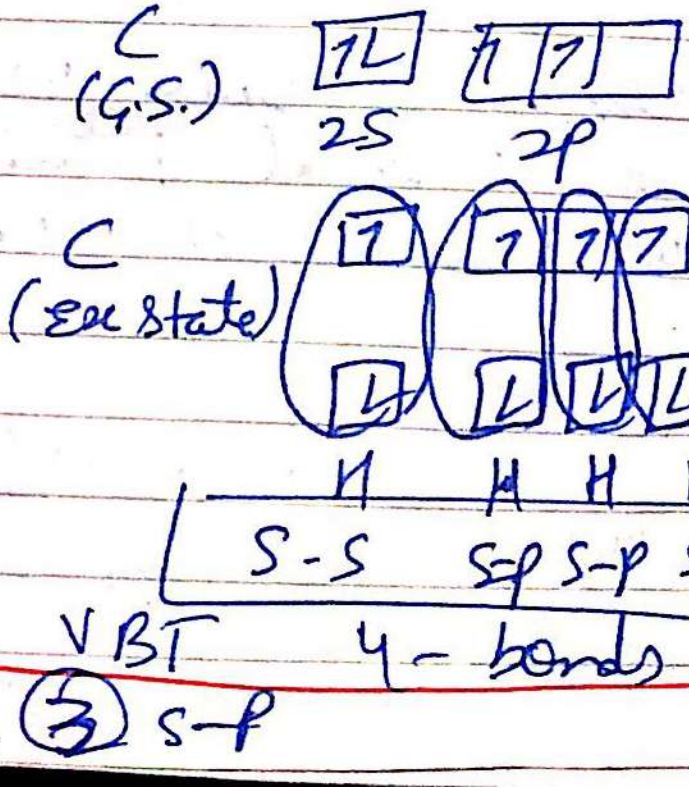
Hybridisation :- Pauling ACC. to VBT



$C \rightarrow 1s^2, 2s^2, 2p^2$



ACC to VBT 4 - bonds are diff types

(1) S-S, (3) S-P

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All four bonds of CH_4 are equivalent in all respects

{ B.E., B.L same }

C
G.S. [2s] [2p]

C
(excited) [2s] [2p]

energy nearly same s & p

[sp³] [sp³] [sp³] [sp³]

energy same

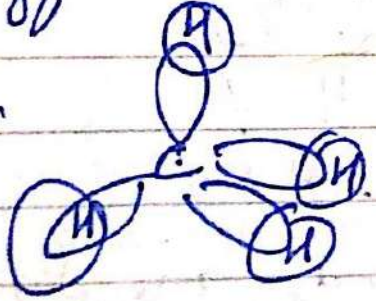
4 sp³

H
H — C — H
H

(4) S-sp³ hyb. orbital all 4-bonds are same

Atomic orbital of same or nearly same energy orbital intermix to give new orbital of exactly same energy

Td.



all 4-hyb. bonds repele to each other & take a geometry

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where repulsⁿ is min^m

Points of hyb.

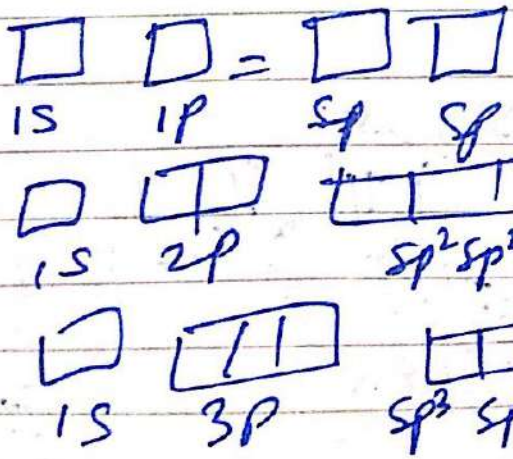
(1) Intermixing of Atomic orbitals of same or nearly same Energy to give new orbitals of exactly same energy

(2) Half filled orbital } all can undergo
coordⁿ Empty orbital } hybridizatⁿ
l.p. fully filled "

(3) no. of Hyb orbital = no. of intermixing orbital

(4) concept of Hybridizatⁿ is for σ b.p. (Single) bond.
π-bond is not related to hyb.
(σ bond making orbital involves in hyb.)

(5) Hyb. orbitals are named after the Parent orbitals.



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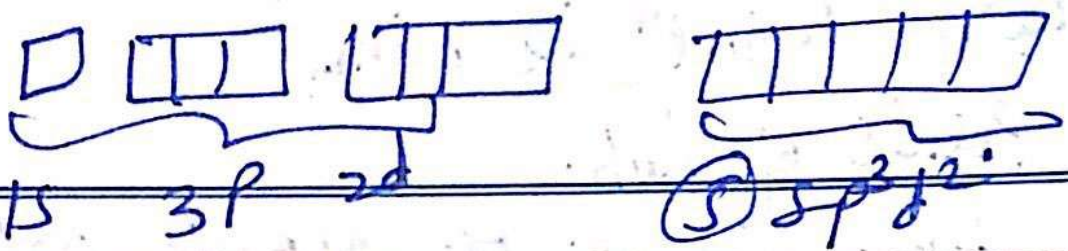
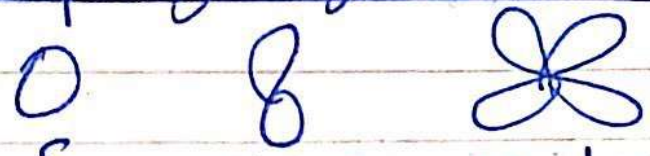


1s 3p 2d (5) sp^3d^2

Shape of hyb. orbital



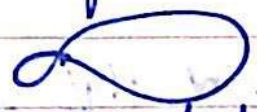
S P d

Round double double

Hyb. orbital

sp, sp^2, sp^3

Same Shape



Hyb lobe.

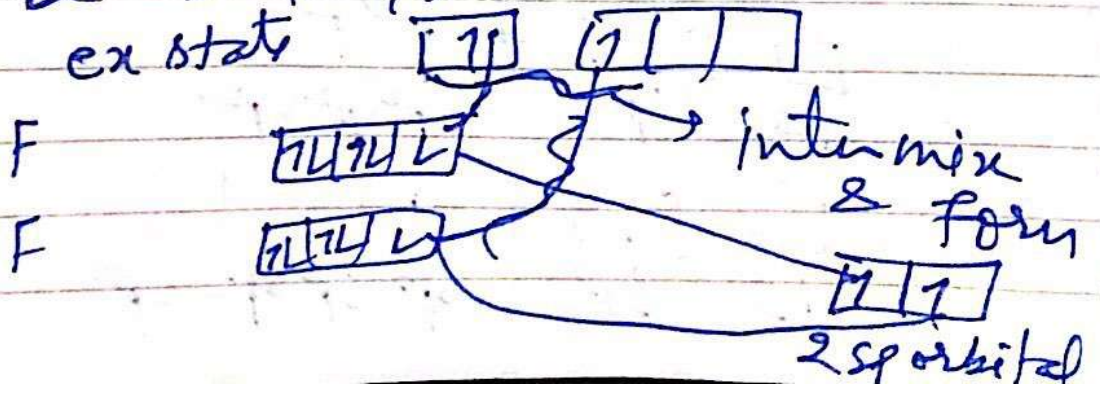
* Hyb orbitals orientate such that repulsn bet^n them is minm so Stability ↑ (or), Hybridizat^n gives Geometry of Compd

Types of Hybridizat^n / Geometry

Eg BeF_2

Be → $1s^2, 2s^2$

ex state



F

F

intermix & form

2 sp orbital

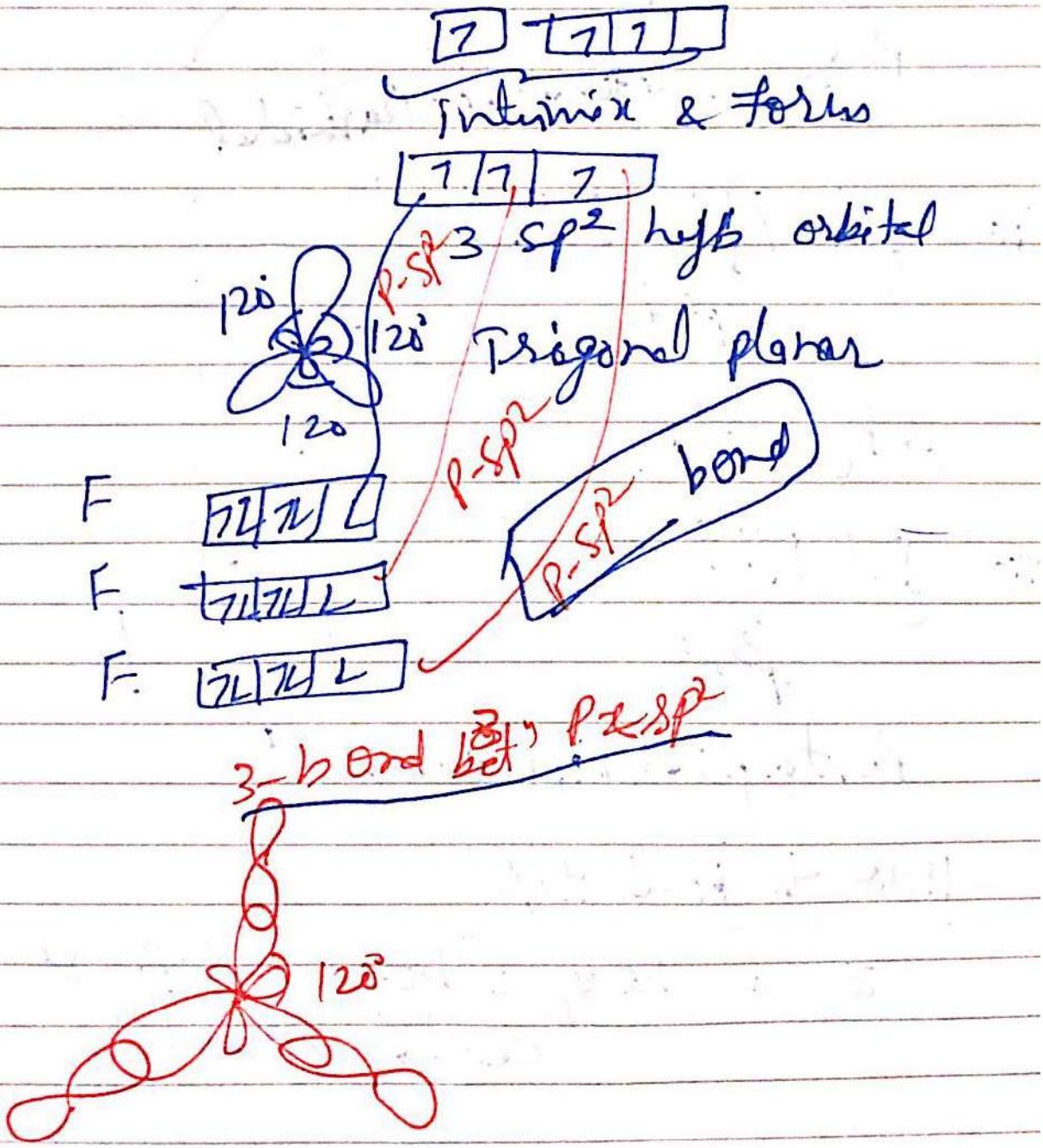
② P- sp^2 bond

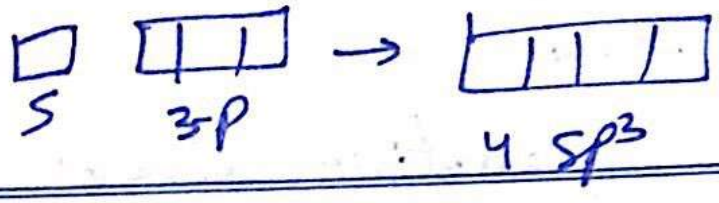
sp hyb geometry linear

$BeCl_2$, $BeBr_2$

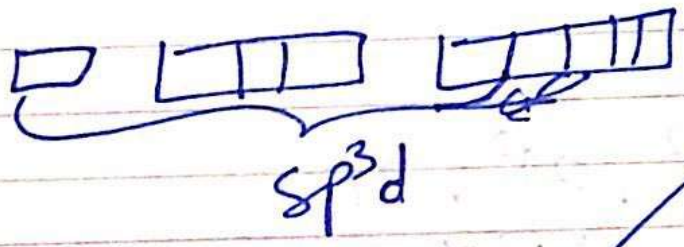
Eg BCl_3

B $1s^2, 2s^2, 2p^1$

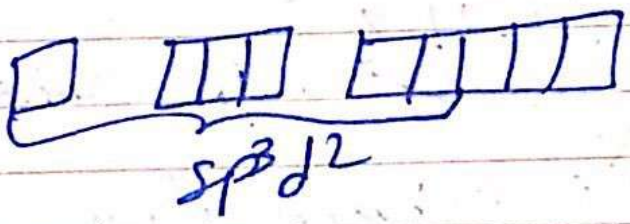


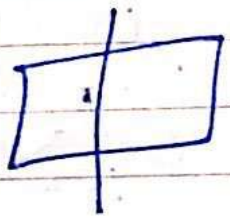


eg CH₄

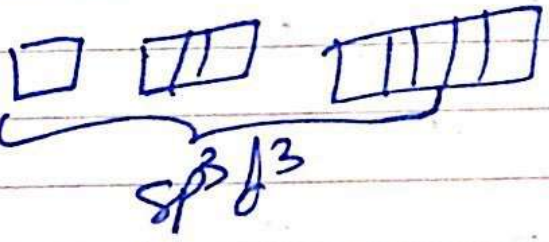


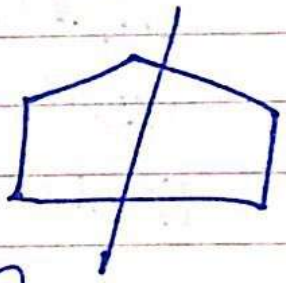
PCls Trigonal bipyramidal





SF_6 oh





Pentagonal bipyramidal

How to find Hyb.

Z = no of σ bond + l.p. of central atom.

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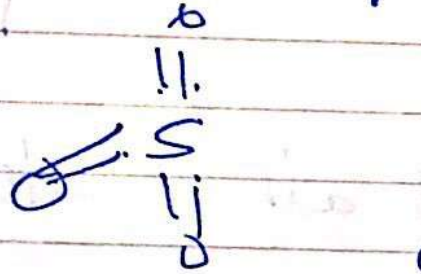
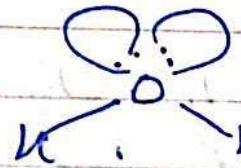
Z =	
2	sp
3	sp^2
4	sp^3
5	sp^3d
6	sp^3d^2
7	sp^3d^3

SO_3



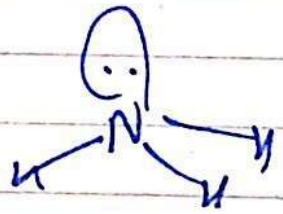
Z = 3 sp^2

H_2O



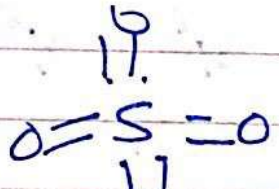
sp^3 Td

#



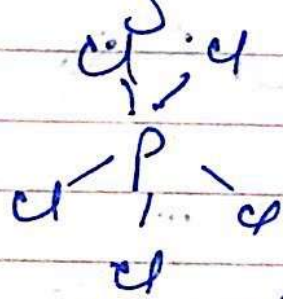
sp^3 Td

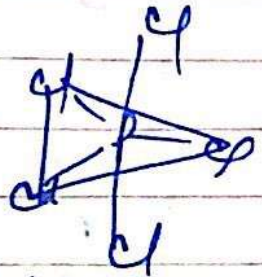
SO_4^{-2}



Td

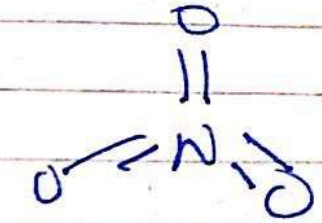
PCl_5





Trigonal bipyramidal

NO_3^-



sp^2 Trigonal planar

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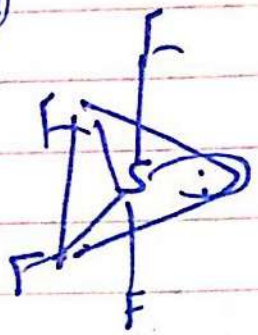
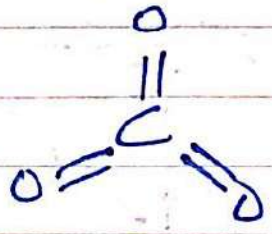
H_2S  sp^3 Td

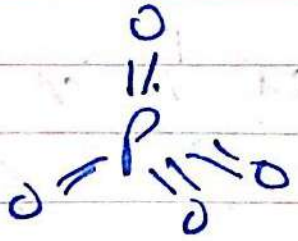
SF_4  sp^3d 

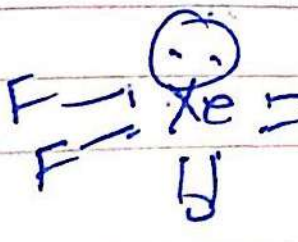
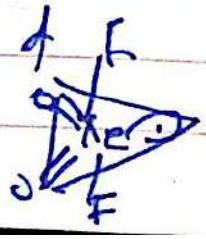
Find Hyb. of all C-atoms in the given molecule

$H_2C = CH - C \equiv C - CH = CH_2$
$sp^2 \quad sp^2 \quad sp \quad sp \quad sp^2 \quad sp^2$

$CH_3 \quad H_3C - HC = CH_2$
$sp^3 \quad sp^2 \quad sp^2$

CO_3^{-2}  sp^2

PO_4^{-3}  sp^3

XeO_2F_2  sp^3 

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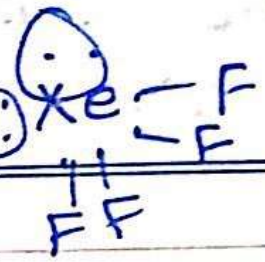
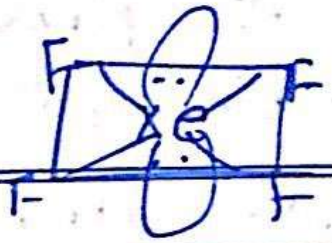
XeF_4

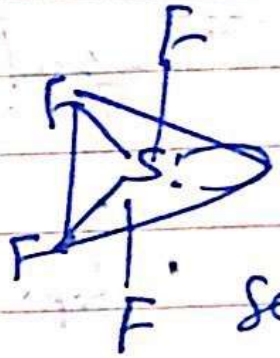
sp^3d^2





SF_4

sp^3d



See-saw

Sn

Si in SiF_4

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