LEVEL-1.

Q.1. (B)

There must be an overall decrease in energy, i.e. energy must be released. For this, a cation should have low Ionisation Potential and anion should have high value of electron-affinity. This is the basic condition for formation of an electrovalent bond.

Q.2. (C)

K is highly electropositive. Electronic configuration of K is 2, 8, 8, 1 and I is highly electronegative. Therefore they form an electrovalent or ionic bond.

Q.3. (B)

In NaOH, Na is 2, 8, 1 & OH has -1 valency
∴ Na donates 1 electron and OH accepts one electron. This is the case in each option ∴ they form ionic compounds. But in HCl, both H & Cl are sharing electrons.

Q.4. (B)

Lattice Energy is the amount of energy released when one mole of ionic solid is formed from it's gaseous ions. The amount of energy released is due to ~~intermolecular~~ electrostatic force of attraction. $F \propto \dfrac{q_1 q_2}{r^2}$.

where r is the interionic distance ②
and q_1, q_2 are magnitude of charges.

∴ for max. lattice energy, r should be minimum.

r will be small, if size of ions is small.

5. (B)
Overlapping does not take place in ionic bond. Rb is a metal present in group I(A) of periodic table

6. (A)
ClF_3 has more electrons than 8. ∴ Does not follow octet Rule

7 (A)
Lewis structure of NO_3^- ion is.

$$:\ddot{O}=N-\ddot{O}:$$
$$\underset{:\ddot{O}:}{|}$$
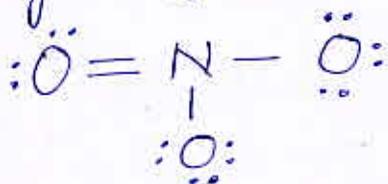
∴ 4 bond pairs on Nitrogen and sence there is no lone pair on N atom.

Ans → 4, 0 .

8. (B)
In covalent bonds, overlapping takes place
∴ Bonds are directional.

9 (C)

10. (C) KCN
Ionic bond is formed when electronegativity difference is very large i.e. b/w 1.7 to 3.2. Hence Ionic Bond is formed between K and C & Covalent bond is formed between C and N.

12. (D) For overlap of p_z orbital; the X-Y plane should provide the plane of symmetry. Similarly when Z-plane is ~~plane~~ plane of symmetry, $p_z + p_z$ orbitals will not form a π bond. ∴ $p_x + p_x$ ~~orbitals~~ will form a π bond.

13. (D·) p_x & p_y orbital will not overlap.

14. (D) PF_5 is trigonal bipyramidal.

15. (B) SF_4 is trigonal bipyramid.

16) (D)

Arrangement is trigonal bipyramidal but shape is linear.

17] (A)
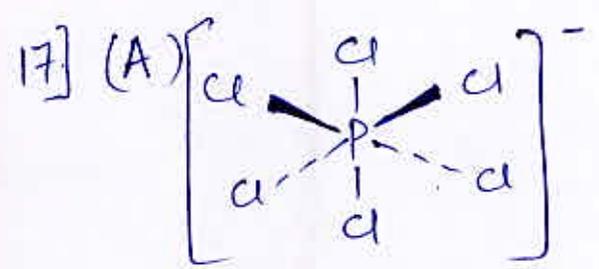
18.] (B·) calculate hybridization for each molecule.

$NO_2^+ \rightarrow \frac{1}{2}[0 + 5 - 1] \sim 2 . = sp$ hybridization.

No. of lone pairs = 0 .
∴ shape is linear .

19] (C·) Trigonal Planar .

21. (D) Repulsion between
④   lone-pair-lone pair > Lone pair Bond pair > Bond pair Bond pair.
∴ II is least stable.

22. (B)
Bond strength depends on the size of the involved atoms. Smaller the size of the atom, greater is the overlapping and therefore greater is the bond strength.

23. (D)
Water is a polar solvent and like dissolves like. Be, Mg, Ca, Ba, Sr, Ra are elements of group II A. and as we go down a group electronegativity decreases. Hence the least electropositive elements are topmost elements i.e Be, Mg. Since Mg is more electropositive than the other option, the bond between MgF_2 is highly polar.

24. (B) RbCl and $BeCl_2$.
Compare these elements in the periodic table to find Rb is most electropositive and Be is least electropositive.
Greatest Ionic character is seen when highly electropositive element reacts with highly electronegative element.

25. (B.)
To be Insoluble in water, the solute should be non-polar. I is more electropositive than F. ∴ AgI is more non-polar than AgF.

26. (A) For such questions, refer the periodic table and check electronegativities.
To be least ionic, the electronegativity difference between the metal and non-metal should be the least.

27. (B) Hybridization of all 4 molecules is the same. The electronegativity of N is more

28. (D) Same In All.
All the factors that affect the bond angle are the same in all cases. ⑤

29. (B) Highest melting point will be a characteristic of highly ionic compound. Since the electropositive element is same in all options, we check the most electronegative element. F, Cl, Br, I are elements of group 17 Al. As we go down the group, electronegativity decreases ∴ Most E.N. element is F.

30. (C) Electronegative element is same, Na is more electropositive than Li ∴ more Ionic

31. (C)

non-polar bond

O—O

H   H

polar bonds.
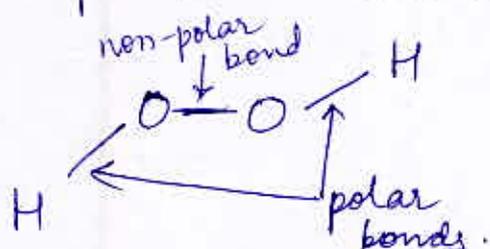
32. (C) For most polar character, we find most Electrog-negative element from O, Br, F and S.

E.N decreases ↓   O   F   ↑ E.N decreases
                   S   Br. ↓

E.N inc →   From periodic table.

∴ F most electronegative.

33. (B) BF_3 is trigonal planar and hence has zero dipole moment.

34. (D) In NH_3, the orbital dipole due to lone pair is in the same direction as resultant dipole moment of N-H bonds but in NF_3, the orbital dipole is in the direction opposite to resultant dipole moment of the 3 N-F bonds.

35. A] calculate the hybridization of each molecule
(A) and (C) have sp^2 hybridization.

H   C   H BF_3 is symmetrical so
   O   O   zero dipole

36. (B) $\overline{IV} < I < II < III$

37. (C) $SiF_4 \rightarrow$ Less E.N. difference

~~38~~ (B) no. of e^-s in antibonding MOT's

39.
1) $O_2 \rightarrow 4$.   3) $O_2^- \rightarrow 5$.
2) $O_2^+ \rightarrow 3$ 4) $O_2^{2-} \rightarrow 6$.

38. (A) NO, NO^+, NO^-.

$NO \rightarrow$ 1 lone pair & 1 lone electron.
$NO^+ \rightarrow$ 1 lone pair.
$NO^- \rightarrow$ 2 lone pair.

Greater number of lone pairs leads to greater repulsion $\therefore$ lower bond energy

40. (A) O_2 molecule.

Total e^-s $= 16$.

$\sigma_{1s}^2, \sigma_{1s}^{*2}, \sigma_{2s}^2, \sigma_{2s}^{*2}, \sigma_{2px}^2 \left\{ \begin{matrix} \pi_{py}^2 \\ \pi_{pz}^2 \end{matrix} \right\} \left\{ \begin{matrix} \pi_{2py}^{*1} \\ \pi_{2pz}^{*1} \end{matrix} \right\}$
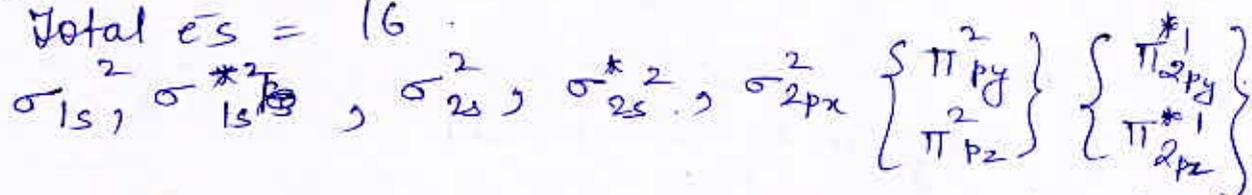
41. (A) Those that have one or more unpaired electrons are paramagnetic. See the O_2 arrangement of electrons shown in Ans.40. Since there are unpaired electrons here, it is paramagnetic

42. (B) We have seen O_2 is paramagnetic.

$B_2 \rightarrow$ no. of electrons $= 10$.

$\sigma_{1s}^2, \sigma_{1s}^{*2}, \sigma_{2s}^2, \sigma_{2s}^{*2}, \left\{ \begin{matrix} \pi_{2py}^1 \\ \pi_{2p-z}^1 \end{matrix} \right\}$
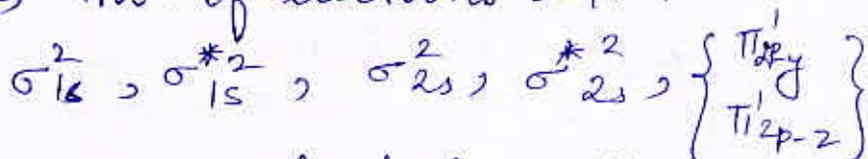
unpaired electrons. Hence paramagnetic.

43. (B) $\frac{1}{2}(6-4) \Rightarrow 1 =$ Bond order

44. (A)

45. (C) Carbon molecule. Total e^-s in C_2 molecule $= 12$.

$\sigma_{1s}^2, \sigma_{1s}^{*2}, \sigma_{2s}^2, \sigma_{2s}^{*2} \left\{ \begin{matrix} \pi_{2p-y}^2 \\ \pi_{2p-z}^2 \end{matrix} \right\}$
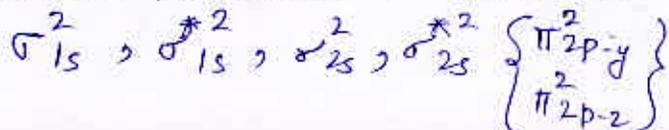
Q.46. (D) $C_2H_5OC_2H_5$.

because Hydrogen is not directly linked to a highly electronegative element.

47 (D)

48. (D) HF should be most volatile i.e. have least boiling point but it does not because of hydrogen bonding. ∴ HCl is ~~too~~ most volatile.

49 (A) H_2O because of hydrogen bonding.

50. (D) Hydrogen bonding does not occur with Cl as Cl is bigger in size ∴ no effective hydrogen bonding.

ASSERTION - REASONING.

Q.1. (1) .

Q.2. (1)

Q.3 .

1: (A).

$$H - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - \underset{\underset{OH}{|}}{C} = O$$
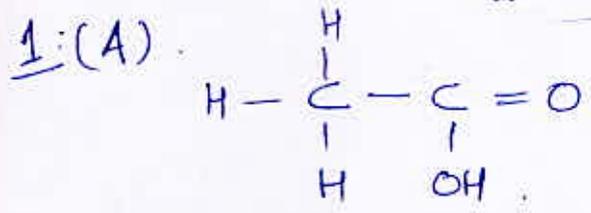
The number of shared electrons is therefore 16.

2: (D) Super octet molecule is a molecule where one of the atoms has completed it's octet and has more than 8 electrons in it's outermost shell. It is not possible in every molecule. It is possible only in molecules which have vacant d-orbitals. All options have more than 8 electrons in the valence shell.

3: (D) Elect. config of N is 2, 5.

In NCl_3. $\quad Cl \cdot {\overset{\times}{\underset{\underset{Cl}{\overset{|}{\times}}}{N}}}{}_{\times}^{\times} \cdot Cl \quad \longrightarrow$ 1 lone-pair.
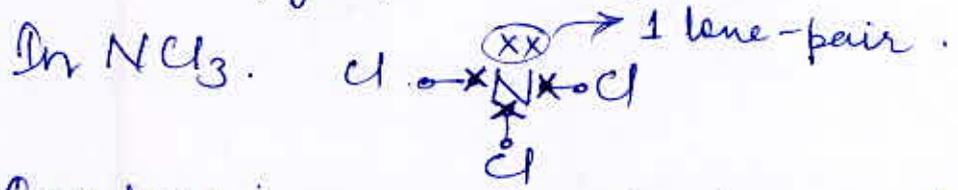
4: (D) Overlapping occurs only in covalent compounds. So all 3 types of overlapping occurs in covalent compounds.

5: (A) Head-on overlap leads to formation of sigma (σ) bonds. Lateral overlap leads to formation of pi (π) bonds.

6: (C) A co-ordinate bond is formed when both electrons of the shared pair are contributed by one atom itself.

$$H - \underset{\underset{H}{|}}{\overset{..}{O}} {\overset{..}{:}} + H^{+} \quad \longrightarrow \quad H - \underset{\underset{H}{|}}{\overset{..}{O}} \rightarrow H$$
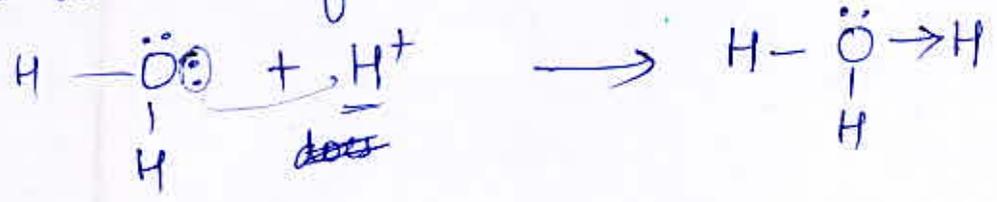
H^+ does not have even 1 electron of it's own.

7 (A)

Calculate hybridization

$$\frac{1}{2}[4+0] = 2 = sp \text{ hybridized}.$$

8. (C)

To be tetrahedral, hybridization should be sp^3. So check hybridization of each option.

$BF_4^- \to \frac{1}{2}[3+4+1] = 4.$

$NH_4^+ \to \frac{1}{2}[5+4-1] = 4.$

$\boxed{CO_3^{2-} \to \frac{1}{2}[4+2] = 3}$

$SO_4^{2-} \to \frac{1}{2}[6+2] = 4.$

$\therefore CO_3^{2-}$ is not tetrahedral.

9. (B).

O + ∞ → ∞

s   p   s-p overlap
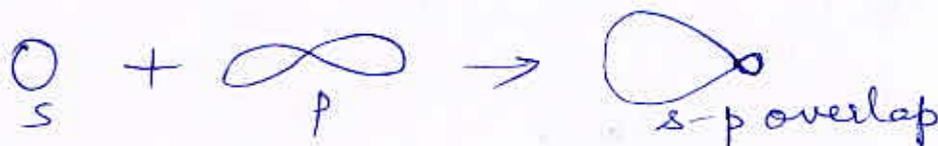
10. (B) Calculate hybridization of BF_3 molecule.

$$\frac{1}{2}[3+3] = 3 = sp^2 \text{ hybridized}.$$

11. (A) Iso-electronic molecule means a molecule having the same no. of electrons. To be iso--structural i.e. to have the same structure, the hybridization should be same.

In option (C) → ClO_2^- is sp^3 hybridized.

CO_3^{2-} is sp^2 hybridized.

∴ option (C) is eliminated.

check options A, B and D for the no. of electrons.

12 (C) Check hybridization and make structure

N≡C—O⁻

13. (B)

$$H - C \equiv C - H$$

14. (B) F_2 molecule.

$F \longrightarrow 1s^2, 2s^2, 2p^5.$

⇅	⇅	↑
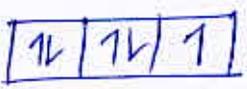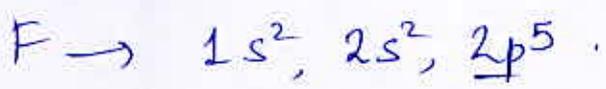
Since overlapping is taking place in p_z orbital only, π bond can't be formed without a sigma bond. ∵ there's only a single bond ∴ It's a sigma bond!

15.
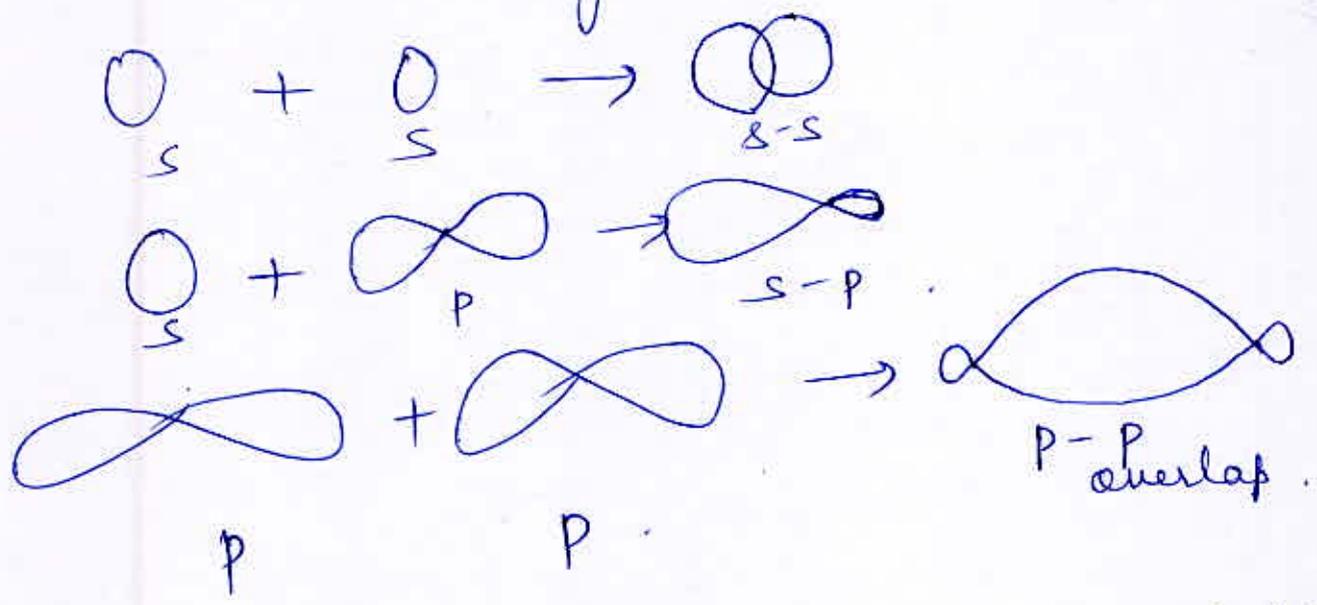
Thus it's easy to see that p-p orbital provide maximum overlapping.

∴ $sp^2 - sp^2$ overlap is maximum.

16. (B)

Bond angle = $120°$.

⇒ hybridization is sp^2 type.

% of s-character in sp^2 ⇒ $\frac{1}{3} \times 100 = 33\%$.

17. (D)

Since Bond length increases with the increase in size of atoms ∴ $CO_3^{2-} > CO_2 > CO$

18: (B) Since hybridization of all 3 molecules is same, so we check the number of lone pairs. Greater the lone pairs, greater is the repulsion ∴ smaller is the bond-angle.

$$H - \overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{\text{N}}} \rightarrow H$$
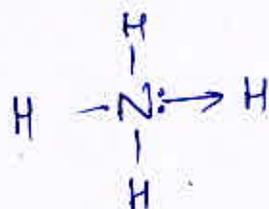
$NH_4^+ \rightarrow$ co-ordinate covalent bond

no lone pair
∴ max. in NH_4^+

19. (D) $NO_2^- \rightarrow$ 1 extra e^-.

1 lone pair

$O = N = O$ NO_2^-

$NO_2^+ \rightarrow$

$O = N = O$
0 lone pair.

$NO_2 \rightarrow$ $O = \overset{\cdot}{N} = O$
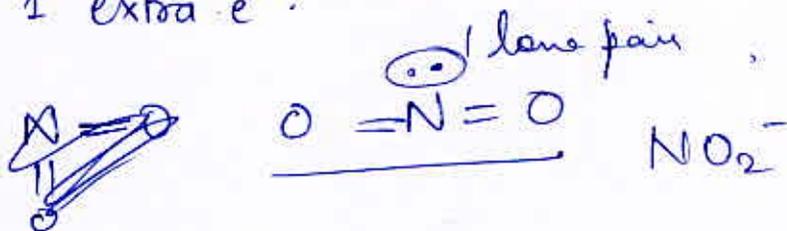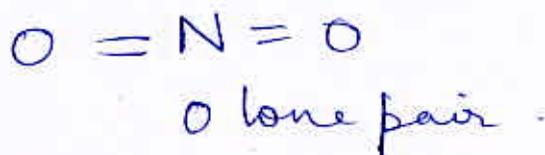
↳ 1 lone electron

lone pair ↑ , bond angle ↓

$NO_2^+ > NO_2 > NO_2^-$.
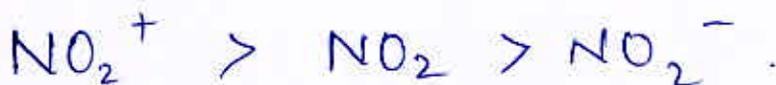
20: (C)
21 (D) One of the factors on which bond angle depends is electronegativity of the central atom. Since Central atom is same in all 3 cases and so is the hybridization.

22. (C) Since the covalent bond is directional.
.. There is 1 co-ordinate bond in NH_4^+ ion.
HF is more ionic than HCl ∴ HF is more polar than HCl.

23. (D) CCl_4.

$$Cl - \underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}} - Cl$$
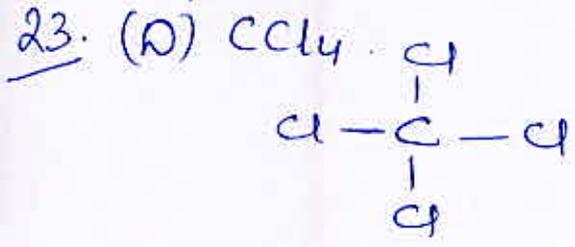
24. (B) C-H bond is least polar.

25. (D) All 3 have zero value of dipole moment as all 3 are symmetrical.
even p-dichlorobenzene

26. (A)

27. (D) BF_3.

$\mu = 0$

$NH_3 \rightarrow$

$\mu = 0$

H_2O.
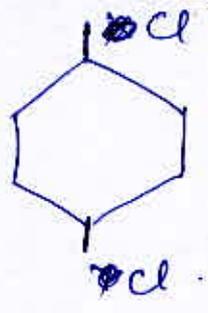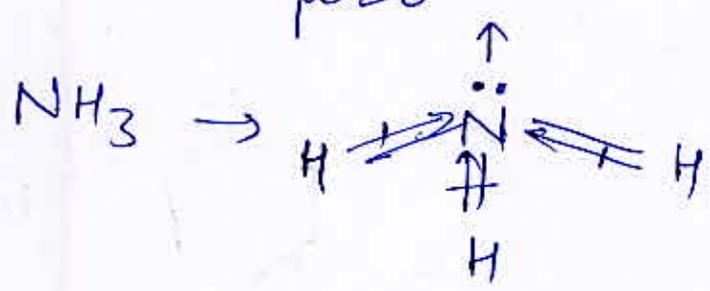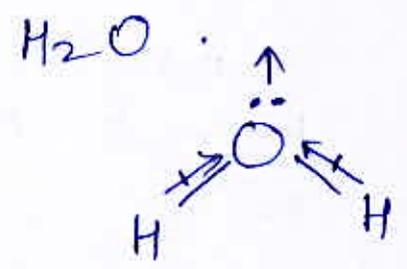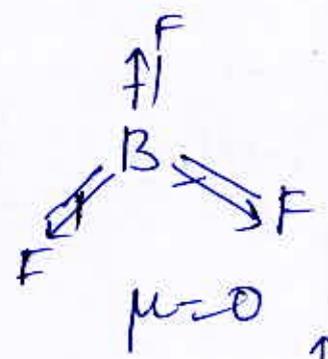
28(C) O–O bond length in O_2 would be the least because the multiplicity of bonds has increased & there are just 2 Oxygen atoms involved.

29. (A).

30.

31. C

32. (C) Only similar atomic orbitals combine to form molecular orbitarts.

33. (D) Bond order in O_2^{2-}

$O_2^{2-} \Rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p_x^2, \pi 2p_y^2, \pi 2p_z^2,$

$\pi^* 2p_y^2 = \pi^* 2p_z^2$
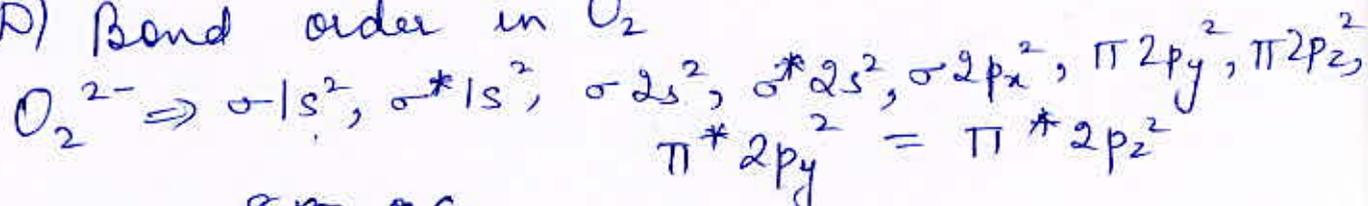
$$\frac{8-6}{2} = 1.$$

∴ Bond order = 1 .

34. (B).
Electron density is increased for the bonding MO's in the inter-nuclear region but decreased for the anti-bonding MO's.

35. (D).
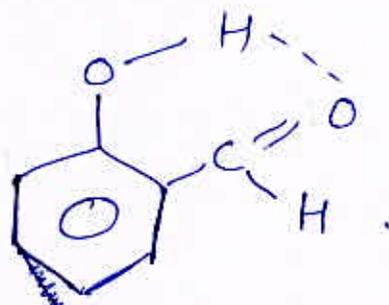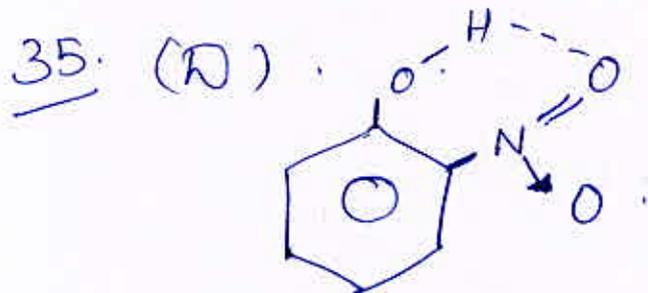
o-nitrophenol.   Salicaldehyde.

Both show intramolecular hydrogen bonding.

36] (A) CH_3F does not fulfil the basic condition required for hydrogen bonding which states that hydrogen should be linked to a highly electronegative element.

37] (D) Hydrogen bond is stronger than most intermolecular forces but weaker than the ionic and covalent bonds.

38] (D) $GeH_4 > SiH_4 > CH_4$.

39.] (C) HF_2^- .

There is no co-ordinate bond as not only 1 atom is donating both ~~the~~ shared electrons

40.] (A)

① (3) silica exists in polymeric form $(SiO_2)_n$

② (3) if size of cation ↓ covalent character ↑

③ (1) non-metallic hydrides are covalent hydrides.

④ (1)

$$\overset{H}{\underset{H}{}}C-N\overset{\equiv}{}C:$$
with H below C
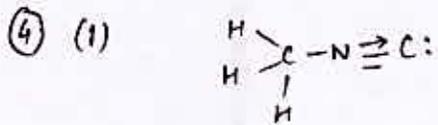
⑤ (3) unsymmetrical structures have $\mu_{net} \neq 0$, so they are permanent dipole moment.

SF4 structure (see-saw)

⑥ (4)
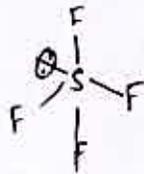
BF3 structure

symmetrical structure so dipole moment is zero.

but in PF_3 its unsymmetrical so $\mu_{net} \neq 0$

PF3 structure

⑦ (2)

% ionic character $= \dfrac{\mu_{actual}}{\mu_{100\% \, ionic}} \times 100$

$= \dfrac{1.6 \times 10^{-30}}{1.6 \times 10^{-19} \times 10^{-8}} \times 100 = 10\%$

⑧ (2) N_2 is non-polar so less reactive.

$:N \equiv N:$

but CN^- is ion so more reactive.

⑨ (3) dipole moment = $\delta \times d$

$\qquad = 4.8 \times 10^{-10} \times 10^{-8}$

$\qquad = 4.8 \times 10^{-18}$ esu. cm

$\qquad = 4.8$ debye

⑩ (1) % ionic character $= \dfrac{\mu_{actual}}{\mu_{theor}} \times 100$

$\qquad = \dfrac{\mu_{experimental}}{\mu_{expected}} \times 100$

$\qquad = \dfrac{1.03}{6.12} \times 100 = 17\%.$

⑪ (2) $CaC_2 \Rightarrow Ca^{2+} \; C_2^{2-}$

$\qquad C_2^{2-} \Rightarrow \overset{\ominus}{:}C \equiv C\overset{\ominus}{:}$

1 triple bond has 1 σ & 2π bonds.

⑫ (4)

$$\underset{\ominus O}{\overset{\displaystyle O}{\underset{\displaystyle \|}{\underset{\displaystyle S}{\diagup \diagdown}}}}\; O_\ominus$$

S is 3rd period element so it has vacant 3d orbital, so pi bond will be $p\pi-d\pi$ bond.

⑬ (1) $\left[\begin{smallmatrix} F \\ \\ F \end{smallmatrix} Be{-}F \right]^{-}$ sp^2 hybrid central atom.
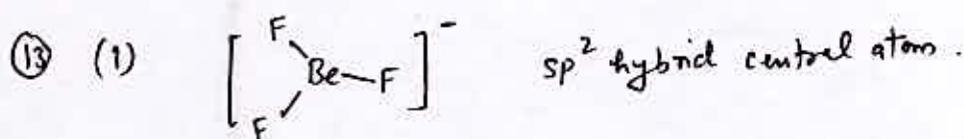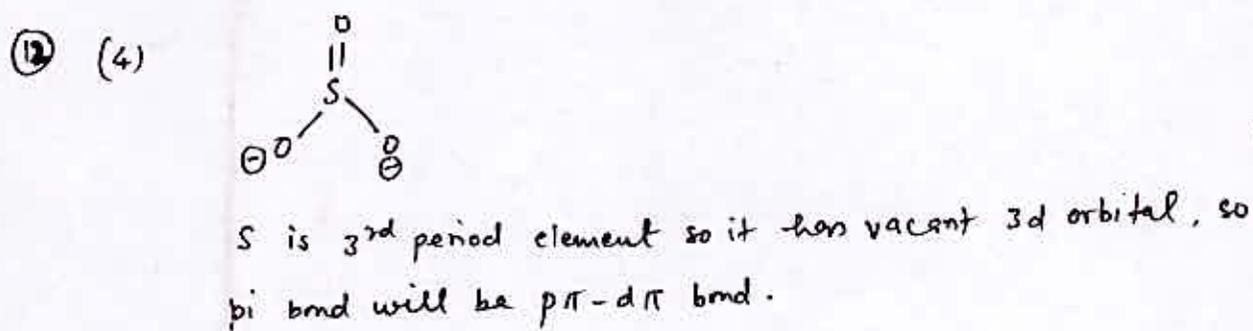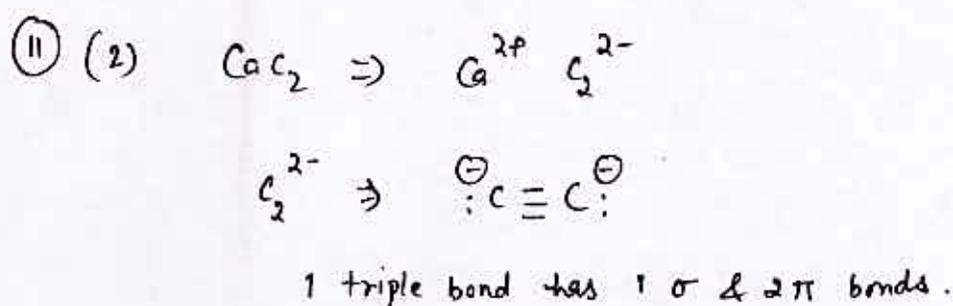
(14) (3)
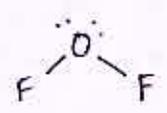
S.N = bp + lp = 2+2

S.N = 4 , sp^3 hybrid

(15) (1)
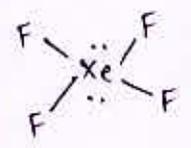
S.N = 4+2 = 6 , sp^3d^2 hybrid

(16) (2) double bonds are shorter than single bond.

H_2O_2
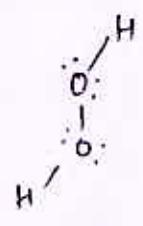
O_3
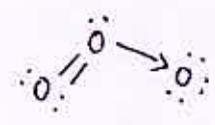
O_2
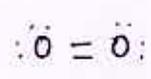
(17) (3) B_2H_6
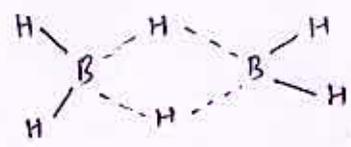
S.N = 4 , sp^3 hybrid

(18) (1) IF_7

B.A = 72° & 180° & 90°

(19) (1)
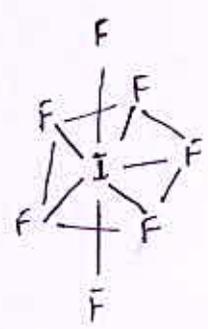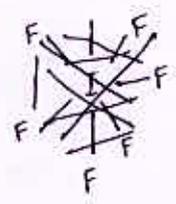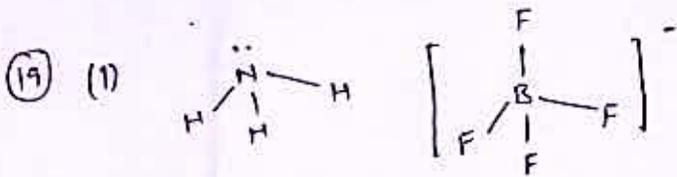
Both are sp^3 hybridised so bond angle $109°28'$.

(20) (3) BCl_3 , sp^2

S.N = 3

(21) (3) MX_6
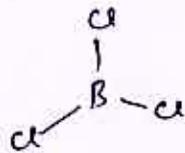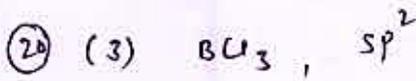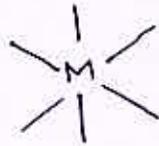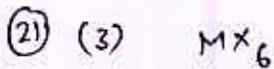
Total bonds at $180° = 3$

(22) (3) in d^2sp^3, geometry is octahedral, so $d_{x^2-y^2}$ & d_{z^2} will be hybridised.

(23) (2)
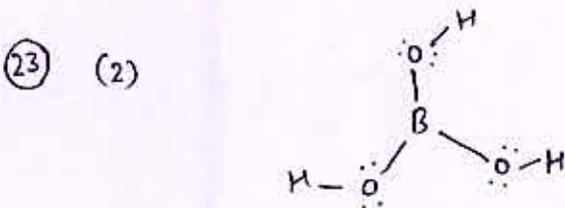
S.N of B = 3 , sp^2 hybrid

S.N of O = 4, sp^3 hybrid

(24) (1)
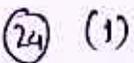
S.N = 4 , sp^3 hybridised so B.A should be $109°28'$ but it will decrease because of bp-lp repulsion.

(25) (3)
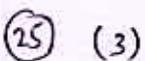
S.N = 4, sp^3 hybridised , tetrahedral

S.N = 5, sp^3d hybridised, see-saw shape

(26) (2) O_2^{+} : $\sigma_{1s}^{2} \, \sigma_{1s}^{*2} \, \sigma_{2s}^{2} \, \sigma_{2s}^{*2} \, \sigma_{2p_z}^{2} \, (\pi_{2p_x}^{2} = \pi_{2p_y}^{2})(\pi_{2p_x}^{*1} = \pi_{2p_y}^{*})\sigma_{2p_z}^{*}$
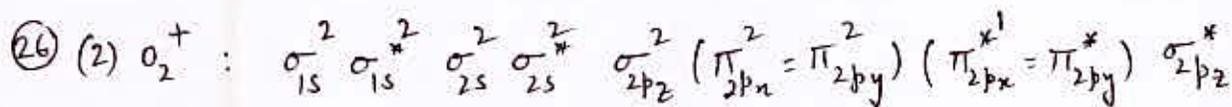
Bond order $= \dfrac{6-1}{2} = 2.5$,

Bond order of $O_2 = \dfrac{6-2}{2} = 2$,

O_2^{+} has unpaired electron so paramagnetic.

(27) (1) O_2^{-} : (KK) $\sigma_{2s}^{2} \, \sigma_{2s}^{*2} \, \sigma_{2p_z}^{2} \, (\pi_{2p_x}^{2} = \pi_{2p_y}^{2})(\pi_{2p_x}^{*2} = \pi_{2p_y}^{*1})\sigma_{2p_z}^{*}$

$\downarrow$

$\sigma_{1s}^{2} \sigma_{1s}^{*2}$
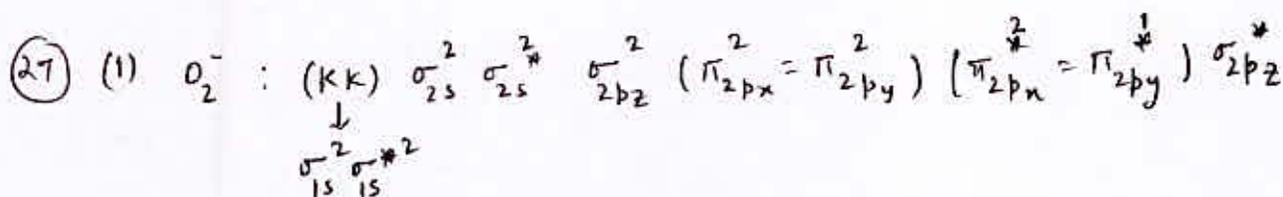
Total number of antibonding electrons $= 7$

O_2 : $\sigma_{1s}^{2} \, \sigma_{1s}^{*2} \, \sigma_{2s}^{2} \, \sigma_{2s}^{*2} \, \sigma_{2p_z}^{2} \, (\pi_{2p_x}^{2} = \pi_{2p_y}^{2})(\pi_{2p_x}^{*1} = \pi_{2p_y}^{*1})\sigma_{2p_z}^{*}$

antibonding electrons $= 6$

O_2^{2-} : $\sigma_{1s}^{2} \, \sigma_{1s}^{*2} \, \sigma_{2s}^{2} \, \sigma_{2s}^{*2} \, \sigma_{2p_z}^{2} \, (\pi_{2p_x}^{2} = \pi_{2p_y}^{2})(\pi_{2p_x}^{*2} = \pi_{2p_y}^{*2})\sigma_{2p_z}^{*}$
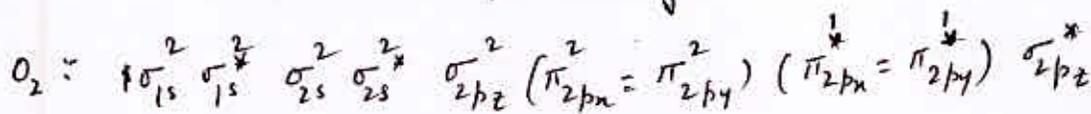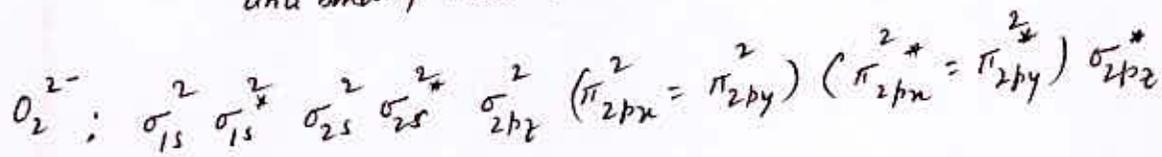
antibonding electrons $= 8$

(28) (3) In o-nitrophenol, there is intramolecular H-bonding which decreases the Boiling point.
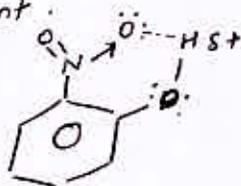
(29) (2) down the group, metallic character increases so boiling point increases but in NH_3, there is intermolecular H-Bonding so its boiling point is more so PH_3 has lowest boiling point.

(30) (1) Refer notes

(31) (3) same like question no. 29

(32) (1)

$\Theta O - \overset{\cdot\cdot}{Cl} = O$ S.N = 4 , sp³ hybrid

(33) (3)

$F - \overset{\cdot\cdot}{N} \overset{|}{\underset{F}{}} - F$

S.N = 4, pyramidal shape

$\left[H - \overset{\cdot\cdot}{O} - H \right]^+$
       |
       H

$\overset{O}{\overset{||}{N}}$:O ⟵ N ⟶ :O:⁻   S.N = 3, trigular planar

$F - B \overset{F}{\underset{F}{}}$

(34) (4) $\overset{1}{C}H_2 = \overset{2}{C}H - \overset{3}{C}H_2 - \overset{4}{C}H_2 - \overset{5}{C} \equiv \overset{6}{C}H$

S.N = 4, sp³
S.N = 3, sp²

(35) (4)

$F - \overset{\cdot\cdot}{S} - F$ (with F's)   S.N = 5, lp = 1

$\overset{F}{\underset{F}{C}}$ with F's   S.N = 4, lp = 0

Xe with F's   S.N = 6, lp = 2

(36) (3) IF_4^+

$$\left[F - \overset{..}{\underset{F}{I}} - F \right]^+ \quad \begin{matrix} F \\ F \end{matrix}$$
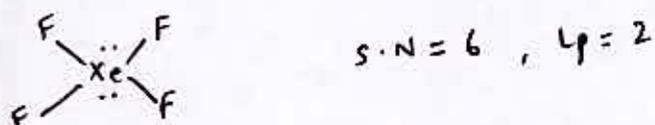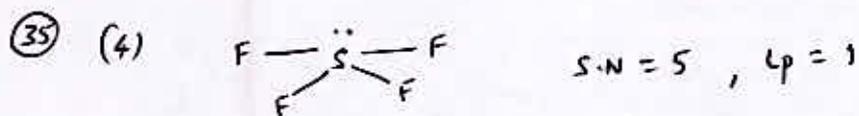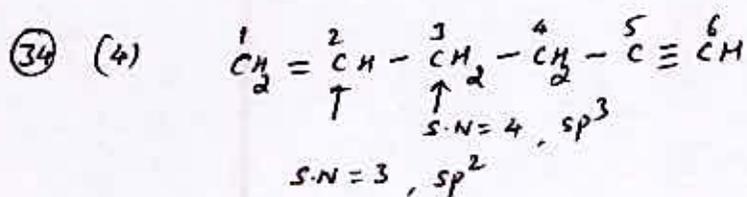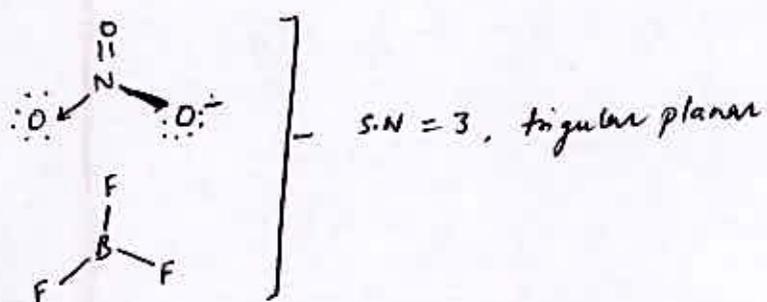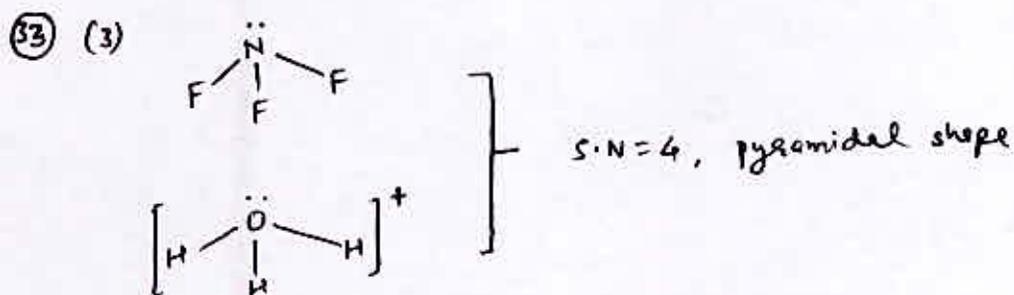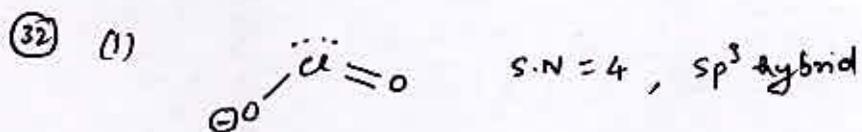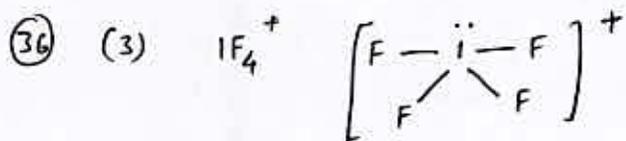
S.N = 5 with 1 Lp

So shape is irregular tetrahedral.

(37) (3) WRONG QUESTION

(38) (3)

$$H_2O \rightarrow \overset{2+}{Cu} \leftarrow OH_2$$
$$H_2O \nearrow \quad \uparrow \quad \nwarrow OH_2$$

$$\overset{O}{\underset{O}{\overset{||}{\underset{||}{S}}}} \quad \cdot H_2O$$
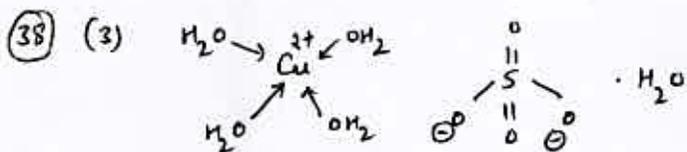
(39) (1) % s character increases then Electronegativity increases.

$$sp \quad > \quad sp^2 \quad > \quad sp^3$$
$$50\% \quad\quad 33.33\% \quad\quad 25\%$$

(40) (1)

$>$

(41) (1)

$$O \overset{\overset{..}{Br}}{\underset{||}{||}} OΘ \qquad O \overset{\overset{..}{Xe}}{\underset{||}{||}} O$$
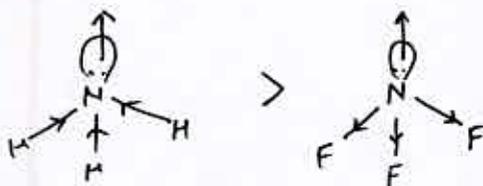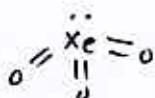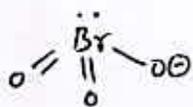
Both have S.N = 4 with one lone pair
So pyramidal shape.

(42) (1)

$$:C \equiv O: \quad < \quad :\overset{..}{O} = C = \overset{..}{O} \quad < \quad \overset{:O}{\underset{-O}{\diagup}} C = \overset{..}{O}:$$
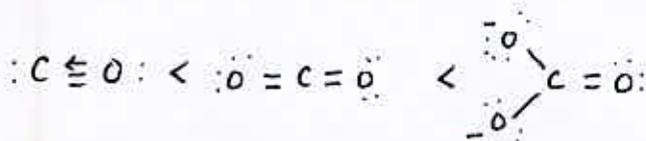
Bond multiplicity decreases the Bond length.

(43) (1)

$$N_2^{2-} : \quad \sigma_{1s}^2 \, \sigma_{1s}^{*2} \, \sigma_{2s}^2 \, \sigma_{2s}^{*2} \, (\pi_{2p_x}^2 = \pi_{2p_y}^2) \, \sigma_{2p_z}^2 \, (\pi_{2p_x}^{*1} = \pi_{2p_y}^{*1}) \, \sigma_{2p_z}^*$$

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

$$N_2^- : \quad \sigma_{1s}^2 \, \sigma_{1s}^{*2} \, \sigma_{2s}^2 \, \sigma_{2s}^{*2} \, (\pi_{2p_x}^2 = \pi_{2p_y}^2) \, \sigma_{2p_z}^2 \, (\pi_{2p_x}^{*1} = \pi_{2p_y}^*) \, \sigma_{2p_z}^*$$

$$B.O = \frac{6-1}{2} = 2.5$$

$$N_2 : \quad \sigma_{1s}^2 \, \sigma_{1s}^{*2} \, \sigma_{2s}^2 \, \sigma_{2s}^{*2} \, (\pi_{2p_x}^2 = \pi_{2p_y}^2) \, \sigma_{2p_z}^2 \, (\pi_{2p_x}^* = \pi_{2p_y}^*) \, \sigma_{2p_z}^*$$
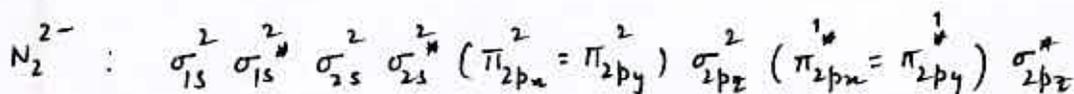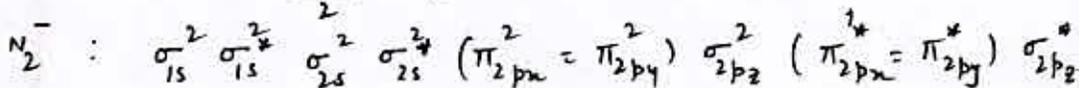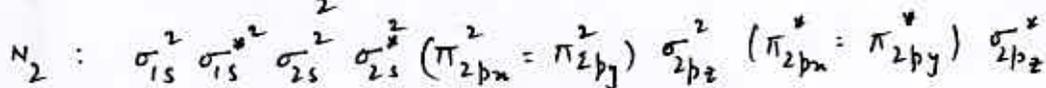
$$B.O = \frac{6-0}{2} = 3$$

(44) (4) refer booklet

(45) (4) Be_2 : σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2}
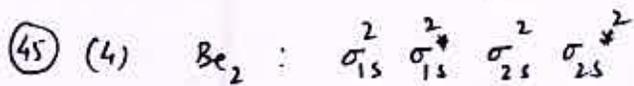
$$B.O = \frac{2-2}{2} = 0$$

(46) (1) Bond order increases bond length decreases.

O_2^+ : 2.5

O_2^- : 1.5

O_2^{2-} : 1.0

O_2 : 2.0

(47) (1)

|	
NO_2^-	sp^2
NO_3^-	sp^2
NH_2^-	sp^3
NH_4^+	sp^3
SCN^-	sp

$O=\overset{..}{N}\diagdown_{O^-}$

$O=\overset{\overset{O}{\uparrow}}{N}-O^-$

$\left[H-\overset{..}{N}\diagdown_H \right]^-$

$\left[H-\overset{\overset{H}{|}}{\underset{|}{N}}-H \right]^+$

$:S=C=\overset{..}{N}:^-$

(48) (3) O_2 : σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $(\pi_{2p_x}^2 = \pi_{2p_y}^2)$ $(\pi_{2p_x}^{*1} = \pi_{2p_y}^{*1})$ $\sigma_{2p_z}^*$

O_2^- : σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $(\pi_{2p_x}^2 = \pi_{2p_y}^2)$ $(\pi_{2p_x}^{*2} = \pi_{2p_y}^{*1})$ $\sigma_{2p_z}^*$

(49) (2) He_2^+ : σ_{1s}^2 σ_{1s}^{*1} $B.O = \frac{2-1}{2} = 0.5$

O_2^- : σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $(\pi_{2p_x}^2 = \pi_{2p_y}^2)$ $(\pi_{2p_x}^{*2} = \pi_{2p_y}^{*1})$ $\sigma_{2p_z}^*$

$NO \equiv O_2^+$ $B.O = 2.5$ $B.O = \frac{6-3}{2} = 1.5$

$C_2^{2-} \equiv N_2$ $B.O = 3.0$

50 (2) refer notes

51 (2)

$$\left[F\underset{F}{\overset{F}{B}}-F \right]^{-} \quad \left[H\underset{H}{\overset{H}{N}}-H \right]^{+}$$
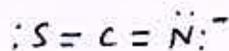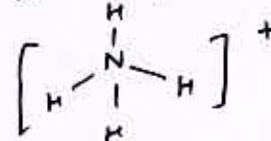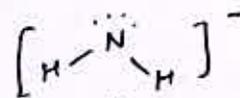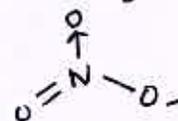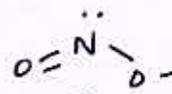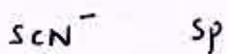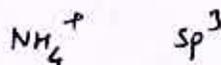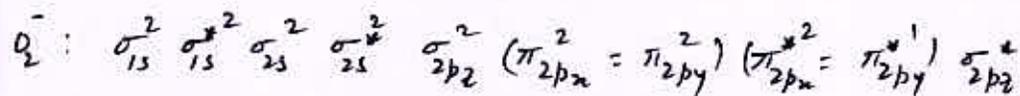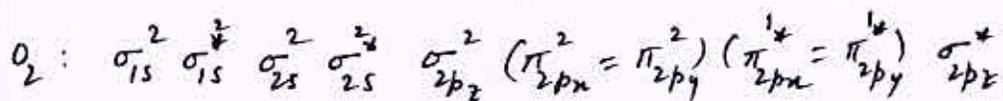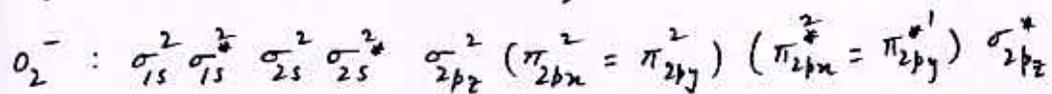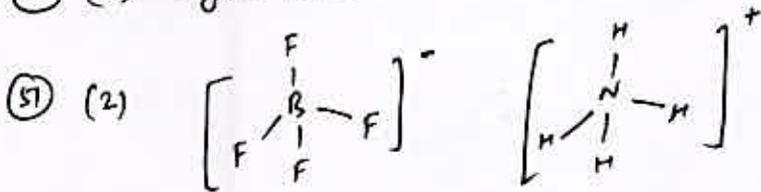
$SN = 4$, tetrahedral

52 (1) N_3H , ox. state $= -1/3$

NH_2OH , ox. state $= -1$

N_2H_4 , ox. state $= -2$

NH_3 , ox. state $= -3$

53 (3) $O_2^{2-} \Rightarrow B.O = 1$

$B_2 \Rightarrow B.O = 1$

54 (4) $O_2^{2-} : B.O = 1$

$O_2 : B.O = 2$

$O_2^{+} : B.O = 2.5$

$O_2^{-} : B.O = 1.5$

55 (3) $O=\overset{\cdot}{N}\to O$

$O=C=O$

$H-\overset{\cdot\cdot}{O}-H$

$O=\overset{\cdot\cdot}{S}=O$

(56) (3)

$$\overset{\displaystyle F}{\underset{\displaystyle F}{\overset{|}{\underset{|}{/\!\!\!\times\!\!\!Xe\!\!-}}}}$$

$S\cdot N = 5 \ (2\,bp + 3\,lp)$

$ICl_2:$

$$\overset{\displaystyle Cl}{\underset{\displaystyle Cl}{\overset{|}{\underset{|}{/\!\!\!\times\!\!\!I\!-}}}}$$

$S\cdot N = 5 \ (2\,bp + 3\,lp)$
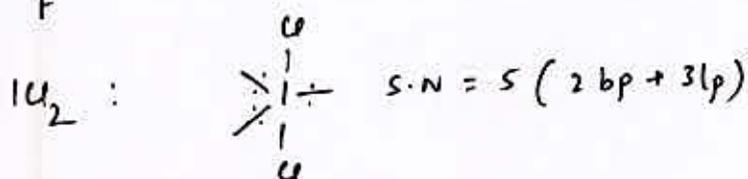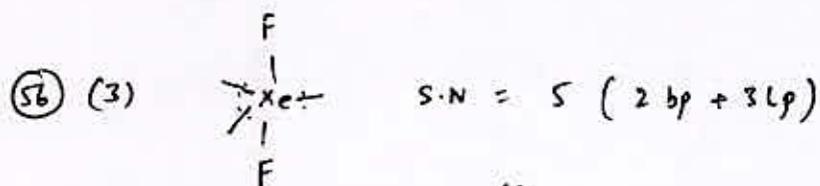
(57) (4) Dipole - induced dipole interactions are present between polar and non-polar molecules.

(58) (3) refer notes

(59) (3) In isoelectronic species, Z increases then ionic radius decreases.

$$Na^+ \xleftarrow{\quad} O^{2-} \xleftarrow{\quad} F^-$$

$$Na^+ < F^- < O^{2-}$$
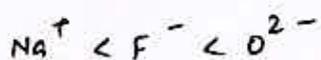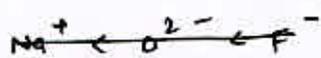
(60) (3) refer notes (inorganic chemistry)

(61) (2) In Be^{2+}, no. of $\bar{e}$s $= 2$

Li^+ than 2 $\bar{e}$s.

(62) (1) Down the group acidity increases because of bigger size of anion.