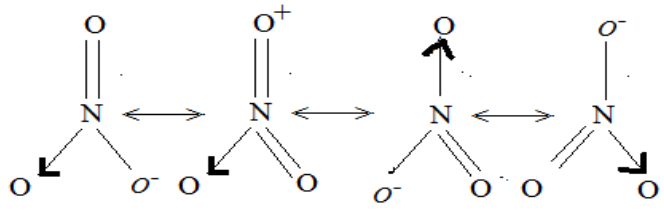
Delight classes

CHEMICAL BOND

1	C-H bond energy is more in 1) C_2H_2 2) C_2H_4 3) C_2H_6 4) same in all
2	The number of ionic, covalent and coordinate bonds in NH_4Cl are respectively 1) 1,3 and 1 2) 1,3 and 2 3) 1,2 and 3 4) 1,1 and 3
3	The bonds present in $N_2O_5(g)$ are 1) only ionic 2) covalent and coordinate 3) only covalent 4) covalent and ionic
4	Which pair of molecules will have permanent dipole moment for both members 1) NO_2 and O_3 2) SiF_4 and CO_2 3) SiF_4 and NO_2 4) NO_2 and CO_2
5	A diatomic molecule has dipole moment of 1.2D. If the bond distance is 1 A^0 what percentage of electronic charge exists on each atom 1) 12%of e 2) 19% of e 3) 25% of e 4) 29% of e
6	The order of increasing dipole moment in HCl, CO_2 and HF molecules is 1) HCl, HF, CO_2 2) HF, HCl, CO_2 3) CO_2, HCl, HF 4) CO_2, HF, HCl
7	Which bond angle 'θ' would result in the maximum dipole moment for the tri atomic molecule YXY 1) $\theta = 90^0$ 2) $\theta = 120^0$ 3) $\theta = 150^0$ 4) $\theta = 180^0$
8	The dipole moment of HBr is 1.6×10^{-30} Cm and inter atomic spacing is $1A^0$ unit, the percent ionic character of HBr is 1) 7 2) 10 3) 15 4) 27
9	The correct sequence of dipole moments among the chlorides of methane is 1) $CHCl_3 < CH_2Cl_2 > CH_3Cl > CCl_4$ 2) $CH_2Cl_2 > CH_3Cl > CHCl_3 > CCl_4$ 3) $CH_3Cl > CH_2Cl_2 > CHCl_3 > CCl_4$ 4) $CH_2Cl_2 > CHCl_3 > CH_3Cl > CCl_4$
10	The shape of SF_4 is 1) See saw 2) Tetra hedral 3) Trigonal 4) Linear

11	Molecular shapes of SF_4, CF_4 & XeF_4 are 1) the same with 2,0 and 1 lone pair of electrons 2) the same with 1,0 and 1 lone pair of electrons 3) different with 0,1 and 2 lone pair of electrons 4) different with 1,0 and 2 lone pair of electrons
12	Which one of the following molecules is planar 1) NF_3 2) NCl_3 3) PH_3 4) BF_3
13	In which of the following process, the bond order has increased and the magnetic behavior has changed 1) $N_2 \rightarrow N_2^+$ 2) $C_2 \rightarrow C_2^+$ 3) $NO \rightarrow NO^+$ 4) $O_2 \rightarrow O_2^+$
14	Which of the following is paramagnetic 1) O_2^- 2) CN^- 3) CO 4) NO^+
15	How would N-N bond distance and O-O bond distance changes when N_2 changes to N_2^+ and O_2 changes of O_2^+ 1) increase, decrease 2) decrease, increase 3) increases, in both the cases 4) decreases in both the cases
16	The number of anti bonding electron pairs in O_2^{2-} molecular ion on the basis of molecular orbital theory is 1) 4 2) 3 3) 2 4) 5
17	The correct order of increasing C-O bond length of CO, CO_3^{2-}, CO_2 is 1) $CO_3^{2-} < CO_2 < CO$ 2) $CO_3 < CO_3^{2-} < CO$ 3) $CO < CO_3^{2-} < CO_2$ 4) $CO < CO_2 < CO_3^{2-}$
18	The common features among the species CN^-, CO and NO^+ are 1) bond order three and isoelectronic 2) bond order two and isoelectronic 3) bond order two and isosters 4) isoelectronic and isobars
19	Statement (S-I) : The double bond in C_2 molecule consists of both π bonds Statement (S-II) : Four electrons are present in two π bonding molecular orbitals in C_2 1. Both S-I & S-II are true

	2. S-I is true but S-II is false 3. S-I is false but S-II is true 4. Both S-I & S-II are false
20	Which one of the following species is diamagnetic in nature 1) He_2^+ 2) H_2 3) H_2^+ 4) H_2^- Sol: H_2 is diamagnetic
21	Stability of the species Li_2, Li_2^- Li_2^+ increases in the order of 1) $Li_2 < Li_2^+ < Li_2^-$ 2) $Li_2^- < Li_2^+ < Li_2$ 3) $Li_2 < Li_2^- < Li_2^+$ 4) $Li_2^- < Li_2 < Li_2^+$
22	H_2O has higher boiling point than H_2S because 1) H_2S is a smaller molecule and hence more closely packed 2) the bond angle of H_2O is more than H_2S and hence H_2O molecule are more tightly packed 3) The intermolecular hydrogen bonding in liquid H_2O 4) The latent heat of vaporization is higher for H_2O than for H_2S
23	The correct order of O-O bond length in O_2, H_2O_2 and O_3 is 1) $O_2 > O_3 > H_2O_2$ 2) $O_3 > H_2O_2 > O_2$ 3) $H_2O_2 > O_3 > O_2$ 4) $O_2 > H_2O_2 > O_3$
24	Which has the least bond angle 1) NH_3 2) BeF_2 3) H_2O 4) CH_4
25	The maximum number of hydrogen bonds formed by a water molecule in ice is 1) 4 2) 3 3) 2 4) 1
26	Bonds present in $CuSO_4.5H_2O$ is 1) Electrovalent and covalent 2) Electrovalent and coordinate 3) Electrovalent, covalent and coordinate 4) Covalent and coordinate
27	Which of the following Lewis structure does not contribute in resonance  I II III IV 1) I 2) III 3) II 4) IV

28	In which of the following pair, both compounds are ionic in nature? 1) BeH_2, BeF_2 2) LiCl, LiH 3) AlF_3, CaC_2 4) $MgCl_2$, CCl_4
29	Solid NaCl is a bad conductor of electricity because: 1) in solid NaCl there are no ions 2) solid NaCl is covalent 3) in solid NaCl there is no mobility of ions 4) in solid NaCl there are no electrons
30	An ionic compound A^+B^- is most likely to be formed when: 1) the ionization energy of A high and electron affinity of B is low 2) the ionisation energy of A is low and electron affinity of B is high 3) both, the ionization energy of A and electron affinity of B are high 4) both, the ionization energy of A and electron affinity of B are low
31	Which of the following statements about LiCl and NaCl is wrong? 1) LiCl has lower melting point than NaCl 2) LiCl dissolves more in organic solvents whereas NaCl does not 3) LiCl dissolves more in water than NaCl 4) Fused LiCl would be less conducting than fused NaCl
32	Which of the following order is incorrect? 1) Ionic character = MCl < MCl_2 < MCl_3 2) polarizibility = $F^- < Cl^- < Br^- < I^-$ 3) Polarising power = $Na^+ < Mg^{+2} < Al^{+3}$ < LiI 4) Covalent character = LiF < LiCl < LiBr
33	Which of the following will be most covalent? 1) NaCl 2) Na_2S 3) $MgCl_2$ 4) MgS
34	Which of the following statement is correct? 1) Minimum polarisation is brought about by a cation of low radius 2) A large cation is likely to bring about a large degree of polarisation 3) Maximum polarisation is brought about by a cation of high charge 4) Distortion of cation by anion is called polarisation
35	Pseudo inert gas configuration is: 1) ns^2np^6 2) $(n-1)d^{10}ns^2np^6$ 3) $ns^2np^6nd^{1-9}$ 4) $ns^2np^6nd^{10}$
36	Which of the following is an example of super octet molecule? 1) ClF_3 2) PCl_5 3) IF_7 4) All the three Sol: Expanded octet is super octet
37	If the z – axis is taken as the internuclear axis, then which of the following combinations of atomic orbitals is a nonbonding combination? 1) s and p_x 2) P_x and p_z 3) P_x and p_y 4) all of these
38	Which of the following is electron – deficient? 1) $(BH_3)_2$ 2) PH_3 3) $(CH_3)_2$ 4) $(SiH_3)_2$
39	In the ozone molecule, the formal charges on three oxygen atoms is. 1) 0, -1. -1 2) 0, +1, -1 3) +1, 0, 0 4) +1, 0, +1
40	The higher lattice energy corresponds to: 1) MgO 2) CaO 3) SrO 4) BaO

41	The'd' orbital involved in the hybridization in the PCl_5 molecule is: 1) $3d_{x2-y2}$ 2) $3d_z^2$ 3) $3d_{xy}$ 4) $4d_{z^2}$
42	The C – H bond and C – C bond in ethane are formed by which of the following types of overlap? 1) $sp^2 - s \text{ and } sp^2 - sp^2$ 2) $sp - s \text{ and } sp - sp$ 3) $p - s \text{ and } p - p$ 4) $sp^3 - s \text{ and } sp^3 - sp^3$
43	The type of hybridization of nitrogen atom in NH_3 is: 1) sp^2 2) sp^3 3) dsp^2 4) sp
44	Which of the following species does not obey octet rule? 1) SiF_4 2) PCl_5 3) ICl 4) CO_3^{-2}
45	In PO_4^{-3} ion, the average formal charge on the oxygen atom is. 1) +1 2) -0.75 3) -1 4) +0.75
46	The formula of an ionic compound is AB. The number of valence electrons in A and B respectively 1) 2, 3 2) 3, 2 3) 5, 6 4) 2, 6
47	How many sigma and pi bonds are present in toluene? 1) 10σ and 3π bonds 2) 12σ and 3π bonds 3) 15σ and 3π bonds 4) 6σ and 3π bonds
48	Lattice energy of NaCl is 'X'. If the ionic size of A^{+2} is equal to that of Na^+ and B^{-2} is equal to Cl^-, then lattice energy associated with the crystal AB is 1) X 2) 4X 3) 6X 4) 8X
49	Identify AB_2E_2 type of molecules among the following. (Where E is no of lonepairs) I = SO_2 II = H_2O III = OF_2 IV = $HClO_3$ 1) I, II only 2) II, III only 3) I, III, IV 4) I, II, III
50	The geometry and hybridisation of Xe in $XeOF_4$ is 1) See-saw, sp^3d 2) Square Pyramidal, sp^3d^2 3) Planar, sp^3d 4) T-shaped, sp^3d
51	The hybridisation of nitrogen in nitrite and nitrate ions respectively 1) sp^2, sp 2) sp, sp^2 3) sp^2, sp^2 4) sp^2, sp^3

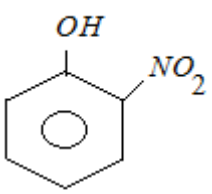
52 A molecule MX_3 has zero dipole moment. The % of 's' character in the hybridized orbitals of M is

1) 25% 2) 33.3% 3) 50% 4) 75%

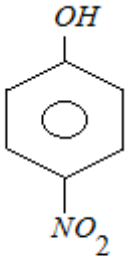
53 When N_2 goes to N_2^+ , the N-N bond distance _____ and when O_2 goes to O_2^+ , the O-O bond distance _____

1) Increases, Decreases
2) Decreases , increases
3) Increases, Increases
4) Decreases, Decreases

54 Some statements are given below with respect to



A



B

I) 'B' is more soluble in water than 'A'.
II) Boiling point of 'A' is higher than that of 'B'.
III) 'A' is more volatile than 'B'.
IV) 'A' contains inter molecular hydrogen bond and B contains intra molecular hydrogen bond.
The correct statements are

1) I, III 2) I, II 3) II, IV 4)II, III

55 Bond order of $O_2, O_2^+, O_2^-, O_2^{-2}$ is in order

1) $O_2^- < O_2^{-2} < O_2 < O_2^+$ 2) $O_2^{-2} < O_2^- < O_2 < O_2^+$
3) $O_2^+ < O_2 < O_2^- < O_2^{-2}$ 4) $O_2 < O_2^+ < O_2^- < O_2^{-2}$

56 Which of the following is wrong

1) ortho nitrophenol is more volatile then para nitro phenol
2) Density of Ice is less than that of water
3) Hydrogen bond is stronger than covalent bond
4) $CuSO_4 5H_2O$ crystals contain hydrogen bond

57 Which of the following statement(s) is/are true ?

i) In N_2 , the doubly degenerate π_{2p} orbitals are completely filled .

ii) In O_2 , the energy of σ_{2p_z} orbital is lower than the doubly degenerate π_{2p} orbitals .

iii) Different molecular species with the same configuration have the same energy.

iv) A π^*_{2p} orbital has two nodal planes.

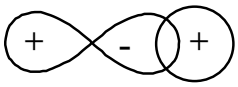
1) i, ii and iv 2) i and ii only 3) i, ii, iii and iv 4) ii, iii, iv

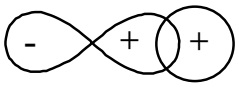
58 Which of the following species is paramagnetic ?

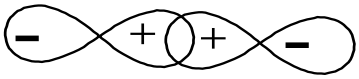
1) N_2 2) B_2 3) O_2^{2-} 4) C_2

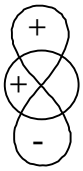
59	In which of the following transformation, the bond order has increased and the magnetic behavior has changed? 1) $C_2^+ \rightarrow C_2$ 2) $NO^+ \rightarrow NO$ 3) $O_2 \rightarrow O_2^+$ 4) $N_2 \rightarrow N_2^+$
60	Bond order of which of the following is equal to that of O_2 1) CO 2) NO 3) C_2 4) CN^-
61	Among the following the wrong statement is 1) Partially negative charged hydrogen of NH_3 forms hydrogen bond with partially negative charged oxygen of H_2O when both are mixed 2) Boiling point of H_2O is greater than HF though hydrogen bond in H – F is stronger than H_2O 3) Inter molecular hydrogen bonding in a liquid will enhance its boiling Point 4) Alcohols are soluble in water due to formation of hydrogen bonds with water molecules
62	Which of the following overlaps is <u>incorrect</u> [assuming z-axis to be the internuclear axis] a) 2 p_y + 2 p_y $\rightarrow$ 2 p_y b) 2 p_z + 2 p_z $\rightarrow$ 2p_z c) 2 p_x + 2 p_x $\rightarrow$ 2 p_x d) 1 s + 2 p_y $\rightarrow$ (1 s-2 p_y) 1) 'a' & 'b' 2) 'b' & 'd' 3) only 'd' 4) b, c
63	Which of the following statements is incorrect ? 1) Among O_2^+, O_2 and O_2^- the bond length decreases as $O_2^- > O_2 > O_2^+$ 2) He_2 molecule does not exist as the bonding and anti – bonding orbitals cancel each other 3) C_2, O_2^{2-} and Li_2 are diamagnetic 4) In F_2 molecule, the energy of σ_{2p_z} is more than π_{2p_x} and π_{2p_y}
64	If we consider no mixing of '2s' and '2p' orbitals, then the bond order and magnetic nature of the diatomic molecule C_2 is 1) 3 and diamagnetic 2) 2.5 and diamagnetic 3) 2 and diamagnetic 4) 2 and paramagnetic
65	Which of the following statements is correct ? 1) H_2O is more volatile than H_2S. 2) Glycerol is more viscous than ethyl alcohol 3) Para Nitro phenol is steam volatile but ortho nitro phenol is not steam volatile 4) Glucose is soluble in water due to high dielectric constant of water
66	Stability of the species Li_2, Li^-_2 and Li^+_2 increases in the order of: 1) $Li_2^- < Li_2^+ < Li_2$ 2) $Li_2 < Li_2^1 < Li_2^+$ 3) $Li_2^- < Li_2 < Li_2^+$ 4) $Li_2 < Li_2^+ < Li_2^-$

67 In which of the following does the overlap of two orbitals give a non bonding interaction ?

1. 

2. 

3. 

4. 

68 The molecules which contain both covalent and coordinate covalent bonds are:

a) CO b) NH_3BF_3 c) BF_4^- d) H_3O^+

1) a, b, c 2) b, c, d 3) a, b, c, d 4) a, c, d

69 According to Molecular orbital theory ,Which of the following represent the increasing order of Bond order ?

1) $N_2^{2-} < N_2^- < N_2$ 2) $N_2 < N_2^{2-} < N_2^-$

3) $N_2^- < N_2^{2-} < N_2$ 4) $N_2^- < N_2 < N_2^{2-}$

70 In the conversion of N_2 into N_2^+ the electron will be lost from which of the following molecular orbitals ?

1) $\sigma^*_{2P_z}$ 2) σ_{2P_z} 3) π_{2P_x} 4) $\pi^*_{2P_x}$

71 The bond orders in BN, BO and CO respectively are -

1) 2, 3, $\frac{5}{2}$ 2) 2, $\frac{5}{2}$, 2 3) 2, $\frac{5}{2}$, 3 4) $\frac{5}{2}$, 2, 3

72 Which is a pair of paramagnetic species ?

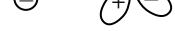
1) KO_2, NO_2 2) K_2O_2, KO_2 3) K_2O, NO_2 4) NO_2, N_2O_2

73 Which of the following leads to the formation of bonding molecular orbital?

1) s-orbital p-orbital

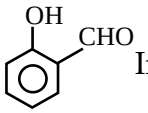
2) s-orbital p-orbital

3) p-orbital p-orbital 

4) p-orbital d-orbital 

74 In an antibonding molecular orbital, electron density is minimum -

1) Around one atom of the molecule
2) Between the two nuclei of the molecule
3) At the region away from the nuclei of the molecule

	4) All are correct
75	Which have odd bond order - 1) O_2^+ 2) O_2^- 3) NO 4) All
76	Number of anti-bonding electrons in N_2 is - 1) 4 2) 10 3) 12 4) 14
77	N_2 and O_2 are converted to monocations N_2^+ and O_2^+ respectively, which is wrong statement- 1) In N_2^+, the N–N bond weakens 2) In O_2^+, the O – O bond order increases 3) In O_2^+, the paramagnetism decreases 4) N_2^+ becomes diamagnetic
78	Glycerol is a thick viscous liquid because of 1) High molar mass 2) It is an organic molecule 3) It has intermolecular hydrogen bonding 4) It has intramolecular hydrogen bonding
79	Which is steam volatile - **1)** o -nitrophenol 2) Aniline 3) Glycerol 4)p-nitrophenol
80	In which molecule is the Vander Waals force is likely to be most important in determining m.p. and b.p.(other than molecular weight) 1) H_2O **2)** Br_2 3) NH_3 4)Alcohol
81	 Incorrect statement about given compound is 1) has intermolecular H-bonding 2) has intra molecular H-bonding 3) is steam-volatile 4) Can be purified by steam distillation
82	Among the following the strongest hydrogen bond is 1) O–H - - - - - S 2) S–H- - - - -O 3) F–H- - - - -F 4) O–H- - - - -O
83	O-nitrophenol is more volatile than para-nitrophenol due to – 1) intramolecular H-bonding in o-nitrophenol and intermolecular H-bonding in p-nitrophenol 2) intermolecular H-bonding in o-nitrophenol and intramolecular H-bonding in p-nitrophenol

	3) more stronger intramolecular H-bonding in o-nitrophenol as compared to p-nitrophenol 4) more stronger intermolecular H-bonding in o-nitrophenol as compared to p-nitrophenol
84	Which of the following compounds is most volatile ? 1) HF 2) HCl 3) HBr 4) HI
85	In which case hydrogen bond will not be observed - 1) $H_3O_2^-$ 2) H_2O 3) HF 4) AsH_3
86	A simple example of a coordinate covalent bond is exhibited by : 1) HCl 2) NH_3 3) C_2H_2 4) H_2SO_4
87	Which of the following has dative bond? 1) NO_3^- 2) N_2 3) CO_2 4) C_2H_4
88	Which is correct order with respect to bond order? 1. $N_2^+ > N_2$ 2. $O_2^+ > O_2$ 3. $O_2^- > O_2$ 4. $O_2^+ > N_2^+$
89	How many electrons are present in the anti bonding orbitals in O_2 molecule? 1) 2 2) 4 3) 8 4) 6
90	The no of dative bonds in HCN molecule is/are 1) 3 2) 1 3) 4 4) 2
91	Which of the following is a correct statement? 1) In a diatomic molecule energy of $\sigma 2p_z$ molecular orbital is higher than that of π and $\pi 2p_y$ molecular orbitals. 2) In a diatomic molecule energy of $\sigma 2p_z$ molecular orbital is lower than that of $\pi 2p_x$ and $\pi 2p_y$ molecular orbitals. 3) In a diatomic molecule energy of $\sigma 2p_z$ molecular orbital is equal to that of $\pi 2p_x$ and $\pi 2p_y$ molecular orbitals. 4) Data is insufficient.
92	C_2 molecule consists of a double bond with both π bonds, since 1) The molecule contains 2 electrons in two pi molecular orbitals. 2) The molecule contains 4 electrons in two pi molecular orbitals. 3) The molecule contains 2 electrons in the sigma molecular orbitals. 4) The molecule contains 2 electrons in two pi and 2 electrons in sigma molecular orbitals.
93	Isoelectronic species have same

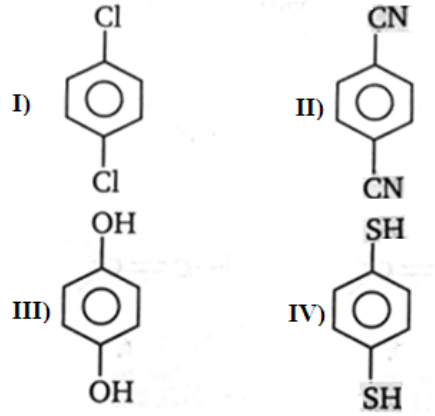
	1) Ionic charges 2) Bond order 3) Energies 4) Stabilities
94	Which of the following has more bond length? 1) C≡ C 2) N≡N 3) H-H 4) C≡N
95	According to valence bond theory, the bonds in methane are formed due to the over lapping 1) $1\sigma s-p, 3\sigma s-s$ 2) $1\sigma s-s, 3\sigma s-p$ 3) $3\sigma s-s, 1\sigma s-p$ 4) $4\sigma sp^3-s$
95	The bond energy (in kcal mol^{-1}) of a C - C single bond is approximately 1) 1 2) 10 3) 100 4) 1000
97	The correct order of double bond character in X - O bond is given by (x= central atom of the ion) 1) $ClO_4^- < SO_4^{2-} < PO_4^{3-} < SiO_4^{4-}$ 2) $ClO_4^- > SO_4^{2-} > PO_4^{3-} > SiO_4^{4-}$ 3) $PO_4^{3-} > SO_4^{2-} < ClO_4^- > SiO_4^{4-}$ 4) $SiO_4^{4-} < PO_4^{3-} > SO_4^{2-} > ClO_4^-$
98	In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is (are) 1) sp & sp^3 2) only sp^2 3) sp^2 & sp^3 4) sp^2 & sp
99	A diatomic molecule has a dipole moment of 1.2D. If the bond distance is 1.0Å. The fraction of an electronic charge, e, present on each atom is 1) 10% 2) 20% 3) 25% 4) 50%
100	In HCHO, there are X non-bonding electron pairs, Y σ- bonds and Z $\pi-$bonds, X, Y and Z are 1) 1, 1, 3 2) 2, 3, 1 3) 1, 2, 3 4) none of these
101	In Lewis formula of O_3, there are 1) $2\sigma, 1\pi, 4$ lone pairs 2) $1\sigma, 2\pi, 1$ lone pairs 3) $2\sigma, 2\pi, 3$ lone pairs 4) $2\sigma, 1\pi, 6$ lone pairs
102	The values of electronegativity of atoms A and B are 1.0 and 4.0 respectively. The percentage ionic character of A-B is 1) 90 2) 75.5 3) 50.0 4) 79.5

103	The correct order of lattice energies of the following ionic compounds is 1) $NaCl>MgCl_2>CaO>Al_2O_3$ 2) $NaCl>CaO>MgCl_2>Al_2O_3$ 3) $Al_2O_3>MgCl_2>CaO>NaCl$ 4) $Al_2O_3>CaO>MgCl_2>NaCl$
104	A molecule which possesses both sp^3 and sp^3d^2 hybridization is 1) $PCl_{5(g)}$ 2) $PCl_{5(s)}$ 3) $PCl_{5(l)}$ 4) none of these
105	Which of the following compounds has a 3 centre bond? 1) BF_3 2) NH_3 3) B_2H_6 4) CO_2
106	Which of the following conversions involve change in both hybridization and shape? 1) $CH_4 \rightarrow C_2H_6$ 2) $NH_3 \rightarrow NH_4^+$ 3) $BF_3 \rightarrow BF_4^-$ 4) $H_2O \rightarrow H_3O^+$
107	The melting point of RbBr is 682^0C while that of NaF is 988^0C. The principal reason for this fact is 1) the molar mass of NaF is less than that of RbBr 2) the bond in RbBr has more covalent character than in NaF 3) the difference in the electronegativity between Rb and Br is smaller than the difference between Na and F 4) the lattice energy of RbBr is less than the lattice energy of NaF because the internuclear distance $(r_c + r_a)$ is greater for RbBr than for NaF
108	Molecular shapes of SF_4, CF_4 and XeF_4 are 1) the same with 1,1 and 1 lone pair of electrons respectively on the central atom 2) the same with 1,0 and 2 lone pairs of electrons respectively on the central atom 3) different with 0,1 and 2 lone pairs of electrons respectively on the central atom 4) different with 1,0 and 2 lone pairs of electrons respectively on the central atom
109	The hybridization of orbitals of N atom in NO_3^-, NO_2^+ and NO_2^- are respectively 1) sp, sp^2, sp^3 2) sp^2, sp, sp^2 3) sp^3, sp, sp^2 4) sp^2, sp, sp
110	Pentagonal bipyramidal structure contains bond angles approximately 1) $120^0, 90^0, 180^0$ 2) $120^0, 72^0, 180^0$ 3) $72^0, 90^0, 180^0$ 4) $72^0, 90^0, 120^0$

111 How many resonating forms can be written for CO_2 and chlorate ions respectively?

1) 3, 2 2) 3, 3
3) 2, 3 4) 3, 4

112 For which of the following molecules have significant $(\mu \neq 0)$ dipole moment



1) I&II 2) I&III
3) II&III **4)** III&IV

113 The type of hybridisation on the five carbon atoms from left to right in the molecule.
$CH_3 - CH = C = CH - CH_3$ are:

1) $sp^3, sp^2, sp^2, sp^2, sp^3$ 2) $sp^3, sp, sp^2, sp^2, sp^3$
3) $sp^3, sp^2, sp, sp^2, sp^3$ 4) $sp^3, sp^2, sp^2, sp, sp^3$

114 Which among the following molecule contains Intra molecular Hydrogen Bond,

1) O-Nitro phenol 2) P-Nitro phenol
3) HF 4) Both 1 and 2

115 d^2SP^3 hybridisation is present in,

1) SF_6 2) BrF_5 3) $[CO(NH_3)_6]^{+3}$ 4) PCl_5

116 In which of the following processes, the bond order has increased and paramagnetic character has changed to diamagnetic?

1) $O_2 \rightarrow O_2^+$ 2) $O_2 \rightarrow O_2^{2-}$ 3) $N_2 \rightarrow N_2^+$ 4) $NO \rightarrow NO^+$

117 Among the following species, the diamagnetic molecules is

1) B_2 2) NO 3) O_2 4) CO

118 During the change of O_2 to O_2^-, the incoming electron goes to the orbital

1) $\sigma^* 2pz$ 2) $\pi 2py$ 3) $\pi^* 2px$ 4) $\pi 2px$

119	Identify the pair in which the geometry of the species is T-shape and square-pyramidal, respectively. 1) IO_3^- and $IO_2F_2^-$ 2) $XeOF_2$ and $XeOF_4$ 3) ICl_2^- and ICl_5 4) ClF_3 and IO_4^-
120	Which of the following conversions involves change in both shape and hybridization? 1) $BF_3 \rightarrow BF_4^-$ 2) $H_2O \rightarrow H_3O^+$ 3) $CH_4 \rightarrow C_2H_6$ 4) $NH_3 \rightarrow NH_4^+$
121	The intermolecular interaction that is dependent on the inverse cube of distance between the molecules is 1) London force 2) Hydrogen bond 3) Ion-ion interaction 4) Ion-dipole interaction
122	In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is(are) 1) sp and sp^3 2) sp and sp^2 3) Only sp^2 4) sp^2 and sp^3
123	Cation to anion radius ratio is more in 1) CsI 2) CsF 3) $LiBr$ 4) NaF
124	Which of the following combination gives strongest ionic bond 1) Na^+ and Cl^- 2) Mg^{2+} and Cl^- 3) Na^+ and O^{2-} 4) Mg^{2+} and O^{2-}
125	The bond angles of NH_3, NH_4^+, NH_2^- are in the order 1) $NH_2^- > NH_3 > NH_4^+$ 2) $NH_4^+ > NH_3 > NH_2^-$ 3) $NH_3 > NH_2^- > NH_4^+$ 4) $NH_3 > NH_4^+ > NH_2^-$
126	Select in which both have sea-saw shape? 1) XeO_2F_2, SiF_4 2) XeO_2F_2, SF_4 3) $TeCl_4, ICl_4^-$ 4) $TeCl_4$, $XeOF_2$
127	Isostructural species are those which have the same shape and hybridisation. Among the given species identify the isostructural pairs. 1) $[NF_3$ and $BF_3]$ 2) $[BF_4^-$ and $NH_4^+]$ 3) $[BCl_3$ and $BrCl_3]$ 4) $[NH_3$ and $NO_3^-]$
128	Select incorrect statement 1) Molecular orbital is polycentric 2) Bonding molecular orbitals are more stable than anti bonding molecular orbitals 3) Bond order in N_2 is 3 4) According to M.O.T. C_2 contains one 'sigma' and one 'pi' bond

129	In which of the following the hydration energy is higher than the lattice energy 1) $BaSO_4$ 2) $MgSO_4$ 3) $RaSO_4$ 4) $SrSO_4$
130	d^2SP^3 hybridisation is present in, 1) SF_6 2) BrF_5 3) $[CO(NH_3)_6]^{+3}$ 4) PCl_5

KEY

1	ANS-1 Sol: SP-S > SP^2-S>SP^3-S : C-H bond energy order
2	ANS-1 Sol: NH_4Cl contain 1 ioninc, 3 covalent, 1 dative bonds
3	ANS-2 Sol: N_2O_5 contains covalent and dative bonds
4	ANS-1 Sol: NO_2 and O_3 molecules will have permanent dipole moment
5	ANS-3 Sol: μ = charge x bond length $1.2x10^{-18}$ = charge x 10^{-8} Charge = $1.2x10^{-10}$ = $1/4^{th}$ of electron charge
6	ANS-3 Sol: CO_2, HCl, HF, H_2O 0, 1.07, 1.78, 1.85
7	ANS-1 Sol: $\mu = 2xbmx\cos\theta/2$ If θ is minimum μ is more
8	ANS-2 Sol: % ionic character = μ observed / μ calculated x 100 $\frac{1.6\times10^{-30}}{1.6\times10^{-19}\times10^{-10}}\times100=10$

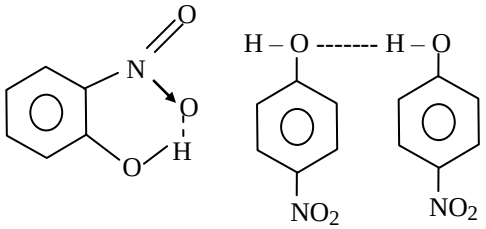
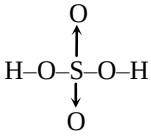
9	ANS-3 Sol: $CH_3Cl > CH_2Cl_2 > CHCl_3 > CCl_4$
10	ANS-1 Sol: The shape of SF_4 is - See saw
11	ANS-4 Sol: Molecular shapes of SF_4, CF_4 & XeF_4 are different with 1,0 and 2 lone pair of electrons 74. Which one of the following molecules is planar
12	ANS-4 Sol: BF_3 is trigonal planar
13	ANS-3 Sol: $NO \rightarrow NO^+$ Bond order is increased from 2.5-3 and magnetic behavior is changed from paramagnetic to diamagnetic
14	ANS-1 Sol: O_2^- is paramagnetic
15	ANS-1 Sol: Bond order is inversely proportional to bond length
16	ANS-1 Sol: O_2^{2-} as four antibonding electron pairs
17	ANS-4 Sol: Bond order is inversely proportional to bond length CO bond order = 3 CO_2 bond order = 2 CO_3^{2-} bond order = 4/3
18	ANS-1 Sol: The species CN^-, CO and NO^+ has same bond order three and isoelectronic
19	ANS-1 Sol: The double bond in C_2 molecule consists of both π bonds Four electrons are present in two π bonding molecular orbitals in C_2
20	ANS-2 Sol: H_2 is diamagnetic
21	ANS-2 Sol: Stability is proportional to bond order and stability decreases with increase in number of antibonding electrons
22	ANS-3 Sol: H_2O has higher boiling point than H_2S because of intermolecular hydrogen bonding in liquid H_2O

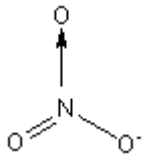
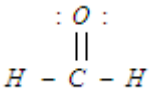
23	ANS-3 Sol: Bond order is inversely proportional to bond length In H_2O_2, O-O bond order = 1 In O_3, O-O bond order = 1.5 In O_2, O-O bond order = 2
24	ANS-3 Sol: NH_3 −107.8 BeF_2-180 H_2O-104.5 CH_4-109.5
25	ANS-1 Sol: H_2O molecule in ice can form four hydrogen bonds
26	ANS-3 Sol: Bonds present in $CuSO_4.5H_2O$ are Electrovalent, covalent, coordinate and hydrogen bonds
27	ANS-3 Sol: Maximum covalency of nitrogen is 4 but in structure II nitrogen has five bonds
28	ANS-3 Sol: AlF_3, CaC_2
29	ANS-3 Sol: Due to absence of mobility of ions
30	ANS-2 Sol: Ionic bond is formed b/w metal with low I.E and non metal with high electron affinity
31	ANS-3 Sol: LiCl is covalent & Nacl is ionic
32	ANS-1 Sol: As the charge on the cation increases ionic character decreases
33	ANS-4 Sol: MgS
34	ANS-1 Sol: As the charge on the cation increases degree of polarization increases
35	ANS-4 Sol: $ns^2np^6\ nd^{10}$
36	ANS-4 Sol: Expanded octet is super octet
37	ANS-4 Sol: S and P_x, P_x and P_z, P_y & P_z, P_x & P_y, S & P_y

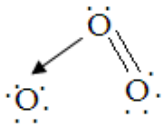
38	ANS-1 Sol: Boron hydrides are electron deficient compounds
39	ANS-2 Sol: -1, 0, +1
40	ANS-1 Sol: Lattice energy $\alpha \frac{Z^+Z^-}{r_c + r_a}$
41	ANS-2 Sol: $3d_{z^2}$
42	ANS-4 Sol: sp^3 – s & sp^3 –
43	ANS-2 Sol: sp^3
44	ANS-2 Sol: PCl_5
45	ANS-2 Sol: $\frac{Total\ charge}{no.of\ oxygen\ atoms} = \frac{-3}{4} = -0.75$
46	ANS-4
47	ANS-3
48	ANS-2 **Sol:** Lattice energy $\propto \frac{Z^+Z^-}{\left(r_c^+ + r_a^-\right)}$ where Z^+ is charge on cation and Z^- is charge on anion.
49	ANS-2 **Sol:** $AB_2E_2 \rightarrow H_2O,\ OF_2$
50	ANS-2 **Sol:** $XeOF_4 \rightarrow$ Square Ryamidal , Sp^3d^2
51	ANS-3

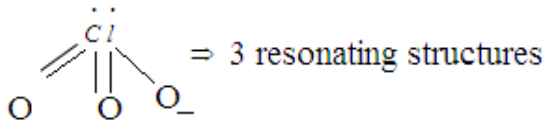
	Sol: $NO_2^-, NO_3^- \rightarrow Sp^2, Sp^2$
52	ANS-2 **Sol:** $MX_3, \mu = 0$ $\rightarrow$ **Planar** $\rightarrow Sp^2$ **%S = 33.3%**
53	ANS-1 **Sol:** $N_2 = B.O = 3$ $N_2^+ = B.O = 2.5$ $O_2 = B.O = 2$ $O_2^+ = B.O = 2.5$
54	ANS-1
55	ANS-2
56	ANS-3
57	ANS-1 Sol: $N_2 : \sigma_{1s}^2 \sigma^*_{1s}{}^2 \sigma_{2s}{}^2 \sigma^*_{2s}{}^2 \left(\pi_{2p_x}^2 = \pi_{2p_y}^2\right) \sigma_{2p_z}^2$ $O_2 : \sigma_{1s}^2 \sigma^*_{1s}{}^2 \sigma_{2s}{}^2 \sigma^*_{2s}{}^2 \sigma_{2p_z}^2 \left(\pi_{2p_x}^2 = \pi_{2p_y}^2\right)\left(\pi^*_{2p_x}{}^1 = \pi^*_{2p_y}{}^1\right)$
58	ANS-2 Sol: $B_2 : \sigma_{1s}^2 \sigma^*_{1s}{}^2 \sigma_{2s}{}^2 \sigma^*_{2s}{}^2 \left(\pi_{2p_x}^1 = \pi_{2p_y}^1\right)$
59	ANS-1 $N_2 \rightarrow N_2^+$
60	ANS-3 Sol: B.O. in $C_2 = \frac{8-4}{2} = 2$
61	ANS-1 Sol: In NH_3, the hydrogen is partially +vely charged
62	ANS-3 Sol: 1s never from $\pi-$ molecular orbital

63	ANS-4
64	ANS-4 Sol: If we consider no mixing of 2s and 2p orbitals, then $C_2 = \sigma_{1s2}\sigma^*_{1s2}\sigma_{2s2}\sigma^*_{2s2}\sigma_{2p_z^2}\left(\pi_{2p_x^1} = \pi_{2p_y^1}\right)$ B.O = $\frac{8-4}{2} = 2$; paramagnetic
65	ANS-2 Sol: Glycerol has more no. of OH groups than alcohol
66	ANS-1 Sol: The stability of a molecule α bond order Bond order : $Li_2 = 1; Li_2^- = 0.5; Li_2^+ = 0.5$ Though Li_2^+ and Li_2^- ions have same B.O; Li_2^- is less stable because its valence electron is present in anti bonding M.O
67	ANS-3
68	ANS-3 Sol: All the given contain dative bonds
69	ANS-1
70	ANS-2 Sol: The unpaired electron is present in σ_{2P_Z}
71	ANS-3 Sol: According to molecular orbital configurations
72	ANS-1 Sol: In KO_2, O_2^- □ (superoxide) has one unpaired electron and NO_2 also has one unpaired electron. Thus, KO_2 and NO_2 are paramagnetic
73	ANS-2 Sol: B The combining atomic orbitals must have the same symmetry about the molecular axis
74	ANS-2 Sol: Because it does not lead to bond formation.
75	ANS-4 Sol: O_2^+ 5/2

	O_2^- 3/2 NO 2.5
76	ANS-1 Sol: Fact
77	ANS-4 Sol: N_2^+ is paramagnetic[D]
78	ANS-3 Sol: It forms extensive intramolecular hydrogen bonding
79	ANS-1 Sol: Since it has intramolecular H bonding
80	ANS-2 Sol: In all other cases hydrogen bonding dominates other forces
81	ANS-1 Sol: Has intra molecular H-bonding
82	ANS-3 Sol: F being most electronegative will yield strongest H–bond
88	ANS-1  Sol: Intramolecular H-bond intermolecular H-bond and steam volatile and boiling pt. is higher.
84	ANS-2 Sol: Molecular mas is relatively less and no H- bonding
85	In which case hydrogen bond will not be observed - 1) $H_3O_2^-$ 2) H_2O 3) HF **4)** AsH_3 Sol: It cannot form H- bondindg
86	ANS-4 Sol: H_2SO_4 

87	ANS-1 Sol: 
88	ANS-2 Sol: $O_2^+ = 2.5$ & $O_2 = 2$
89	ANS-4 Sol: O_2 has 10 bonding electrons and 6 anti bonding electrons and 6 anti bonding electrons.
90	ANS-2 Sol: $H-C\rightleftharpoons N$
91	ANS-4 Sol: It depends upon whether the molecule belongs to before N_2 or after N_2
92	ANS-2 Sol: NCERT- XI page no. 126
93	ANS-2 Sol: Since no of electrons are same bond orders are also same. NCERT page no. 105
94	ANS-1 Sol: Ncert- XI Page no 104
95	ANS-2
95	ANS-3
97	ANS-2
98	ANS-4 Sol: $CH_2 = C = CH_2$
99	ANS-3 Sol: Partial charge $= \frac{1.2\times10^{-18}}{1.0\times10^{-8}} = 1.2\times10^{-10}$ esu The fraction of an electronic charge is $= \frac{1.2\times10^{-10}}{4.8\times10^{-10}} = 0.25$ or 25%
100	ANS-2  Sol:

	 It has $2\sigma,1\pi$ and 6 lone pairs
101	ANS-4 Sol: $CaC_2 \Rightarrow Ca^{+2}\ \&\ C_2^{2-}$ $\bar{C} \equiv \bar{C}$
102	ANS-4 Sol: % of ionic character=$16(x_A - x_B) + 3.5(x_A - x_B)^2$
103	ANS-4 Lattice energy depends on charge and size of the ions
104	ANS-2 $PCl_{5(s)}$ is an ionic species i.e., $[PCl_4]^+\ \&\ [PCl_6]^-$ $[PCl_4]^+ \Rightarrow sp^3$ $[PCl_6]^- \Rightarrow sp^3d^2$
105	ANS-2 $BF_3 \Rightarrow sp^2\ \&\ Triangular\ \ planar$ $BF_4^- \Rightarrow sp^3\ \&\ Tetrahedral$
106	ANS-3 Sol: $BF_3 \Rightarrow sp^2\ \&\ Triangular\ \ planar$ $BF_4^- \Rightarrow sp^3\ \&\ Tetrahedral$
107	ANS-4 Sol: Lattice energy of NaF>Lattice energy of RbBr
108	ANS-4 Sol: $SF_4 \Rightarrow$ see-saw $(1$lonevpair$)$ $CF_4 \Rightarrow$ Tetrahedral $(0$ lonevpair$)$ $XeF_4 \Rightarrow$ Square planar(2 lone pairs)
109	ANS-2 Sol: $NO_3^- \Rightarrow sp^2, NO_2^+ \Rightarrow sp, NO_2^- \Rightarrow sp^2$
110	ANS-3 Sol: $72^0, 90^0, 180^0$

111	ANS-2 Resonance energy =energy of most stable resonating structure - energy of actual structure Sol: O=C=O $\Rightarrow$ 3 resonating structures  $\Rightarrow$ 3 resonating structures
112	ANS-4 Sol: For III & IV $\Rightarrow \mu \neq 0$
113	ANS-3 Sol: sp^3, sp^2, sp, sp^2, sp^3
114	Ans-1
115	Ans-3
116	Ans-4
117	Ans-4
118	Ans-3
119	Ans-2
120	Ans-1
121	Ans-2
122	Ans-2
123	Ans-2
124	Ans-2
125	Ans-2
126	Ans-2
127	Ans-2

128	Ans-4
129	Ans-2
130	Ans-3