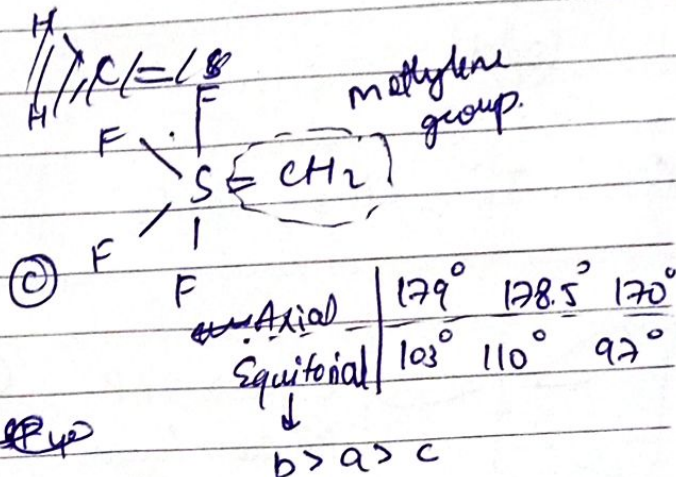


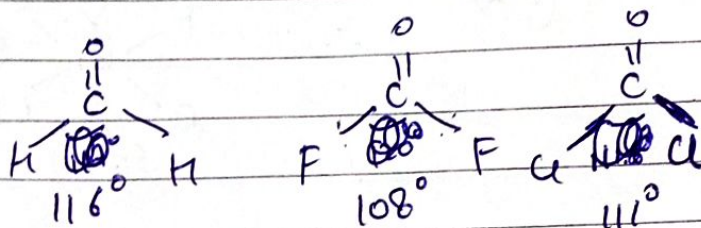
✓ F-S-F (equatorial)

(a) SOF_2 (single bond to O)
 (b) SOF_2 (double bond to O)

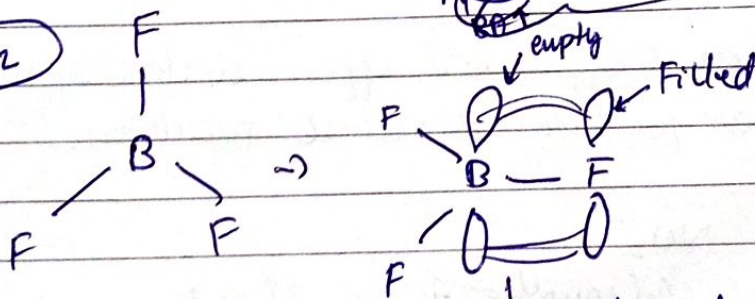
as $\text{S} = \text{O}$ bond is double bond.

 ~~$\text{COF}_4 + \text{CH}_2 = \text{CF}_4 + \text{CF}_4$~~

(0.34)


$$\begin{aligned} \text{EN})_C &= 2.55 \\ Q &= 3.16 \\ F &= 3.98 \\ H &= 2.2 \end{aligned}$$
$$a > c > b$$

Arshad Sir
Tut 2
(cls 35)


$$B: 2s^2 2p^1$$

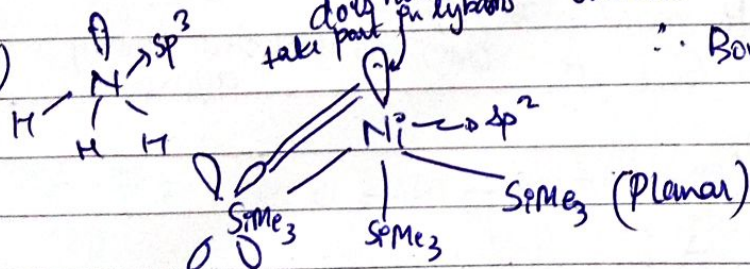
$$F: 2s^2 2p^5$$

Symmetry & same energy.

partial double bond character \Rightarrow p π -p π induction

∴ Bond is shorter.

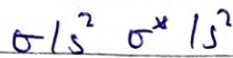
(0.36)



π - π back bonding \Rightarrow double bond character.

$\{e^- > 14 \Rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p_z^2, \pi 2p_x^2 = \pi 2p_y^2, \pi^* 2p_x = \pi^* 2p_y, \sigma^* 2p_z, \sigma 3s^2\}$
 $\{e^- \leq 14 \Rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \pi 2p_x = \pi 2p_y, \sigma 2p_z, \pi^* 2p_x = \pi^* 2p_y, \sigma^* 2p_z\}$
 ↳ Homonuclear diatomic ↳ due to s-p mixing (similar orientation)

(Q:37) $He_2 \Rightarrow 4e^-$



$$B.O. \Rightarrow \frac{N_B - N_{AB}}{2} = \frac{2 - 2}{2} = 0$$

(Q:38) CO^+, CO^{2+}

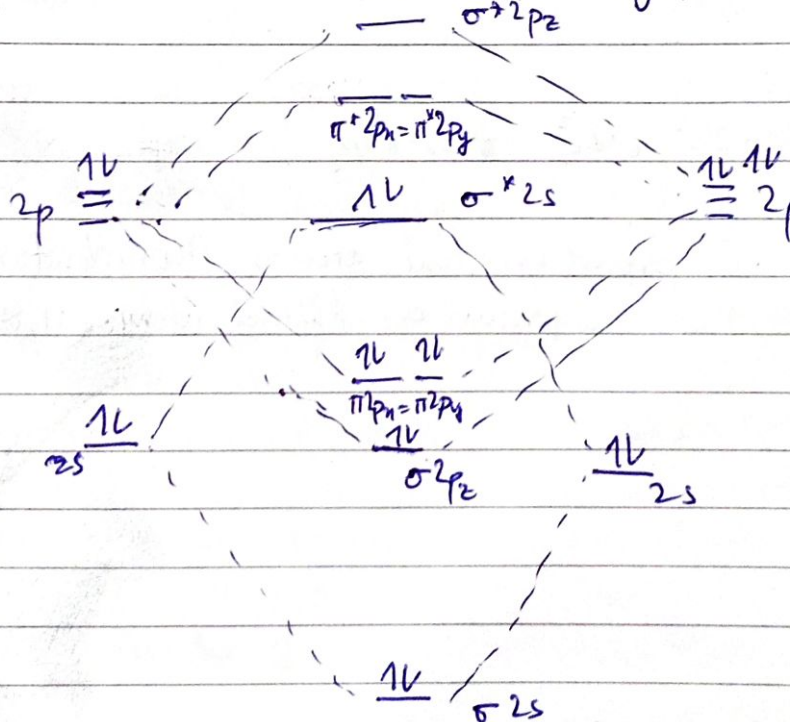
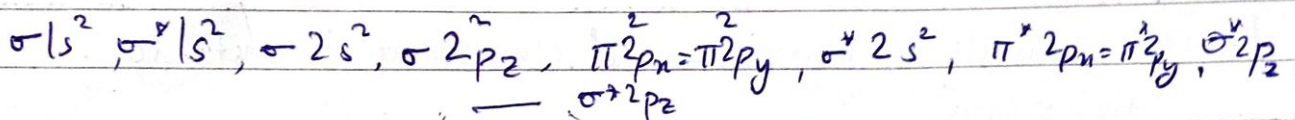
↳ heteronuclear molecule

$CO \Rightarrow 6+8=14$

↳ Above e^- configⁿ can be used for molecules like NO, CN, CN⁻ etc.

$CO \Rightarrow$ An Exception!

↳ But



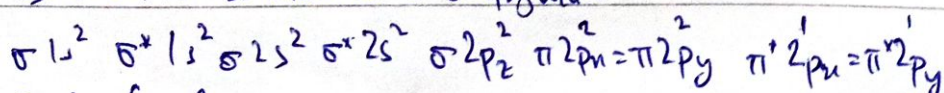
Reason?
↓

$$B.O. \Rightarrow CO : \frac{10 - 4}{2} = 3$$

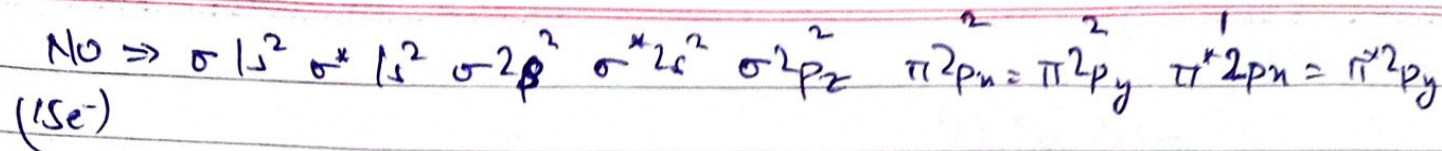
$$CO^{2+} \Rightarrow \frac{10 - 2}{2} = 4$$

$$CO^+ : \frac{10 - 3}{2} = 3.5$$

(Q:39) $NO^- \Rightarrow 7+8=15 \Rightarrow$ Normal e^- configⁿ:



$$B.O. = \frac{10 - 6}{2} = 2$$



$$\text{B.O.} \Rightarrow \frac{10 - 5}{2} = 2.5$$

$$\text{B.O.} : \text{NO} > \text{NO}^-$$

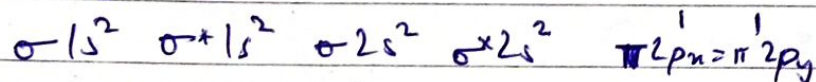
(2.5) (2)

(ii) \Rightarrow Bond length $\Rightarrow \text{NO} < \text{NO}^-$

(iii) $\text{NO}^- \Rightarrow 2$ unpaired e⁻

(iv) B.O. will be centered on more electronegative atom, i.e. O₂.

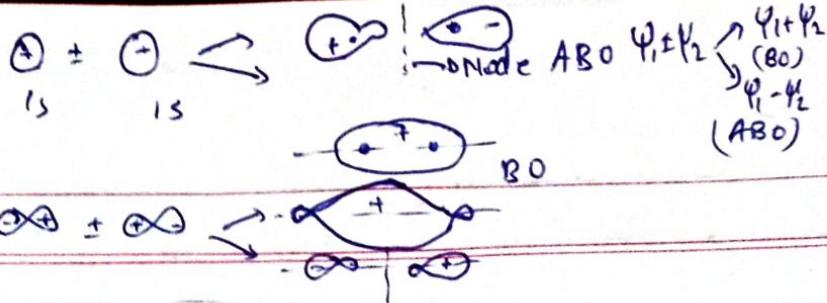
(Q:40) Denticity \Rightarrow No. of lone pairs can donate to metal ion.



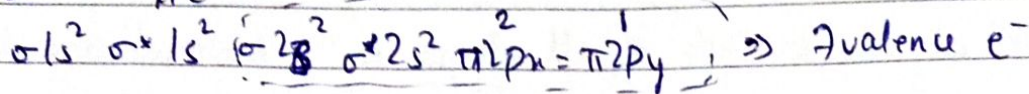
[without MO theory]

As both l.p. are present on same atom \Rightarrow Monodentate. As in multi dentate, l.p. are present on different atoms. ($\text{H}_2\text{N}-\text{NH}_2$)

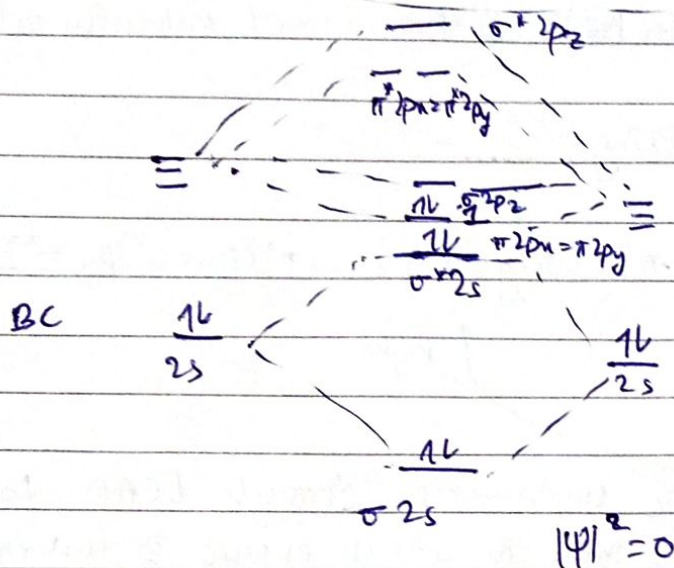
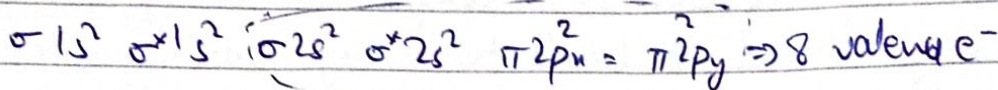
38, 1, 40, 41 → iii



(Q: 41) $\text{BC} \Rightarrow 11e^-$

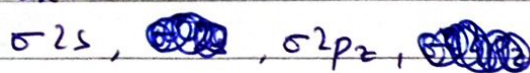


$\text{BC}^- \Rightarrow 12e^-$



(iii) Only π orbitals have planar nodes at internuclear axis (bonding axis)

\therefore Following orbitals do not have nodal planes along bonding axis:



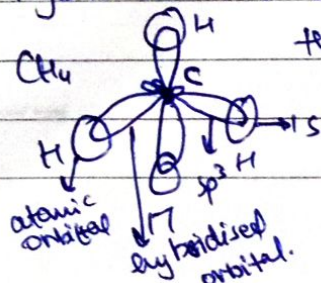
All π MOs &
 $\sigma^* \text{MO}$ have nodal plane

(iv) B.O: $\text{BC} \Rightarrow \frac{8-4}{2} = 1.5$

$\text{BC}^- \Rightarrow \frac{8-4}{2} = 2$

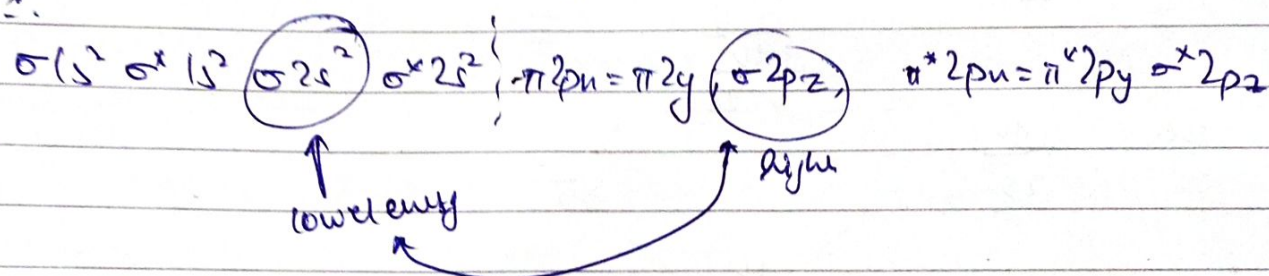
Stronger bond: $\text{BC}^- > \text{BC}$

(Q: 42) Hybrid orbital \Rightarrow Only central atom's atomic orbitals are mixed while the bonded atoms are present in atomic nature/form.



M.O \Rightarrow All atomic orbitals of all atoms in a molecule are mixed.

Q:43) When s & p orbitals with comparable energy & sufficient symmetry interact, it leads to change in expected order of orbital energies (MOs) of the formed molecular orbitals of molecules with $e^- \leq 14$ suffer s-p mixing.



$\sigma 2s$ & $\sigma 2p_z$ undergo combination through LCAO to form modified $\sigma 2s$ & $\sigma 2p_z$ MOs in which energy of lower energy orbital ($\sigma 2s$) is further lowered & energy of higher energy orbital ($\sigma 2p_z$) is further increased.

sp. mixing is significant for molecules with $e^- \leq 14$.