Daily Tutorial Sheet-10	Level - 2

116.(D) For $p\pi - p\pi$ bonding to occur, following conditions should be satisfied.

→ The acceptor atom must have an empty p orbital

→ The p orbital of both atoms must be of comparable energy

In case of NF_3 and NI_3, N does not have any empty p orbital. Therefore, no $p\pi - p\pi$ bonding occurs.

But B has an empty p - orbital.

In BI_3, we have 2p orbital of B which is much lesser in energy as compared to 5p orbital of I. So, no $p\pi - p\pi$ bonding occurs.

117.(A) $XeOF_2 \rightarrow$ Hybridsation = 5 $\rightarrow sp^3d$

So, one d-orbital is involved which is dz^2.

If hybridization is sp^3d^2, then d_{z^2} and $d_{x^2-y^2}$ both are involved. Eg. In SF_6

118.(B) $C_2 \longrightarrow$ Bond Order = 2 and diamagnetic

$C_2^+ \longrightarrow$ Bond Order = 1.5 and paramagnetic

$NO \longrightarrow$ Bond Order = 2.5 and paramagnetic

$NO^+ \longrightarrow$ Bond Order = 3 and diamagnetic

$O_2 \longrightarrow$ Bond Order = 2 and paramagnetic

$O_2^+ \longrightarrow$ Bond Order = 2.5 and paramagnetic

$N_2 \longrightarrow$ Bond Order = 3 and diamagnetic

$N_2^+ \longrightarrow$ Bond Order = 2.5 and paramagnetic

119.(C) Molecular hydrogen → H_2 – 2 electrons – diamagnetic

Molecular nitrogen → N_2 – 14 electrons – diamagnetic

Molecular oxygen → O_2 – paramagnetic

120.(B) $N_2 : KK^* \; LL^* (\pi 2p_x)^2 (\pi 2p_y)^2 (\sigma 2p_z)^2$

So, in N_2^+, the last electrons goes from the last occupied MO i.e. $(\sigma 2p_z)$

121.(B) $H_2 : (\sigma 1s)^2$ Bond Order = 1 ; $H_2^+ : (\sigma 1s)^1$ B.O. = 0.5

Stability of a molecule $\propto$ Bond Order or No. of electrons in bonding MOs

Also, Bond Energy $\propto$ Bond order

Molecule does not exist when bond order is zero.

Since B.O. Of H_2^+ is 0.5, therefore, it exists and has a +ve bond dissociation energy.

Also, in case of H_2, two electrons are shared as compared to only one electron in H_2^+.

$\therefore$ Electron density in case of H_2 will be higher.

122.(ABC) $C_2^+ \longrightarrow$ B.O. = 1.5, Paramagnetic ; $O_2^- \longrightarrow$ B.O. = 1.5, Paramagnetic

$NO \longrightarrow$ B.O. = 2.5, Paramagnetic ; $CO \longrightarrow$ B.O. = 3 , Diamagnetic

123.(D) Bond strength $\propto$ Bond order

124.(C) Bond Order = $\frac{N_b - N_a}{2}$

Bond order of NO_+^- = 2

NO^+ = 3

NO = 2.5

N_2 = 3

NO^{2-} = 1.5

125.(C) H_3PO_4 has intermolecular H-bonding