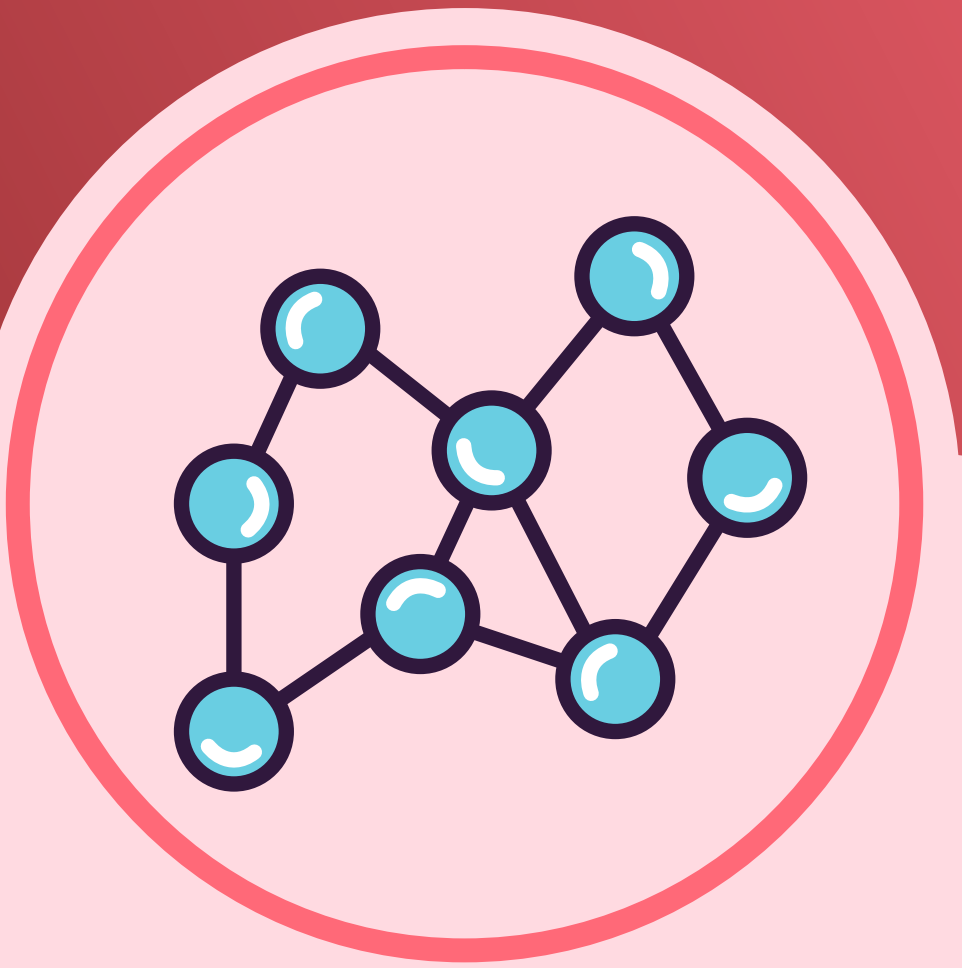
PRE-MEDICAL

INORGANIC CHEMISTRY

ENTHUSIAST | LEADER | ACHIEVER



EXERCISE

Chemical Bonding

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) — Build Up Your Understanding

OCTET RULE :

1. Which among the following shows the limitation of Lewis octet rule ?
(1) CH_4 (2) NO (3) CO_2 (4) NH_4^+
CB0326

2. Which of the following is an example of expanded octet ?
(1) SF_6 (2) PF_5
(3) H_2SO_4 (4) All of these
CB0327

COVALENT BOND :

3. The strength of bonds by 2s - 2s, 2p - 2p and 2p -2s overlapping has the order :-
(1) s – s > p – p > s – p (2) s – s > p – s > p –p
(3) p – p > s – p > s – s (4) p – p > s – s > p –s
CB0003

4. In which of the excitation state of chlorine ClF_3 is formed:-
(1) In ground state
(2) In third excitation state
(3) In first excitation state
(4) In second excitation state
CB0004

5. A sigma bond is formed by the overlapping of :–
(1) s-s orbital alone
(2) s and p orbitals alone
(3) s–s, s–p or p–p orbitals along internuclear axis
(4) p–p orbital along the sides
CB0005

6. Which overlapping is involved in HCl molecule :–
(1) s–s overlap (2) p–p overlap
(3) s–d overlap (4) s–p overlap
CB0006

7. Which is not characteristic of π-bond:-
(1) π - bond is formed when a sigma bond already formed
(2) π - bond are formed from hybrid orbitals
(3) π - bond may be formed by the overlapping of p-orbitals
(4) π-bond results from lateral overlap of atomic orbitals
CB0007

8. π bond is formed :-
(1) By overlapping of hybridised orbitals
(2) Overlapping of s - s orbitals
(3) Head on overlapping of p -p orbitals
(4) By p - p collateral overlapping
CB0008

9. p–p overlapping will be observed in the molecules of:
(1) Hydrogen (2) Hydrogen bromide
(3) Hydrogen chloride (4) Chlorine
CB0010

10. Which compound of xenon is not possible
(1) XeF_2 (2) XeF_4 (3) XeF_5 (4) XeF_6
CB0011

11. Higher is the bond order, greater is -
(1) Bond dissociation energy
(2) Covalent character
(3) Bond length
(4) Paramagnetism
CB0013

12. Which condition is not favourable for the combination of atomic orbitals :-
(1) The combining atomic orbitals nearly have the same energy
(2) The combining atomic orbitals must have the same symmetry about the molecular axis
(3) The combining orbitals must overlap to the maximum extent
(4) The combining orbital must overlap to the minimum extent
CB0328

HYBRIDISATION

13. In the protonation of H_2O, change occurs in
(1) Hybridisation state of oxygen
(2) Shape of molecule
(3) Hybridisation and shape both
(4) None
CB0014

14. In the compound
$\overset{1}{CH_2}=\overset{2}{CH}-\overset{3}{CH_2}-\overset{4}{CH_2}-\overset{5}{C}\equiv\overset{6}{CH}$, the $C^2 - C^3$ bond is formed by the overlapping of :-
(1) $sp - sp^2$ (2) $sp^3 - sp^3$
(3) $sp - sp^3$ (4) $sp^2 - sp^3$
CB0015

15. Which of the following elements can not exhibit sp^3d hybridisation state:-

(a) C (b) P (c) Cl (d) B

Correct answer is:-

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

CB0018

16. Which of the following species are expected to be planar:-

(a) NH_3 (b) NH_3^{2+} (c) CH_3^+ (d) PCl_3

The correct answer is:-

(1) b and c (2) c and d

(3) b and d (4) a and d

CB0019

17. In which following set of compound/ion has linear shape

(1) CH_4, NH_4^+, BH_4^- (2) CO_3^{-2}, NO_3^-, BF_3

(3) NO_2^+, CO_2, XeF_2 (4) $BeCl_2$, BCl_3, CH_4

CB0020

18. Which of the following set is not correct:–

(1) SO_3, O_3, NH_4^+ all have coordinate bonds

(2) H_2O, NO_2, ClO_2^-, all are 'V' shape molecules

(3) I_3^-, lCl_2^-, NO_2^+ ; all are linear molecules

(4) SF_4, SiF_4, XeF_4 are tetrahedral in shape

CB0022

19. Shape of a molecule having 4 bond pairs and two lone pairs of electrons, will be :-

(1) Square planar (2) Tetra hedral

(3) Linear (4) Octa hedral

CB0023

20. The shape of IF_4^+ will be :-

(1) Square planar

(2) Tetrahedral

(3) Pentagonal bipyramidal

(4) Distorted tetrahedral

CB0024

21. Which of the following has pyramidal shape ?

(1) BF_3 (2) H_3O^+

(3) NO_3^- (4) CO_3^{2-}

CB0025

22. A σ bonded molecule MX_3 is T–shaped. The number of non–bonding pairs of electrons is

(1) 0

(2) 2

(3) 1

(4) Can be predicted if atomic number of M is known.

CB0026

23. Amongst CO_3^{2-}, AsO_3^{3-}, XeO_3, ClO_3^-, BO_3^{3-} and SO_3^{2-} the non-planar species are :-

(1) XeO_3, ClO_3^-, SO_3^{2-}, AsO_3^{3-}

(2) AsO_3^{3-}, XeO_3, CO_3^{-2}

(3) BO_3^{3-}, CO_3^{2-}, SO_3^{2-}

(4) AsO_3^{3-}, BO_3^{3-}, CO_3^{2-}

CB0027

24. The type of hybrid orbitals used by chlorine atom in ClO^-, ClO_2^-, ClO_3^- and ClO_4^- is/are :-

(1) sp, sp^2, sp^3 and sp^3d (2) sp and sp^3

(3) Only sp^3 (4) only sp

CB0028

25. On the basis of hybridization of one s & one p orbitals they are arrange at :-

(1) Two orbitals mutually at 90° angle

(2) two orbitals mutually at 180° angle

(3) Two orbitals mutually at 120°angle

(4) Two orbitals mutually at 150° angle

CB0029

26. Which of the following having a square planar structure is

(1) NH_4^+ (2) BF_4^-

(3) XeF_4 (4) CCl_4

CB0030

27. When p-character of hybridised orbital (formed by s and p orbitals) increases. Then the bond angle

(1) Decreases (2) Increases

(3) Becomes twice (4) Remains unaltered

CB0031

28. Which orbitals overlap to form bond in OF_2

(1) sp^3 – 2p (2) sp^2–2p

(3) sp – 2p (4) p – p

CB0032

29. Among the following orbitals/bonds, the angle is minimum between :

(1) sp^3 bonds

(2) p_x and p_y orbitals

(3) H—O—H bond in water

(4) sp bonds

CB0034

30. The AsF_5 molecule is trigonal bipyramidal. The hybrid orbitals used by the As atoms for bonding are:

(1) $d_{x^2-y^2}, d_{z^2}, s, p_x, p_y$ (2) d_{xy}, s, p_x, p_y, p_z

(3) $s, p_x, p_y, p_z, d_{z^2}$ (4) $d_{x^2-y^2}, s, p_x, p_y$

CB0036

31. When the hybridization state of carbon atom changes from sp^3, sp^2 and sp, the angle between the hybridized orbitals.

(1) decrease considerably

(2) increase progressively

(3) decrease gradually

(4) all of these

CB0037

32. The hybridization states of the central atoms of the ions I_3^-, ICl_4^- and ICl_2^- are respectively :

(1) sp^2, sp^3d, sp^3

(2) sp^3d, sp^3d^2 and sp^3d

(3) sp^3d, sp^3d, sp

(4) sp, sp, sp^2

CB0038

33. Molecular shapes of SF_4, CF_4 and XeF_4 are :-

(1) The same, with 2, 0 and 1 lone pairs of electrons respectively

(2) The same, with 1,1 and 1 lone pairs of electrons respectively

(3) Different, with 0,1 and 2 lone pairs of electrons respectively

(4) Different, with 1,0 and 2 lone pairs of electrons respectively

CB0039

34. Which of the following two are isostructural :-

(1) XeF_2, IF_2^- (2) NH_3,BF_3

(3) CO_3^{2-},SO_3^{2-} (4) PCl_5, ICl_5

CB0040

35. Select the correct matching :

List I		List II	
A : XeF_4		1. Pyramidal	
B : XeF_6		2. T-shape	
C : XeO_3		3. Distorted octahedral	
D : $XeOF_2$		4. Square planar	
A	B	C	D
(1) 4	3	1	2
(2) 1	2	3	4
(3) 2	1	3	4
(4) 4	1	3	2

CB0041

36. Which one of the following pair is a correct with respect to molecular formula of xenon compound and hybridization state of xenon in it :

(1) XeF_4,sp^3 (2) XeF_2,sp

(3) XeF_2,sp^3d (4) XeF_4,sp^2

CB0042

37. The molecule does not have bent shape :-

(1) SO_2 (2) O_3

(3) H_2O (4) NH_4^+

CB0329

38. Which among the given choices does not have the same hybridisation and geometry of $(PCl_6)^-$?

(1) $(SiF_6)^{2-}$

(2) XeF_6

(3) SF_6

(4) $[Al(H_2O)_6]^{3+}$

CB0330

39. Incorrect regarding the hybridisation is :-

(1) The number of hybrid orbitals are equal to the number of the atomic orbitals that get hybridised

(2) The hybrid orbital are always equivalent in energy and shape

(3) The hybrid orbitals are more effective in forming stable bonds than the pure atomic orbitals

(4) Overlapping and hybridisation are same phenomenon

CB0331

40. The percent s-character in CH_4 is :-

(1) 100% (2) 45% (3) 75% (4) 25%

CB0332

DIPOLE MOMENT

41. Which statement is correct:-
(1) All the compounds having polar bonds, have dipole moment
(2) SO_2 is non-polar
(3) H_2O molecule is non polar, having polar bonds
(4) PH_3 is polar molecule having non polar bonds

CB0044

42. BeF_2 has zero dipole moment where as H_2O has a dipole moment because :-
(1) Water is linear
(2) H_2O is bent
(3) F is more electronegative than O
(4) Hydrogen bonding is present in H_2O

CB0045

43. Which of the following molecule have zero dipole moment:-
(1) BF_3 (2) CH_2Cl_2
(3) NF_3 (4) SO_2

CB0047

44. The dipole moment of NH_3 is:-
(1) Less than dipole moment of NCl_3
(2) Higher than dipole moment of NCl_3
(3) Equal to the dipole moment of NCl_3
(4) None of these

CB0048

45. Which set of molecules is polar :-
(1) XeF_4, IF_7, SO_3 (2) PCl_5, C_6H_6, SF_6
(3) $SnCl_2$, SO_2, NO_2 (4) CO_2, CS_2, C_2H_6

CB0050

46. Which of the following has symmetrical structure :
(1) PCl_3 (2) CH_2Cl_2
(3) $CHCl_3$ (4) CCl_4

CB0051

47. Species having zero dipole moment :-
(1) XeF_4
(2) 1,2,4 trichloro benzene
(3) SF_4
(4) CH_2Cl_2

CB0052

48. What conclusion can be drawn from the fact that BF_3 has no dipole moment but PF_3 does
(1) BF_3 is not symmetrical but PF_3 is
(2) BF_3 molecule must be linear
(3) Atomic radius of P is larger than that of B
(4) BF_3 molecule must be planar triangular

CB0053

49. PCl_5 is non polar because :-
(1) P – Cl bond is non-polar
(2) Its dipole moment is zero
(3) P – Cl bond is polar
(4) P & Cl have equal electronegativity

CB0054

50. Dipole moment of CO_2 is zero which implies that :
(1) Carbon and oxygen have equal electronegativities
(2) Carbon has no polar bond
(3) CO_2 is a linear molecule
(4) Carbon has bond moments of zero value

CB0055

51. The correct order of dipole moment is :
(1) $CH_4 < NF_3 < NH_3 < H_2O$
(2) $NF_3 < CH_4 < NH_3 < H_2O$
(3) $NH_3 < NF_3 < CH_4 < H_2O$
(4) $H_2O < NH_3 < NF_3 < CH_4$

CB0056

52. Which of the following has the highest value of dipole moment :
(1) HCl (2) HF (3) HI (4) HBr

CB0058

53. Which compounds have permanent dipole moment:-
(A) BF_3 (B) SiF_4 (C) SF_4 (D) XeF_4
(E) XeF_2 (F) $CHCl_3$
(1) A & B (2) C & D (3) D, E & F (4) C & F

CB0333

54. Which molecule has largest dipole moment :-
(1) CH_4 (2) $CHCl_3$ (3) CCl_4 (4) CHI_3

CB0334

55. Which of the following is the most polar :-
(1) CCl_4 (2) $CHCl_3$ (3) CH_2Cl_2 (4) CH_3Cl

CB0335

56. The molecule does not have zero dipole moment :-
(1) CO_2 (2) CCl_4 (3) BF_3 (4) HCl

CB0336

57. Which of the following compound possess dipole moment :-
(1) Water (2) Boron trifluoride
(3) Benzene (4) Carbon tetra chloride

CB0337

MOLECULAR ORBITAL THEORY

58. The ion that is isoelectronic with CO and having same bond order is :-
(1) CN^- (2) O_2^+ (3) O_2^- (4) N_2^+
CB0059

59. Which of the following is paramagnetic:-
(1) O_2^- (2) CN^- (3) CO (4) NO^+
CB0060

60. In the following which of the two are paramagnetic
(a) N_2 (b) CO (c) B_2 (d) NO_2
Correct answer is :-
(1) a and c (2) b and c
(3) c and d (4) b and d
CB0061

61. The bond order of CO molecule on the basis of molecular orbital theory is
(1) Zero (2) 2 (3) 3 (4) 1
CB0062

62. The no. of antibonding electron pair in O_2^- is
(1) 4 (2) 3 (3) 8 (4) 10
CB0064

63. Which of the following species will have the minimum bond energy
(1) N_2 (2) N_2^- (3) N_2^+ (4) N_2^{-2}
CB0065

64. Which of the following ion do not have bond order of 2.5 ?
(1) O_2^- (2) O_2^+ (3) N_2^+ (4) N_2^-
CB0066

65. The electron adds to which one of the following orbitals during change of N_2 to N_2^-.
(1) σ orbital (2) σ* orbital
(3) π* orbital (4) π orbital
CB0338

66. In which of the following species removal of electron exhibit a decrease in paramagentic behavior ?
(1) F_2 (2) N_2 (3) C_2 (4) B_2
CB0339

67. Pick the wrong statement w.r.t. molecular orbital theory (MOT).
(1) Participation of orbitals of comparable energies takes place.
(2) The electron is under the influence of two or more than two nuclie.
(3) The molecular orbital formed is equal to the number of atomic orbitals combined.
(4) The probablity of electron distribution in a molecule is given by atomic orbitals only.
CB0340

68. Which among the following species is does not exist?
(1) He_2^+ (2) H_2^+ (3) H_2^- (4) Be_2
CB0341

69. Which of the given statements is not correct ?
(1) Electron density in a bonding molecular orbital is located between the bonded atoms.
(2) Electron cloud is located away from the space between the nuclei in anti-bonding molecular orbital
(3) In anti-bonding molecular orbital there is always a nodal plane
(4) The total energy of the molecular orbitals varies from the original energies of atomic orbitals
CB0342

70. The given species not having the same bond order as of other three :-
(1) He_2^+ (2) H_2^+ (3) H_2^- (4) Li_2
CB0343

71. The minimum bond length will be observed in :-
(1) O_2 (2) O_2^- (3) O_2^+ (4) O_2^{2-}
CB0344

72. Which among the given pair of molecules consists only of Pi(π) bonds ?
(1) B_2 and F_2 (2) B_2 and C_2
(3) N_2 and O_2 (4) C_2 and N_2
CB0345

73. Which molecule does not exist :-
(1) He_2 (2) O_2 (3) N_2 (4) B_2
CB0346

74. Which is correct electronic configuration for C_2 molecule according to M.O.T.
(1) $KK(\sigma 2s)^2\ (\sigma^*2s)^2\ (\pi 2p_x^{\ 2} = \pi 2p_y^{\ 2})$
(2) $KK(\sigma 2s^2)\ (\sigma^*2s)^2\ (\pi 2p_x^{\ 1} = \pi 2p_y^{\ 1})\ \sigma 2p_z^{\ 2}$
(3) $KK(\sigma^*2s^2)\ (\sigma 2s)^2\ (\pi 2p_x^{\ 2} = \pi 2p_y^{\ 2})$
(4) $KK(\sigma 2s^2)\ (\sigma^*2s^2)^2\ \sigma 2p_z^{\ 2}\ (\pi 2p_x^{\ 1} = \pi 2p_y^{\ 1})$
CB0347

75. The molecule/species having highest bond order :-
(1) O_2 (2) O_2^- (3) O_2^+ (4) O_2^{-2}
CB0348

76. The calculated bond order in H_2^- ion is :-
(1) 0 (2) $\frac{1}{2}$ (3) $-\frac{1}{2}$ (4) 1
CB0349

77. O_2 molecule is paramagnetic due to :-
(1) it contains 2 unpaired electrons in π^*2p_x and π^*2p_y molecular orbitals
(2) it contains no unpaired electrons in π^*2p_x and π^*2p_y molecular orbitals
(3) it contains 2 paired electrons in $\sigma 2s$ orbital
(4) it contains 1 unpaired electrons in $\sigma 2s$ orbital

CB0350

78. Which is not correct according to M.O.T.
(1) $N_b > N_a$ Positive bond order
(2) $N_b < N_a$ Negative bond order
(3) $N_b = N_a$ Zero bond order
(4) $N_b > N_a$ Negative bond order

CB0351

79. The molecule having bond order 3 is :-
(1) H_2 (2) N_2 (3) O_2 (4) He_2^+

CB0352

80. Which is correct electronic configuration for singly positive nitrogen molecule :-
(1) $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \pi 2p_x^2\ \pi 2p_y^2\ \sigma 2p_z^1$
(2) $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p_x^2\ \pi 2p_x^2\ \pi^*2p_z^1$
(3) $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p_z^2\ \pi 2p_x^2\ \pi 2p_y^2$
(4) $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2\ \sigma 2p_z^2\ \pi 2p_x^1\ \pi 2p_z^1$

CB0353

81. Two nodal planes are present in :-
(1) π^*2p_x (2) $\sigma 2p_z$ (3) $\pi 2p_x$ (4) $\pi 2p_y$

CB0354

82. Which is the most stable :-
(1) N_2 (2) N_2^+ (3) N_2^- (4) N_2^{-2}

CB0355

83. Which set of molecules having same sequence of energy levels.
(1) B_2, O_2, N_2 (2) O_2, Be_2, F_2
(3) B_2, C_2, N_2 (4) N_2, O_2, B_2

CB0356

COORDINATE BOND

84. In Co-ordinate bond, the acceptor atoms must essentially contain in its valence shell an orbital:-
(1) With paired electron (2) With single electron
(3) With no electron (4) With three electron

CB0068

85. The bonds present in N_2O_5 are :–
(1) Only ionic
(2) Covalent & coordinate
(3) Only covalent
(4) Covalent & ionic

CB0069

86. Dative bond is present in
(1) SO_3 (2) NH_3
(3) K_2CO_3 (4) BF_3

CB0070

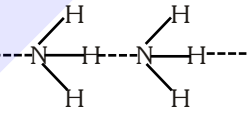
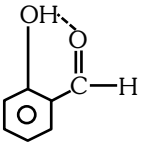
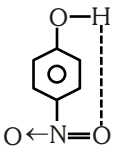
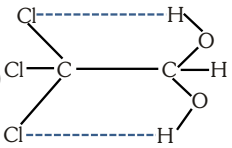
87. The compound containing co-ordinate bond is :
(1) H_2SO_4 (2) O_3
(3) SO_3 (4) All of these

CB0072

WEAK FORCES

88. Intermolecular hydrogen bonds are not present in:-
(1) CH_3CH_2OH (2) CH_3COOH
(3) $C_2H_5NH_2$ (4) CH_3OCH_3

CB0074

89. In which of the following molecule, the shown hydrogen bond is not possible:-
(1) 
(2) 
(3) 
(4) 

CB0075

90. Correct order of volatility is:-
(1) HF > HCl > HBr > HI
(2) HCl > HBr > HI > HF
(3) HI > HBr > HCl > HF
(4) HBr < HCl < HI < HF

CB0076

91. The correct order of volatility is:-
(1) $NH_3 < H_2O$
(2) p– nitro phenol < o– nitro phenol
(3) $CH_3OH > CH_3 – O– CH_3$
(4) HF > HCl

CB0077

92. The incorrect order of decreasing boiling points is
(1) $NH_3 > AsH_3 > PH_3$
(2) $H_2O > H_2Se > H_2S$
(3) $Br_2 > Cl_2 > F_2$
(4) $CH_4 > GeH_4 > SiH_4$

CB0078

93. Acetic acid exists as dimer in benzene due to:-
(1) Condensation reaction
(2) Hydrogen bonding
(3) Presence of carboxyl group
(4) None of the above

CB0079

94. Maximum no. of hydrogen bonds formed by a water molecule in ice is
(1) 4 (2) 3 (3) 2 (4) 1

CB0080

95. Strongest hydrogen bond is shown by :
(1) Water (2) Ammonia
(3) Hydrogen fluoride (4) Hydrogen sulphide

CB0081

96. Density of ice is less than that of water because of
(1) presence of hydrogen bonding
(2) crystal modification of ice
(3) open cage like structure of ice due to hydrogen bonding
(4) different physical states of these

CB0082

97. NH_3 has abnormally high boiling point because it has :
(1) Alkaline nature (2) Distorted shape
(3) sp^3 - Hybridisation (4) Hydrogen bonding

CB0083

98. Which of the following is soluble in water ?
(1) CS_2 (2) C_2H_5OH
(3) CCl_4 (4) $CHCl_3$

CB0084

99. KF combines with HF to form KHF_2. The compound contains the species :
(1) K^+, F^- and H^+ (2) K^+, F^- and HF
(3) K^+ and $[HF_2]^-$ (4) $[KHF]^+$ and F_2

CB0085

IONIC BOND

100. Which one is the correct statement with reference to solubility of $MgSO_4$ in water:
(1) Hydration energy of $MgSO_4$ is higher in comparison to its lattice energy
(2) Ionic potential of Mg^{2+} is very low
(3) SO_4^{2-} ion mainly contributes towards hydration energy
(4) Size of Mg^{2+} and SO_4^{2-} are similar

CB0088

101. Conditions for ionic bond formation is/are :
(a) Small cation, large anion
(b) Low IP of cation, high electron affinity of anion
(c) Large cation, small anion and less charge
(d) Less lattice energy
Correct answer is:
(1) a, d (2) b, c and d
(3) b and c (4) a, b

CB0089

102. The force responsible for dissolution of ionic compound in water is –
(1) Dipole – dipole forces
(2) Ion – dipole force
(3) Ion – ion force
(4) Hydrogen bond

CB0091

103. Born Haber cycle is mainly used to determine
(1) Lattice energy (2) Electron affinity
(3) Ionisation energy (4) Electronegativity

CB0092

104. An ionic compound $A^+ B^-$ is most likely to be formed when –
(1) Ionization energy of A is low
(2) Electron affinity of B is high
(3) Electron affinity of B is low
(4) Both (1) and (2)

CB0093

105. Highest melting point would be of
(1) $AlCl_3$ (2) LiCl
(3) NaCl (4) $BeCl_2$

CB0096

106. As compared to covalent compounds electrovalent compounds generally possess
(1) High m.p. and high b.p.
(2) Low m.p. and low b.p.
(3) Low m.p. and high b.p.
(4) high m.p. and low b.p.

CB0098

107. The electronic configuration of metal M is $1s^2\ 2s^2\ 2p^6\ 3s^1$. The formula of its oxide will be :
(1) MO (2) M_2O (3) M_2O_3 (4) MO_2
CB0099

108. Which of the following does not show electrical conduction ?
(1) diamond
(2) graphite
(3) sodium chloride (fused)
(4) potassium
CB0102

109. The most covalent halide is:-
(1) AlF_3 (2) $AlCl_3$ (3) $AlBr_3$ (4) AlI_3
CB0103

110. Ionic potential (ϕ) of electropositive element will be highest in which of the following compound:-
(1) CsCl (2) $MgCl_2$ (3) AlF_3 (4) SF_6
CB0104

111. LiCl is soluble in organic solvent while NaCl is not because :-
(1) Lattice energy of NaCl is less than that of LiCl
(2) Ionisation potential of Li is more than that of Na
(3) Li^+ has more hydration energy than Na^+ ion
(4) LiCl is more covalent compound than that NaCl
CB0105

112. The most stable carbonate is
(1) Li_2CO_3 (2) $BeCO_3$
(3) $CaCO_3$ (4) $BaCO_3$
CB0106

113. Correct order of covalent character of alkaline earth metal chloride in
(1) $BeCl_2 < MgCl_2 < CaCl_2 < SrCl_2$
(2) $BeCl_2 < CaCl_2 < SrCl_2 < MgCl_2$
(3) $BeCl_2 > MgCl_2 > CaCl_2 > SrCl_2$
(4) $SrCl_2 > BeCl_2 > CaCl_2 > Mg\ Cl_2$
CB0107

114. Which of the compound is least soluble in water
(1) AgF (2) AgCl (3) AgBr (4) AgI
CB0108

115. CCl_4 is more covalent than LiCl because :
(1) There is more polarization of Cl in CCl_4
(2) There is more polarization of Cl in LiCl
(3) CCl_4 has more weight
(4) None of above
CB0109

116. The correct order of decreasing polarisable ions is:
(1) Cl^-, Br^-, I^-, F^- (2) F^-, I^-, Br^-, Cl^-
(3) F^-, Cl^-, Br^-, I^- (4) I^-, Br^-, Cl^-, F^-
CB0111

117. Ionic conductances of hydrated M^+ ions are in the order –
(1) $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq)$
(2) $Li^+(aq) > Na^+(aq) < K^+(aq) < Rb^+(aq) < Cs^+(aq)$
(3) $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) < Cs^+(aq)$
(4) $Li^+(aq) < Na^+(aq) < K^+(aq) < Rb^+(aq) < Cs^+(aq)$
CB0112

118. Which of the following does not give an oxide on heating –
(1) $MgCO_3$ (2) Li_2CO_3 (3) $ZnCO_3$ (4) K_2CO_3
CB0114

119. Which decomposes on heating –
(1) NaOH (2) KOH (3) LiOH (4) RbOH
CB0115

120. Which of the following forms metal oxide on heating
(1) Na_2CO_3 (2) Li_2CO_3
(3) K_2SO_4 (4) $NaHCO_3$
CB0116

121. Increasing order of stability of –
I. K_2CO_3 II.$MgCO_3$ III Na_2CO_3
(1) I < II < III (2) II < III < I
(3) II < I < III (4) I < III < II
CB0117

122. Which of the following carbonate will not decompose on heating :-
(1) $BaCO_3$ (2) $ZnCO_3$
(3) Na_2CO_3 (4) Li_2CO_3
CB0118

123. Correct order of melting point is ?
(1) $SnCl_2 > SnCl_4$ (2) $SnCl_4 > SnCl_2$
(3) $SnCl_2 = SnCl_4$ (4) None of these
CB00357

124. Which of the following suffers a weight loss on heating :-

(1) Li_2CO_3 (2) Washing soda

(3) both (1) & (2) (4) None

CB0358

125. On heating Na_2CO_3 gives :-

(1) $Na_2O + CO_2$ (2) $Na_2 + CO_3$

(3) $Na + CO_2$ (4) None

CB0359

126. Correct order of melting point is :-

(1) $NaF < MgF_2 < AlF_3$

(2) $AlF_3 > NaF > MgF_2$

(3) $MgF_2 < NaF < AlF_3$

(4) None

CB0360

EXERCISE-I (Conceptual Questions) ANSWER'S KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**4**	**3**	**3**	**3**	**4**	**2**	**4**	**4**	**3**	**1**	**4**	**2**	**4**	**2**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**3**	**4**	**1**	**4**	**2**	**2**	**1**	**3**	**2**	**3**	**1**	**1**	**2**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**2**	**2**	**4**	**1**	**1**	**3**	**4**	**2**	**4**	**4**	**4**	**2**	**1**	**2**	**3**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**1**	**4**	**2**	**3**	**1**	**2**	**4**	**2**	**4**	**4**	**1**	**1**	**1**	**3**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**3**	**2**	**4**	**1**	**3**	**4**	**4**	**4**	**4**	**4**	**3**	**2**	**1**	**1**	**3**
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	**2**	**1**	**4**	**2**	**1**	**1**	**1**	**3**	**3**	**2**	**1**	**4**	**4**	**3**	**2**
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	**2**	**4**	**2**	**1**	**3**	**3**	**4**	**2**	**3**	**1**	**3**	**2**	**1**	**4**	**3**
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	**1**	**2**	**1**	**4**	**4**	**4**	**4**	**3**	**4**	**1**	**4**	**4**	**4**	**3**	**2**
Que.	121	122	123	124	125	126									
Ans.	**2**	**3**	**1**	**3**	**4**	**1**									

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT-2006

1. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is
(1) 1 (2) 2 (3) 3 (4) 4
CB0120

2. Which of the following species has a linear shape:
(1) O_3 (2) NO_2^- (3) SO_2 (4) NO_2^+
CB0121

3. Which of the following is not isostructural with $SiCl_4$?
(1) NH_4^+ (2) SCl_4 (3) SO_4^{2-} (4) PO_4^{3-}
CB0122

4. The electronegativity difference between N and F is greater than that between N and H yet the dipole mement of NH_3 (1.5 D) is larger than that of NF_3 (0.2 D). This is because
(1) in NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction
(2) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction
(3) in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions
(4) in NH_3 as well as NF_3 the atomic dipole and bond dipole are in opposite directions
CB0123

5. In which of the following molecules are all the bonds **not** equal :-
(1) NF_3 (2) ClF_3
(3) BF_3 (4) AlF_3
CB0124

AIPMT-2007

6. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$ $CaCO_3$ and $BeCO_3$ is
(1) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
(2) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
(3) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$
(4) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$
CB0125

7. In which of the following pairs the two species are iso-structural
(1) SO_3^{-2} and NO_3^- (2) BF_3 and NF_3
(3) BrO_3^- and XeO_3 (4) SF_4 and XeF_4
CB0126

8. The correct order of C–O bond length among CO, CO_3^{-2}, CO_2 is
(1) $CO < CO_3^{-2} < CO_2$
(2) $CO_3^{-2} < CO_2 < CO$
(3) $CO < CO_2 < CO_3^{-2}$
(4) $CO_2 < CO < CO_3^{-2}$
CB0127

9. In which of the following hydration energy is higher than lattice energy
(1) $MgSO_4$ (2) $CaSO_4$
(3) $BaSO_4$ (4) $SrSO_4$
CB0128

10. Which one of the following orders correctly represents the increasing acid strengths of the given acids :
(1) $HOClO_3 < HOClO_2 < HOClO < HOCl$
(2) $HOCl < HOClO < HOClO_2 < HOClO_3$
(3) $HOClO < HOCl < HOClO_3 < HOClO_2$
(4) $HOClO_2 < HOClO_3 < HOClO < HOCl$
CB0129

AIPMT-2008

11. Four diatomic species are listed below in different sequences. Which of these presents the correct order of their increasing bond order :
(1) $C_2^{2-} < He_2^+ < NO < O_2^-$
(2) $He_2^+ < O_2^- < NO < C_2^{2-}$
(3) $O_2^- < NO < C_2^{2-} < He_2^+$
(4) $NO < C_2^{2-} < O_2^- < He_2^+$
CB0130

12. The angular shape of ozone molecule (O_3) consists of
(1) 1 sigma and 1 pi bonds
(2) 2 sigma and 1 pi bonds
(3) 1 sigma and 2 pi bonds
(4) 2 sigma and 2 pi bonds
CB0131

13. The correct order of increasing bond angles in the following triatomic species is:-
(1) $NO_2^+ < NO_2 < NO_2^-$ (2) $NO_2^+ < NO_2^- < NO_2$
(3) $NO_2^- < NO_2^+ < NO_2$ (4) $NO_2^- < NO_2 < NO_2^+$
CB0132

AIPMT-2009

14. In which of the following molecules/ions BF_3, NO_2^-, NH_2^- and H_2O, the central atom is sp^2 hybridized :
(1) BF_3 and NO_2^- (2) NO_2^- and NH_2^-
(3) NH_2^- and H_2O (4) NO_2^- and H_2O
CB0133

15. According to MO theory which of the following lists ranks the nitrogen species in terms of increasing bond order :
(1) $N_2^- < N_2^{2-} < N_2$ (2) $N_2^- < N_2 < N_2^{2-}$
(3) $N_2^{2-} < N_2^- < N_2$ (4) $N_2 < N_2^{2-} < N_2^-$
CB0134

16. In the case of alkali metals, the covalent character decreases in the order :
(1) MI > MBr > MCl > MF
(2) MCl > MI > MBr > MF
(3) MF > MCl > MBr > MI
(4) MF > MCl > MI > MBr
CB0135

17. What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to a gas :
(1) London or dispersion force
(2) Hydrogen bonding
(3) Dipole-dipole interaction
(4) Covalent bonds
CB0136

AIPMT-2010

18. Some of the properties of the two species, NO_3^- and H_3O^+ are described below. Which one of them is correct :-
(1) Isostructural with same hybridization for the central atom.
(2) Isostructural with different hybridization for the central atom.
(3) Similar in hybridization for the central atom with different structures.
(4) Dissimilar in hybridization for the central atom with different structures.
CB0137

19. In which of the following molecules the central atom does not have sp^3 hybridization :-
(1) SF_4 (2) BF_4^-
(3) NH_4^+ (4) CH_4
CB0138

20. Which one of the following species does not exist under normal conditions :
(1) Li_2 (2) Be_2^+
(3) Be_2 (4) B_2
CB0139

21. In which of the following pairs of molecules/ions, the central atoms have sp^2 hybridization :
(1) BF_3 and NH_2^- (2) NO_2^- and NH_3
(3) BF_3 and NO_2^- (4) NH_2^- and H_2O
CB0140

22. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy :
(1) $SrSO_4$ (2) $CaSO_4$
(3) $BeSO_4$ (4) $BaSO_4$
CB0141

23. In which one of the following species the central atom has the type of hybridisation which is not the same as that present in the other three :
(1) PCl_5 (2) SF_4
(3) I_3^- (4) $SbCl_5^{2-}$
CB0142

24. Property of the alkaline earth metals that increases with their atomic number :-
(1) Electronegativity
(2) Solubility of their hydroxides in water
(3) Solubility of their sulphates in water
(4) Ionization energy
CB0143

AIPMT Pre-2011

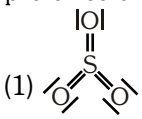
25. Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear :
(1) $CH_3–CH=CH–CH_3$
(2) $CH_3–C\equiv C–CH_3$
(3) $CH_2=CH–CH_2–C\equiv CH$
(4) $CH_3–CH_2–CH_2–CH_3$
CB0144

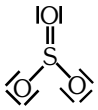
26. Which of the following has the minimum bond length :
(1) O_2^+ (2) O_2^- (3) O_2^{2-} (4) O_2
CB0145

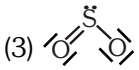
27. Which of the two ions from the list given below that have the geometry that is explained by the same hybridization of orbitals, NO_2^-, NO_3^-, NH_2^-, NH_4^+, SCN^- :
(1) NO_2^- and NO_3^- (2) NH_4^+ and NO_3^-
(3) SCN^- and NH_2^- (4) NO_2^- and NH_2^-
CB0146

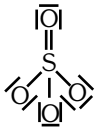
28. Which of the following compounds has the lowest melting point :
(1) $CaCl_2$ (2) $CaBr_2$
(3) CaI_2 (4) CaF_2
CB0147

29. Which of the following structures is the most preferred and hence of lowest energy for SO_3 :

(1) 

(2) 

(3) 

(4) 

CB0148

AIPMT Pre-2012

30. Which one of the following pairs is isostructural (i.e. having the same shape and hybridization) :

(1) [NF_3 and BF_3] (2) $\left[BF_4^-\text{ and }NH_4^+\right]$

(3) [BCl_3 and $BrCl_3$] (4) [NH_3 and NO_3^-]

CB0151

31. Which of the following species contains three bond pairs and one lone pair around the central atom:

(1) NH_2^- (2) PCl_3 (3) H_2O (4) BF_3

CB0152

32. The pair of species with the same bond order is:

(1) NO, CO (2) N_2, O_2

(3) O_2^{2-}, B_2 (4) O_2^+, NO^+

CB0153

33. Bond order of 1.5 is show by:

(1) O_2^{2-} (2) O_2 (3) O_2^+ (4) O_2^-

CB0154

AIPMT Mains-2012

34. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals :

(1) σ^* orbital (2) σ orbital

(3) π^* orbital (4) π orbital

CB0155

35. Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them :

(1) $C_2^{2-} < He_2^+ < O_2^- < NO$

(2) $He_2^+ < O_2^- < NO < C_2^{2-}$

(3) $NO < O_2^- < C_2^{2-} < He_2^+$

(4) $O_2^- < NO < C_2^{2-} < He_2^+$

CB0156

NEET-UG-2013

36. Which one of the following molecules contains no π bond :

(1) NO_2 (2) CO_2 (3) H_2O (4) SO_2

CB0157

37. XeF_2 is isostructural with :-

(1) $BaCl_2$ (2) TeF_2 (3) ICl_2^- (4) $SbCl_3$

CB0158

38. Dipole induced dipole interactions are present in which of the following pairs :-

(1) SiF_4 and He atoms (2) H_2O and alcohol

(3) Cl_2 and CCl_4 (4) HCl and He atoms

CB0159

39. Which of the following is a polar molecule :

(1) XeF_4 (2) BF_3 (3) SF_4 (4) SiF_4

CB0160

40. Which of the following is paramagnetic :

(1) NO^+ (2) CO (3) O_2^- (4) CN^-

CB0161

41. Identify the correct order of solubility in aqueous medium :

(1) $Na_2S > ZnS > CuS$ (2) $CuS > ZnS > Na_2S$

(3) $ZnS > Na_2S > CuS$ (4) $Na_2S < CuS > ZnS$

CB0162

AIPMT-2014

42. Which of the following molecules has the maximum dipole moment :

(1) CO_2 (2) CH_4 (3) NH_3 (4) NF_3

CB0164

43. Which one of the following species has plane triangular shape :

(1) N_3^- (2) NO_3^- (3) NO_2^- (4) CO_2

CB0165

AIPMT-2015

44. The correct bond order in the following species is:-

(1) $O_2^{2+} < O_2^- < O_2^+$ (2) $O_2^+ < O_2^- < O_2^{2+}$

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

CB0167

45. Which of the following pairs of ions are isoelectronic and isostructural :

(1) ClO_3^-, CO_3^{2-} (2) SO_3^{2-}, NO_3^-

(3) ClO_3^-, SO_3^{2-} (4) CO_3^{2-}, SO_3^{2-}

CB0168

46. Which of the following options represents the correct bond order :

(1) $O_2^- < O_2 < O_2^+$

(2) $O_2^- > O_2 < O_2^+$

(3) $O_2^- < O_2 > O_2^+$

(4) $O_2^- > O_2 > O_2^+$

CB0169

47. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence :-
(1) Ca > Sr > Ba > Mg
(2) Sr > Ca > Mg > Ba
(3) Ba > Mg > Sr > Ca
(4) Mg > Ca > Sr > Ba

CB0170

48. Maximum bond angle at nitrogen is present in which of the following :
(1) NO_2^- (2) NO_2^+ (3) NO_3^- (4) NO_2

CB0171

RE-AIPMT-2015

49. On heating which of the following releases CO_2 most easily :
(1) $MgCO_3$ (2) $CaCO_3$
(3) K_2CO_3 (4) Na_2CO_3

CB0172

50. Decreasing order of stability of O_2, O_2^-, O_2^+ and O_2^- is :-
(1) $O_2 > O_2^+ > O_2^{2-} > O_2^-$
(2) $O_2^- > O_2^{2-} > O_2^+ > O_2$
(3) $O_2^+ > O_2 > O_2^- > O_2^{2-}$
(4) $O_2^{2-} > O_2^- > O_2 > O_2^+$

CB0173

51. In which of the following pairs, both the species are not isostructural :
(1) NH_3, PH_3
(2) XeF_4, XeO_4
(3) $SiCl_4$, PCl^+_4
(4) Diamond, silicon carbide

CB0174

52. The variation of the boiling points of the hydrogen halides is in the order HF > HI > HBr > HCl.

What explains the higher boiling point of hydrogen fluoride ?

(1) The bond energy of HF molecules is greater than in other hydrogen halides
(2) The effect of nuclear shielding is much reduced in fluorine which polarises the HF molecule
(3) The electronegativity of fluorine is much higher than for other elements in the group.
(4) There is strong hydrogen bonding between HF molecules

CB0175

NEET-I 2016

53. Consider the molecules CH_4, NH_3 and H_2O. Which of the given statements is false ?
(1) The H –C–H bond angle in CH_4, the H–N–H bond angle in NH_3, and the H–O–H bond angle in H_2O are all greater than 90°
(2) The H–O–H bond angle in H_2O is larger than the H–C–H bond angle in CH_4.
(3) The H–O–H bond angle in H_2O is smaller than the H–N–H bond angle in NH_3.
(4) The H–C–H bond angle in CH_4 is larger than the H–N–H bond angle in NH_3.

CB0181

54. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?
(1) $I_2 > Br_2 > Cl_2 > F_2$ (2) $Cl_2 > Br_2 > F_2 > I_2$
(3) $Br_2 > I_2 > F_2 > Cl_2$ (4) $F_2 > Cl_2 > Br_2 > I_2$

CB0182

55. Predict the correct order among the following :-
(1) lone pair- lone pair > lone pair - bond pair > bond pair - bond pair
(2) lone pair - lone pair > bond pair - bond pair > lone pair - bond pair
(3) bond pair - bond pair > lone pair - bond pair > lone pair - lone pair
(4) lone pair - bond pair > bond pair - bond pair > lone pair - lone pair

CB0183

56. Match the compounds given in column I with the hybridisation and shape given in column II and mark the **correct** option.

Column-I		**Column-II**	
(a)	XeF_6	(i)	Distorted octahedral
(b)	XeO_3	(ii)	Square planar
(c)	$XeOF_4$	(iii)	pyramidal
(d)	XeF_4	(iv)	Square pyramidal

Code :-

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(iv)	(ii)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iv)	(i)	(ii)	(iii)

CB0184

NEET-II 2016

57. The correct geometry and hybridization for XeF_4 are:

(1) Planar triangle, sp^3d^3

(2) square planar, sp^3d^2

(3) octahedral, sp^3d^2

(4) trigonal bipyramidal, sp^3d

CB0185

58. Among the following which one is a wrong statement?

(1) SeF_4 and CH_4 have same shape

(2) I_3^+ has bent geometry

(3) PH_5 and $BiCl_5$ do not exist

(4) $p\pi$-$d\pi$ bonds are present in SO_2

CB0186

59. The hybridizations of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are

(1) sp, sp^2 and sp^3

(2) sp^2, sp and sp^3

(3) sp, sp^3 and sp^2

(4) sp^2, sp^3 and sp

CB0187

60. Which of the following fluoro-compounds is most likely to behave as a Lewis base ?

(1) CF_4 (2) SiF_4

(3) BF_3 (4) PF_3

CB0188

61. Which of the following pairs of ions is isoelectronic and isostructural ?

(1) SO_3^{2-}, NO_3^-

(2) ClO_3^-, SO_3^{2-}

(3) CO_3^{2-}, NO_3^-

(4) ClO_3^-, CO_3^{2-}

CB0189

NEET(UG) 2017

62. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field ?

(1) K (2) Rb (3) Li (4) Na

CB0198

63. Match the interhalogen compounds of column-I with the geometry in column II and assign the correct. code.

Column-I		Column-II	
(a)	XX'	(i)	T-shape
(b)	XX'_3	(ii)	Pentagonal bipyramidal
(c)	XX'_5	(iii)	Linear
(d)	XX'_7	(iv)	Square-Pyramidal
		(v)	Tetrahedral

Code :

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(iv)	(ii)
(2)	(v)	(iv)	(iii)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(iii)	(iv)	(i)	(ii)

CB0199

64. Which of the following pairs of compounds is isoelectronic and isostructural ?

(1) TeI_2, XeF_2 (2) IBr_2^-, XeF_2

(3) IF_3, XeF_2 (4) $BeCl_2$, XeF_2

CB0200

65. The species, having bond angles of 120° is :-

(1) ClF_3 (2) NCl_3

(3) BCl_3 (4) PH_3

CB0201

66. Which of the following pairs of species have the same bond order ?

(1) O_2, NO^+ (2) CN^-, CO

(3) N_2 , O_2^- (4) CO, NO

CB0202

NEET(UG) 2018

67. Among CaH_2, BeH_2, BaH_2, the order of ionic character is

(1) $BeH_2 < CaH_2 < BaH_2$

(2) $CaH_2 < BeH_2 < BaH_2$

(3) $BeH_2 < BaH_2 < CaH_2$

(4) $BaH_2 < BeH_2 < CaH_2$

CB0207

68. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is

(1) Mg_2X_3 (2) MgX_2

(3) Mg_2X (4) Mg_3X_2

CB0208

69. Consider the following species:

CN^+, CN^-, NO and CN

Which one of these will have the highest bond order?

(1) NO (2) CN^-

(3) CN^+ (4) CN

CB0209

70. Which one of the following elements is unable to form MF_6^{3-} ion ?

(1) Ga (2) AI (3) B (4) In

CB0210

71. In the structure of ClF_3, the number of lone pairs of electrons on central atom 'Cl' is

(1) one (2) two

(3) four (4) three

CB0211

NEET(UG) 2019

72. The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne is :-

(1) 10 σ bonds and 3π bonds

(2) 8 σ bonds and 5π bonds

(3) 11 σ bonds and 2π bonds

(4) 13 σ bonds and no π bond

CB0362

73. Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory ?

(1) O_2 (2) N_2

(3) C_2 (4) Be_2

CB0363

74. Which of the following species is **not** stable ?

(1) $[SiF_6]^{2-}$

(2) $[GeCl_6]^{2-}$

(3) $[Sn(OH)_6]^{2-}$

(4) $[SiCl_6]^{2-}$

CB0364

75. Identify the **incorrect** statement related to PCl_5 from the following :-

(1) Three equatorial P–Cl bonds make an angle of 120° with each other

(2) Two axial P–Cl bonds make an angle of 180° with each other

(3) Axial P–Cl bonds are longer than equatorial P–Cl bonds

(4) PCl_5 molecule is non–reactive

CB0365

76. Match the Xenon compounds in **Column–I** with its structure in **Column–II** and assign the **correct** code:-

Column–I	**Column–II**
(a) XeF_4	(i) pyramidal
(b) XeF_6	(ii) square planar
(c) $XeOF_4$	(iii) distorted octahedral
(d) XeO_3	(iv) square pyramidal

Code :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(ii)	(iii)	(i)	(iv)
(4)	(iii)	(iv)	(i)	(ii)

CB0366

77. Which is the **correct** thermal stability order for H_2E (E=O, S, Se, Te and Po) ?

(1) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$

(2) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$

(3) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$

(4) $H_2Se < H_2Te < H_2Po < H_2O < H_2S$

CB0367

NEET(UG) 2019 (ODISHA)

78. Which of the following is paramagnetic ?

(1) N_2 (2) H_2

(3) Li_2 (4) O_2

CB0368

79. Which of the following is the correct order of dipole moment ?

(1) $NH_3 < BF_3 < NF_3 < H_2O$

(2) $BF_3 < NF_3 < NH_3 < H_2O$

(3) $BF_3 < NH_3 < NF_3 < H_2O$

(4) $H_2O < NF_3 < NH_3 < BF_3$

CB0369

80. The number of hydrogen bonded water molecule(s) associated with $CuSO_4.5H_2O$ is :-

(1) 3 (2) 1

(3) 2 (4) 5

CB0370

NEET(UG) 2020

81. Identify a molecule which does not exist.

(1) O_2 (2) He_2

(3) Li_2 (4) C_2

CB0526

82. Which of the following set of molecules will have zero dipole moment ?

(1) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

(2) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

(3) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

(4) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene

CB0527

NEET(UG) 2020(COVID-19)

83. Among the compounds shown below which one revealed a linear structure ?

(1) NO_2 (2) HOCl

(3) O_3 (4) N_2O

CB0528

84. Match the compounds of Xe in column I with the molecular structure in column II.

Column-I	**Column-II**
(a) XeF_2	(i) Square planar
(b) XeF_4	(ii) Linear
(c) XeO_3	(iii) Square pyramidal
(d) $XeOF_4$	(iv) Pyramidal

(1) (a)-(ii) (b)-(i) (c)-(iii) (d)-(iv)

(2) (a)-(ii) (b)-(iv) (c)-(iii) (d)-(i)

(3) (a)-(ii) (b)-(iii) (c)-(i) (d)-(iv)

(4) (a)-(ii) (b)-(i) (c)-(iv) (d)-(iii)

CB0529

85. Match the coordination number and type of hybridisation with distribution of hybrid orbitals in space based on Valence bond theory.

Coordination number and type of hybridisation	**Distribution of hybrid orbitals in space**
(a) 4, sp^3	(i) trigonal bipyramidal
(b) 4, dsp^2	(ii) octahedral
(c) 5, sp^3d	(iii) tetrahedral
(d) 6, d^2sp^3	(iv) square planar

Select the correct option :

(1) (a)-(ii) (b)-(iii) (c)-(iv) (d)-(i)

(2) (a)-(iii) (b)-(iv) (c)-(i) (d)-(ii)

(3) (a)-(iv) (b)-(i) (c)-(ii) (d)-(iii)

(4) (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

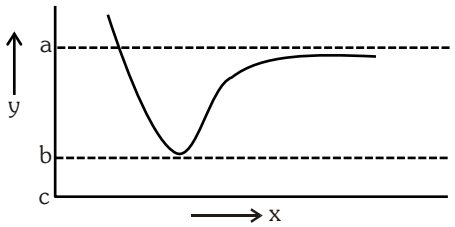
CB0530

86. Identify the wrongly matched pair.

Molecule	**Shape or geometry of molecule**
(1) PCl_5	Trigonal planar
(2) SF_6	Octahedral
(3) $BeCl_2$	Linear
(4) NH_3	Trigonal pyramidal

CB0531

87. The potential energy (y) curve for H_2 formation as a function of internuclear distance (x) of the H atoms is shown below.



The bond energy of H_2 is :

(1) (b – a) (2) $\frac{(c-a)}{2}$

(3) $\frac{(b-a)}{2}$ (4) (c – a)

CB0532

NEET(UG) 2021

88. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are:

(1) sp^3 and 4 (2) sp^3 and 6

(3) sp^2 and 6 (4) sp^2 and 8

CB0533

89. Match **List - I** with **List - II**.

List-I	List-II
(a) PCl_5	(i) Square pyramidal
(b) SF_6	(ii) Trigonal planar
(c) BrF_5	(iii) Octahedral
(d) BF_3	(iv) Trigonal bipyramidal

Choose the **correct** answer from the options given below.

(1) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

(2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

(3) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(4) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

CB0534

90. Which of the following molecules is non-polar in nature ?

(1) $POCl_3$ (2) CH_2O

(3) $SbCl_5$ (4) NO_2

CB0535

91. From the following pairs of ions which one is not an iso-electronic pair ?

(1) O^{2-}, F^- (2) Na^+, Mg^{2+}

(3) Mn^{2+}, Fe^{3+} (4) Fe^{2+}, Mn^{2+}

CB0536

NEET (UG) 2021 (Paper-2)

92. Match the columns.

List I	List II
a. $IF_2^{\ominus}$	i. sp
b. HCN	ii. sp^3d
c. PCl_4^+	iii. sp^3d^2
d. XeF_4	iv. sp^3

(1) a – i, b – iv, c – ii, d – iii

(2) a – ii, b – i, c – iv, d – iii

(3) a – iii, b – ii, c – i, d – iv

(4) a – iv, b – iii, c – ii, d – i

CB0537

93. Which of the following has greater bond length?

(1) P – O (2) S – O

(3) Cl – O (4) O = O

CB0538

94. Amongst sodium halides (NaF, NaCl, NaBr and NaI), NaF has the highest melting point because of

(1) highest oxidising power

(2) lowest polarity

(3) maximum ionic character

(4) minimum ionic character

CB0539

95. In SiF_6^{2-} and $SiCl_6^{2-}$ which one is known and why?

(1) SiF_6^{2-} because of small size of F

(2) SiF_6^{2-} because of large size of F

(3) $SiCl_6^{2-}$ because of small size of Cl

(4) $SiCl_6^{2-}$ because of large size of Cl

CB0540

NEET(UG) 2022

96. Which amongst following is **incorrect** statement?

(1) C_2 molecule has four electrons in its two degenerate π molecular orbitals.

(2) H_2^+ ion has one electron

(3) O_2^+ ion is diamagnetic.

(4) The bond orders of O_2^+, O_2, O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1, respectively.

CB0541

97. Amongst the following which one will have maximum 'lone pair-lone pair' electron repulsions?

(1) IF_5 (2) SF_4

(3) XeF_2 (4) ClF_3

CB0542

NEET(UG) 2022 (OVERSEAS)

98. Which one of the following statements is true about the structure of CO_3^{2-} ion ?

(1) Out of the three C–O bonds, two are longer and one is shorter.

(2) It has three sigma and three π-bonds.

(3) All three C-O bonds are equal in length with a bond order in between 1 and 2.

(4) It can be explained by considering sp^3 hybridization.

CB0543

99. LiF is sparingly soluble in water because it has

(1) small electronegativity.

(2) high lattice enthalpy.

(3) low hydration enthalpy.

(4) partial covalent character.

CB0544

100. What is the **correct** order for boiling points of the following compounds ?

(1) $BiH_3 > SbH_3 > NH_3 > AsH_3 > PH_3$

(2) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$

(3) $PH_3 > NH_3 > AsH_3 > SbH_3 > BiH_3$

(4) $AsH_3 > PH_3 > NH_3 > SbH_3 > BiH_3$

CB0545

101. Which one of the following is the **correct** order of decreasing bond enthalpies for the given species ?

(1) $N_2 > O_2 > O_2^{2-} > O_2^-$

(2) $N_2 > O_2 > O_2^- > O_2^{2-}$

(3) $O_2 > N_2 > O_2^- > O_2^{2-}$

(4) $O_2^{2-} > O_2^- > O_2 > N_2$

CB0546

Re-NEET(UG) 2022

102. The correct order of bond angles in the following compounds/species is:

(1) $H_2O < NH_3 < \overset{+}{N}H_4 < CO_2$

(2) $H_2O < \overset{+}{N}H_4 < NH_3 < CO_2$

(3) $H_2O < \overset{+}{N}H_4 = NH_3 < CO_2$

(4) $CO_2 < NH_3 < H_2O < \overset{+}{N}H_4$

CB0547

103. Match List-I with List-II :

	List-I (Molecules)		**List-II (Shape)**
(a)	NH_3	(i)	Square pyramidal
(b)	ClF_3	(ii)	Trigonal bipyramidal
(c)	PCl_5	(iii)	Trigonal pyramidal
(d)	BrF_5	(iv)	T-shape

Choose the **correct answer** from the options given below :

(1) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)

(2) (a) – (iii), (b) – (iv), (c) – (ii), (d) – (i)

(3) (a) – (iv), (b) – (iii), (c) – (i), (d) – (ii)

(4) (a) – (iii), (b) – (iv), (c) – (i), (d) – (ii)

CB0548

EXERCISE-II (Previous Year Questions) ANSWER'S KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**4**	**2**	**3**	**2**	**1**	**3**	**3**	**1**	**2**	**2**	**2**	**4**	**1**	**3**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**2**	**4**	**1**	**3**	**3**	**3**	**4**	**2**	**2**	**1**	**1**	**3**	**1**	**2**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**2**	**3**	**4**	**3**	**2**	**3**	**3**	**4**	**3**	**3**	**1**	**3**	**2**	**3**	**3**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**1**	**4**	**2**	**1**	**3**	**2**	**4**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**4**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**2,3**	**3**	**1**	**2**	**3**	**2**	**1**	**4**	**2**	**3**	**2**	**1**	**3**	**4**	**4**
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	**2**	**3**	**4**	**2**	**2**	**2**	**1**	**4**	**4**	**2**	**1**	**1**	**3**	**1**	**3**
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103		
Ans.	**4**	**2**	**1**	**3**	**1**	**3**	**3**	**3**	**2**	**1**	**2**	**1**	**2**		

EXERCISE-III (Analytical Questions) Master Your Understanding

1. The thermal stability of alkaline earth metal carbonates $MgCO_3$, $CaCO_3$, $BaCO_3$ and $SrCO_3$ decreases as :

(1) $CaCO_3 > SrCO_3 > MgCO_3 > BrCO_3$

(2) $BaCO_3 > SrCO_3 > MgCO_3 > CaCO_3$

(3) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$

(4) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$

CB0224

2. Which of the following are iosoelectronic and isostructural NO_3^-, CO_3^{-2}, ClO_3^-, SO_3

(1) NO_3^-, CO_3^{-2} (2) SO_3, NO_3^-

(3) ClO_3^-, CO_3^{-2} (4) CO_3^{-2}, SO_3

CB0225

3. According to molecular orbital theory which of the following statement about the magnetic character and bond order is correct regarding O_2^+ ?

(1) paramagnetic and bond order < O_2

(2) paramagnetic and bond order > O_2

(3) diamagnetic and bond order < O_2

(4) diamagntic and bond order > O_2

CB0226

4. Number of σ and π bond in SO_4^{-2} are :-

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

(3) 4, 4 (4) 2, 3

CB0228

5. The paramagnetic property of the oxygen molecule is due to the presence of unpaired electrons present in :-

(1) $(\sigma 2p_x)^1$ and $(\sigma^* 2p_x)^1$ (2) $(\sigma 2p_x)^1$ and $(\pi 2p_y)^1$

(3) $(\pi^* 2p_y)^1$ and $(\pi^* 2p_x)^1$ (4) $(\pi^* 2p_y)^1$ and $(\pi 2p_y)^1$

CB0229

6. What is the hybridization of oxygen atom in an alcohol molecule?

(1) sp^3 (2) sp (3) sp^2 (4) sp^3d

CB0233

7. In which of the following ionisation processes, the bond order has increased and the magnetic behaviour has changed

(1) $NO \rightarrow NO^+$ (2) $O_2 \rightarrow O_2^+$

(3) $N_2 \rightarrow N_2^+$ (4) $C_2 \rightarrow C_2^+$

CB0235

8. Which of the following hydrogen bonds is the strongest

(1) F–H ····· F (2) O–H ····· O

(3) O–H ····· F (4) O–H ····· N

CB0236

9. Which of the following species exhibits the diamagnetic behaviour

(1) O_2^+ (2) O_2 (3) NO (4) O_2^{2-}

CB0237

10. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizing power of the cationic species, K^+, Ca^{+2}, Mg^{+2}, Be^{+2}

(1) $Be^{+2} < K^+ < Ca^{+2} < Mg^{+2}$

(2) $K^+ < Ca^{+2} < Mg^{+2} < Be^{+2}$

(3) $Ca^{+2} < Mg^{+2} < Be^{+2} < K^+$

(4) $Mg^{+2} < Be^{+2} < K^+ < Ca^{+2}$

CB0238

11. Which one of the following constitutes a group of the isoelectronic species ?

(1) C_2^{2-}, O_2^-, CO, NO

(2) $NO^+, C_2^{2-}, CN^-, N_2$

(3) $CN^-, N_2, O_2^{2-}, C_2^{2-}$

(4) N_2, O_2^-, NO^+, CO

CB0239

12. Which of the following pairs of species have the same bond order ?

(1) CN^- and NO^+ (2) CN^- and CN^+

(3) O_2^- and CN^- (4) NO^+ and CN^+

CB0240

13. Among the following, the molecule with highest dipole moment is :-

(1) CH_3Cl (2) CH_2Cl_2

(3) $CHCl_3$ (4) CCl_4

CB0241

14. Which one of the following molecules is expected to exhibit diamagnetic behaviour ?

(1) C_2 (2) N_2^- (3) O_2 (4) S_2

CB0243

15. Which one of the following order is correct for the bond energies of halogen molecules :

(1) $I_2 > Cl_2 > Br_2$ (2) $Br_2 > Cl_2 > I_2$

(3) $I_2 > Br_2 > Cl_2$ (4) $Cl_2 > Br_2 > I_2$

CB0245

16. The boiling point of ICl is nearly 40°C higher than that of Br_2 although the two substances have the same relative molecular mass. This is bacasue :-

(1) ICl is ionic compound

(2) I-Cl bond is stronger than Br - Br bond

(3) ICl is polar covalent molecule while Br_2 is non polar

(4) IP of Iodine is less than that of Br.

CB0246

17. Nitrogen does not form NF_5 because

(1) Nitrogen is member of V group

(2) It contains no empty d-orbital

(3) The bond energy of N ≡ N is very high

(4) Inert pair effect exists in the molecule

CB0247

18. CO_2 is a gas, while SiO_2 is a solid but both are-

(1) Covalent containing π–bond

(2) Molecules having pπ – dπ bonding

(3) Acidic

(4) Discrete molecules

CB0248

19. Dipole moment is shown by

(1) 1, 4 - dichlorobenzene

(2) Cis 1, 2-dichloro ethene

(3) Trans-1, 2– dichloro ethene

(4) benzene

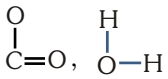
CB0250

20. Experiment shows that H_2O has a dipole moment where as CO_2 has not. Point out the structures which best illustrate these facts –

(1) O=C=O, H—O—H

(2)  , H—O—H

(3) O=C=O, 

(4) 

CB0251

21. In which of the species, bond order increases on removing one electron:-

(a) NO (b) CN^- (c) O_2 (d) CO

Correct answer is -

(1) b and d (2) a and c

(3) b, d and c (4) b and c

CB0252

22. Increasing order of bond length in NO, NO^+ and NO^- is :-

(1) $NO > NO^- > NO^+$

(2) $NO^+ < NO < NO^-$

(3) $NO < NO^+ < NO^-$

(4) $NO < NO^+ = NO^-$

CB0253

23. N_2 and O_2 are converted into monoanions, N_2^- and O_2^- respectively. Which of the following statements is wrong ?

(1) In N_2^- , N-N bond weakens

(2) In O_2^-, O-O bond order increases

(3) In O_2^-, O-O bond order decreases

(4) N_2^- becomes pagamegnetic

CB0254

24. N_2 and O_2 are converted into monocations, N_2^+ and O_2^+ respectively. Which of the following is wrong ?

(1) In N_2^+, N-N bond weakens

(2) In O_2^+, the O-O bond order increases

(3) In O_2^+, paramagnetism decreases

(4) N_2^+ becomes diamagnetic

CB0255

25. Glycerol is more viscous than glycol the reason is :-

(1) Higher molecular wt.

(2) More covalent

(3) More extent of hydrogen bonding

(4) Complex structure

CB0258

26. Incorrect order of viscosity :-

(1) $H_2SO_4 > HNO_3$

(2) $H_2O > CH_3OH$

(3) o-nitro phenol > p-nitro phenol

(4) Glycol > ether

CB0259

27. Which of the following does not form a hydrogen bond with water

(1) $(CH_3)_2CO$ (2) CH_3CN

(3) CH_3OH (4) C_2H_6

CB0261

28. Lithium chloride is highly soluble in –

(1) C_6H_6 (2) H_2O

(3) D_2O (4) All

CB0264

29. Which of the following molecule contains net π-bond only

(1) B_2 (2) C_2

(3) C_2^{-2} (4) Both 1 & 2

CB0266

30. Pick out the incorrect statement :-

(1) sp^3d hybridisation involves $d_{x^2-y^2}$ orbital

(2) Hybridised orbital form σ-bond when overlaps with other orbitals.

(3) SF_2 molecule is more polar than CS_2

(4) o-nitrophenol is more volatile than p-nitrophenol.

CB0267

31. The group of substances in which at melting point covalent bond becomes weak :-

(1) NaCl, KCl, $CaCl_2$ (2) I_2(s), CH_4(s), dry ice

(3) B_4C, diamond, SiC (4) All of the above

CB0268

32. The incorrect statement is :-

(1) π^* p have two nodal planes

(2) Bond order of HeH^+ is 0.5

(3) In NCO^- , C is sp hybridised

(4) O_3 is polar while O_2 is non polar

CB0269

33. Solid CH_4 is

(1) Molecular solid (2) Ionic solid

(3) Covalent solid (4) None of these

CB0270

34. Which compound has the weakest bond

(1) Diamond

(2) Neon(solid)

(3) KCl

(4) water (ice)

CB0271

35. Which of the following order is not correct ?

(1) $SF_2 > SF_4 > SF_6$ (ionic character)

(2) $AlF_3 < Al_2O_3 < AlN$ (covalent character)

(3) $CaCl_2 < SnCl_2 < CdCl_2$ (covalent character)

(4) $ZnCl_2 < CdCl_2 < HgCl_2$ (ionic character)

CB0274

36. Match the column :-

(A) $NO_3^- + HCl$ (p) Keesom attraction

(B) $Xe + H_2O$ (q) Debye attraction

(C) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3 + CH_3-C\equiv N$ (r) London force

(D) $CO_2 + CS_2$ (s) Ion-dipole attraction

(1) A-s, B-q, C-p, D-r

(2) A-q, B-s, C-p, D-r

(3) A-s, B-p, C-q, D-r

(4) A-s, B-q, C-r, D-p

CB0275

37. Which of the following statement is not correct ?

(1) NO has one unpaired electron in ABMO.

(2) N–H bond length is higher in N_2H_4 as compared to N_2H_2

(3) Both PF_5 and IF_5 have identical shape

(4) Both SO_2 and BrF_3 are polar and planar

CB0277

38. Which of the following follow octet rule ?

(1) BeH_2(s) (2) B_2H_6

(3) $BeCl_2$(s) (4) None

CB0371

39. Total no. of 90° angles in IF_5 molecule ?

(1) 4 (2) 8 (3) 0 (4) 6

CB0372

40. Which is most nonpolar compound :-

(1) PCl_5 (2) PCl_3

(3) CH_3Cl (4) ClF_3

CB0373

41. C_2 molecule consists of both π bonds due to :-

(1) The presence of four electrons in two π molecular orbitals

(2) The absence of any electrons in two π molecular orbitals

(3) The presence of 2 electrons in one σ molecular orbital

(4) The presence of 4 electrons in one σ molecular orbital

CB0374

42. Which is incorrect for both $H_2^{\ominus}$ and $He_2^{\oplus}$ ions :-

(1) both have same bond order

(2) both have same number of electrons in antibonding M.O.

(3) both have similar stability

(4) both have different bond order

CB0375

43. Incorrect about PCl_5 molecule is :-

(1) Three P–Cl bond lie in equatorial plane

(2) Two P–Cl bond lie in axial plane

(3) Axial bond pairs suffer more repulsive interaction from the equatorial bond pair

(4) Equatorial bonds are longer than the axial bonds

CB0376

44. Incorrect about C_2 is :-

(1) It contain 2 π bond

(2) It contain $KK(\sigma 2s)^2\ (\sigma^*2s)^2\ (\pi 2P_x^{\ 2} = \pi 2P_y^{\ 2})$

(3) It contains four electrons in 2 pi molecular orbitals

(4) It contains 6 electrons in bonding molecular orbital

CB0377

EXERCISE-III (Analytical Questions) ANSWER'S KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**1**	**2**	**1**	**3**	**1**	**1**	**1**	**4**	**2**	**2**	**1**	**1**	**1**	**4**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**4**	**3**	**3**	**4**	**1**	**4**	**1**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
Ans.	**3**	**2**	**1**	**2**	**4**	**1**	**3**	**3**	**3**	**1**	**1**	**4**	**4**	**4**	