BASIC CHEMICAL BONDING

Condition of ionic bond

1. When metals combine with non-metals, the metal atom tends to
   (1) Lose electrons (2) Gain electrons
   (3) Remain electrically neutral (4) None of these
2. Which does not favour the formation of ionic compound:
   (1) the ionization energy of the metal atom should be low.
   (2) the lattice energy of the compound formed must be low.
   (3) the electron affinity of the non-metal should be high.
   (4) the lattice energy of the compound formed must be high.
3. Electrovalent bond formation depends on
   (1) Ionization energy (2) Electron affinity
   (3) Lattice energy (4) All the three above
4. The lattice energy of sodium chloride crystal is the energy released when one mole of NaCl(s) is formed from:
   (1) Na(g) and Cl(g) atoms
   (2) Na^+(g) and Cl^-(g) ions
   (3) Na(s) and Cl_2(g)
   (4) crystallization from aqueous solution of sodium chloride.
5. Lattice energy of $BeCO_3$ (I), $MgCO_3$ (II) and $CaCO_3$ (III) are in the order
   (1) I > II > III (2) I < II < III (3) I < III < II (4) II < I < III
6. Lattice energy of an ionic compound depends upon
   (1) Charge on the ion only (2) Size of the ion only
   (3) Packing of ions only (4) Charge on the ion and size of the ion
7. Which of the following substance has the largest negative lattice enthalpy?
   (1) NaCl (2) $CaBr_2$ (3) NaBr (4) $CaCl_2$
8. Indicate the nature of bonding in CCl_4 and CaH_2
   (1) Covalent in CCl_4 and electrovalent in CaH_2
   (2) Electrovalent in both CCl_4 and CaH_2
   (3) Covalent in both CCl_4 and CaH_2
   (4) Electrovalent in CCl_4 and covalent in CaH_2
9. Which forms a crystal of NaCl
   (1) NaCl molecules (2) Na^+ and Cl^- ions
   (3) Na and Cl atoms (4) None of the above
10. When sodium and chlorine react then
    (1) Energy is released, and ionic bond is formed
    (2) Energy is released, and a covalent bond is formed
    (3) Energy is absorbed, and ionic bond is formed
    (4) Energy is absorbed, and covalent bond is formed
11. Which of the following is an electrovalent linkage
    (1) CH_4 (2) $MgCl_2$ (3) $SiCl_4$ (4) BF_3

12. From the following which group of elements easily forms cation
(1) F, Cl, Br (2) Li, Na, K (3) O, S, Se (4) N, P, As

13. Which of the following ionic compound has high lattice energy?
(1) NaF (2) NaCl (3) AlF_3 (4) Al_2O_3

14. Which of the following has the highest lattice energy?
(1) NaF (2) MgF_2 (3) AlF_3 (4) CaF_2

15. Compound having least lattice energy is:
(1) NaF (2) KF (3) RbF (4) CsF

16. The lattice energies of the oxides of Mg, Ca Sr and Ba follow the order
(1) BaO>SrO>CaO> MgO (2) CaO>BaO>SrO> MgO
(3) MgO >CaO>SrO>BaO (4) MgO >SrO>CaO>BaO

17. Which of the following has highest lattice energy?
(1) MgO (2) SrO (3) BaO (4) CaO

18. Select the pair of compounds in which first compound has more lattice energy as compared to second compound, but solubility is less.
(1) $BeCl_2$, $BaCl_2$ (2) LiF, CsF
(3) $KHCO_3$, $NaHCO_3$ (4) $BeSO_4$, $BaSO_4$

Properties of ionic compund

19. Molten sodium chloride conducts electricity due to the presence of
(1) Free electrons (2) Free ions
(3) Free molecules (4) Atoms of sodium and chlorine

20. Ionic compounds do not have
(1) Hard and brittle nature (2) High melting and boiling point
(3) Directional properties (4) Soluble in polar solvents

21. Which of the following statements is wrong regarding ionic compounds -
(1) These are generally in solid state at room temperature
(2) The force of attraction between ions is non directional
(3) Ionic compounds are soluble in all solvents
(4) They conduct electricity in molten and solution state

22. Electrovalent compound's
(1) Melting points are low (2) Boiling points are low
(3) Conduct current in fused state (4) Insoluble in polar solvent

23. Element X is strongly electropositive, and Y is strongly electronegative. Both elements are univalent, the compounds formed from their combination will be
(1) X^+Y^- (2) X^-Y^+ (3) X-Y (4) X→Y

24. In the formation of NaCl from Na and Cl
(1) Sodium and chlorine both give electrons
(2) Sodium and chlorine both accept electrons
(3) Sodium loses electron and chlorine accepts electron
(4) Sodium accepts electron and chlorine loses electron

25. Electrovalent compounds do not have
(1) High M.P. and Low B.P. (2) High dielectric constant
(3) High M.P. and High B.P. (4) High polarity

26. Many ionic crystals dissolve in water because
(1) Water is an amphiprotic solvent
(2) Water is a high boiling liquid
(3) The process is accompanied by a positive heat of solution
(4) Water decreases the interionic attraction in the crystal lattice due to salvation

27. The electronic structure of four elements A, B, C, D are
(1) $1s^2$ (2) $1s^2,2s^2,2p^2$ (3) $1s^2,2s^2,2p^5$ (4) $1s^2,2s^2,2p^6$
The tendency to form electrovalent bond is largest in
(1) *A* (2) *B* (3) *C* (4) *D*

28. In the given bonds which one is most ionic
(1) **Cs-Cl** (2) Al-Cl (3) C-Cl (4) H-Cl

29. Sodium chloride easily dissolves in water. This is because
(1) It is a covalent compound (2) Salt reacts with water
(3) It is a white substance (4) Its ions are easily solvated

30. When NaCl is dissolved in water the sodium ion becomes
(1) Oxidized(2) Reduced (3) Hydrolysed (4) Hydrated

31. Solid NaCl is a bad conductor of electricity since
(1) In solid NaCl there are no ions (2) Solid NaCl is covalent
(3) In solid NaCl there is no motion of ions
(4) In solid NaCl there are no electrons

32. Ionic bonds are usually formed by combination of elements with
(1) High ionisation potential and low electron affinity
(2) Low ionisation potential and high electron affinity
(3) High ionisation potential and high electron affinity
(4) Low ionisation potential and low electron affinity

33. Molten sodium chloride conducts electricity due to the presence of
(1) Free electrons (2) Free ions
(3) Free molecules (4) Atoms of sodium and chlorine

34. A number of ionic compounds *e.g. AgCl, CaF_2* , $BaSO_4$ are insoluble in water. This is because
(1) Ionic compounds do not dissolve in water
(2) Water has a high dielectric constant
(3) Water is not a good ionizing solvent
(4) These molecules have exceptionally high alternative forces in the lattice

35. What is the nature of chemical bonding between Cs and F
(1) Covalent (2) Ionic (3) Coordinate (4) Metallic

36. Which one of the following compounds is ionic
(1) KCl (2) CH_4 (3) Diamond (4) H_2

37. Which of the following compound has electrovalent linkage
(1) CH_3Cl (2) NaCl (3) CH_4 (4) Cl_2

38. An ionic compound is generally a
(1) Good electrolyte (2) Weak electrolyte
(3) Non-electrolyte (4) Neutral

39. What metals combine with non-metals, the metal atom tends to
(1) Lose electrons (2) Gain electrons
(3) Remain electrically neutral (4) None of these

40. Among the bonds formed by a chlorine atom with atoms of hydrogen, chlorine, sodium and carbon, the strongest bond is formed between
(1) HCl (2) Cl-Cl (3) Na-Cl (4) C-Cl

41. Out of the following, which compound will have electrovalent bonding
(1) Ammonia (2) Water
(3) Calcium chloride (4) Chloromethane

42. The force which holds atoms together in an electrovalent bond is
(1) Vander Waal's force (2) Dipole attraction force
(3) Electrostatic force of attraction (4) All the above

43. The main reaction during electrovalent bond formation is
(1) Redox reaction (2) Substitution reaction
(3) Addition reaction (4) Elimination reaction

44. Electrovalent compounds are
(1) Good conductor of electricity (2) Polar in nature
(3) Low M.P. and low B.P. (4) Easily available

45. Ionic compounds do not have
(1) Hard and brittle nature (2) High melting and boiling point
(3) Directional properties (4) Soluble in polar solvents

46. Which type of bonding exists in Li_2O and CaF_2 respectively
(1) Ionic, ionic (2) Ionic, covalent
(3) Covalent, ionic (4) Coordinate, ionic

47. An atom with atomic number 20 is most likely to combine chemically with the atom whose atomic number is
(1) 11 (2) 14 (3) 16 (4) 10

48. Bond formed in crystal by anion and cation is
(1) Ionic (2) Metallic (3) Covalent (4) Dipole

49. Atoms or group of atoms which are electrically charged are known
(1) Anions (2) Cations (3) Ions (4) Atoms

50. The interionic attraction depends on interaction of
(1) Solute-Solute (2) Solvent-Solvent
(3) The charges (4) Molecular properties

51. Which of the following compounds is ionic
(1) KI (2) CH_4 (3) Diamond (4) H_2

52. The energy that opposes dissolution of a ionic nbond is
(1) Hydration energy (2) Lattice energy
(3) Internal energy (4) Bond energy

53. Which of the following statements is not true for ionic compounds
(1) High melting point (2) Least lattice energy
(3) Least solubility in organic compounds (4) Soluble in water

54. Electrolytes are compound containing
(1) Electrovalent bond (2) Covalent bond
(3) Coordinate bond (4) Hydrogen bond

55. Electricity do not pass-through ionic compounds
(1) In solution (2) In solid state
(3) In melted state (4) None of these

56. The order of increasing lattice energy of the following salt is:
(1) NaCl <CaO<NaBr<BaO (2) NaBr< NaCl <BaO<CaO
(3) NaCl <NaBr<BaO<CaO (4) NaBr< NaCl <CaO<BaO

57. The electronic structure of four elements a,b,c and d are :
a = $1s^2$, b = $1s^2$, $2s^2$ $2p^2$, c = $1s^2$ $2s^2$ $2p^2$,d = $1s^2$ $2s^2$ $2p^6$
The tendency to form electrovalent bond is greatest in:
(1) a (2) b (3) c (4) d

58. Compound with maximum ionic character is formed from:
(1) Na and Cl (2) Cs and F (3) Cs and I (4) Na and F

59. 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

Polarization and Fazan's Rule

60. Favourable conditions for electrovalency are
(1) Low charge on ions, large cation, small anion
(2) High charge on ions, small cation, large anion
(3) High charge on ions, large cation, small anion
(4) Low charge on ions, small cation, large anion

61. Polarising power is estimated by

A. $\frac{\text{Ionic charge}}{(\text{Ionic radius})^3}$ B. $\frac{\text{Ionic charge}}{(\text{Ionic radius})^2}$ C. $\frac{(\text{Ionic charge})^2}{\text{Ionic radius}}$ D. $\frac{\text{Ionic radius}}{\text{Ionic charge}}$

62. Out of list I select the cation which has less polarizing power than Ca^{2+} and from list II select the anion having more polarisability than S^{2-}

List I : Mg^{2+}, Sc^{3+}, K^{+} List II: O^{2-}, Cl^{-}, P^{3-}

(1) Mg^{2+}, O^{2-} (2) K^{+}, P^{3-} (3) Sc^{3+}, P^{3-} (4) Mg^{2+}, Cl^{-}

63. Which cationic species has more polarising power –

(1) Na^{+} (2) Mg^{+2} (3) Al^{+3} (4) all

64. According to Fajan's rule covalent bond is favoured by –

(1) Large cation and small anion (2) Large cation and large anion

(3) Small cation and large anion (4) Small cation and small anion

65. Which option is correct for the following order

LiCl < NaCl <KCl<RbCl<CsCl

(1) Ionic character (2) Melting point order

(3) Solubility in water (4) Polarising power of their cations

66. Choose incorrect option:

(1) More distortion of anion, more will be polarisation then covalent character increases.

(2) CsF is 100% ionic compound.

(3) Charge on cation α polarisation. (4) Size of anion α polarisation

67. Among LiCl, $BeCl_2$, BCl_3 and CCl_4, the covalent bond characteristics follow the order

(1) LiCl > $BeCl_2$> BCl_3> CCl_4 (2) LiCl < $BeCl_2$< BCl_3< CCl_4

(3) LiCl > $BeCl_2$> BCl_3> CCl_4 (4) LiCl > $BeCl_2$< BCl_3> CCl_4

68. Which among the following has maximum covalent character:

(1) NaCl (2) $MgCl_2$ (3) $AlCl_3$ (4) $CaCl_2$

69. Among LiCl, $BeCl_2$, NaCl, CsCl, the compounds with the greatest and the least ionic character respectively are

(1) LiCl and CsCl (2) NaCl and LiCl

(3) CsCl and NaCl (4) CsCl and $BeCl_2$

70. The correct order of increasing covalent character is:

(1) LiCl, NaCl, $BeCl_2$ (2) $BeCl_2$, NaCl, LiCl

(3) NaCl, LiCl, $BeCl_2$ (4) $BeCl_2$, LiCl, NaCl

71. Choose the compounds of maximum and minimum ionic character from LiCl, RbCl, $BeCl_2$ and $MgCl_2$:

(1) LiCl and RbCl (2) RbCl and $BeCl_2$

(3) RbCl and $MgCl_2$ (4) $MgCl_2$ and $BeCl_2$

72. Higher polarisation in case of AgCl compared to KCl is due to
(1) larger size of cation (2) smaller size of cation
(3) inert gas configuration of cation
(4) Pseudo inert gas configuration of cation.

73. Which of the following is most covalent.
(1) CuCl (2) NaCl (3) AgCl (4) AuCl

74. Out of the following which one has the highest values of covalent character?
(1) $ZnCl_2$ (2) $CdCl_2$ (3) $HgCl_2$ (4) CuCl

75. Which of the following has highest covalent character.
(1) $CaCl_2$ (2) $ZnCl_2$ (3) KCl (4) CuCl

76. Polarisation may be called as the distortion of the shape of an anion by an adjacently placed cation. Which of the following statements is/are correct?
(1) Lesser polarization is brought about by a cation of low radius
(2) A large cation is likely to bring about a large degree of polarization
(3) Larger polarisation is brought about by a cation of high charge
(4) A small anion is likely to undergo a large degree of polarisation

77. Out of following which one has maximum ionic character -
(1) NaCl (2) KCl (3) $CaCl_2$ (4) $MgCl_2$

78. Among LiCl, $BeCl_2$, BCl_3 and CCl_4, the covalent bond character follows the order -
(1) $LiCl < BeCl_2 > BCl_3 > CCl_4$ (2) $LiCl > BeCl_2 < BCl_3 < CCl_4$
(3) $LiCl < BeCl_2 < BCl_3 < CCl_4$ (4) $LiCl > BeCl_2 > BCl_3 > CCl_4$

79. Which one is most ionic in the following compounds
(1) AgCl (2) KCl (3) $BaCl_2$ (4) $CaCl_2$

80. Which of the following does not conduct electricity in the fused state
(1) $BeCl_2$ (2) $MgCl_2$ (3) $SrCl_2$ (4) $BaCl_2$

81. If the electron pair forming a bond between two atoms *A* and *B* is not in the centre, then the bond is
(1) Single bond (2) Polar bond (3) Non-polar bond (4) π-bond

82. Polarization is the distortion of the shape of an anion by an adjacently placed cation. Which of the following statements is correct?
(1) Maximum polarization is brought about by a cation of high charge
(2) Minimum polarization is brought about by a cation of low radius
(3) A large cation is likely to bring about a large degree of polarization
(4) A small anion is likely to undergo a large degree of polarization

83. The bonds between P atoms and Cl atoms in PCl_5 are likely to be
(1) Ionic with no covalent character
(2) Covalent with some ionic character
(3) Covalent with no ionic character
(4) Ionic with some metallic character

84. Two electrons of one atom *A* and two electrons of another atom *B* are utilized to form a compound *AB*. This is an example of
(1) Polar covalent bond (2) Non-polar covalent bond
(3) Polar bond (4) Dative bond

85. Which of the following has a high polarising power
(1) Mg^{+2} (2) Al^{+3} (3) Na^{+} (4) Ca^{+2}

86. Maximum covalent character is associated with the compound
(1) NaI (2) MgI_2 (3) $AlCl_3$ (4) AlI_3

87. Polarisibility of halide ions increases in the order
(1) F^-, Cl^-, Br^-, I^- (2) Cl^-, F^-, Br^-, I^-
(3) I^-, Br^-, Cl^- , F^- (4) I^-, Br^-, F^-, Cl^-

88. According to Fajan's rule, covalent bond is favoured by
(1) Large cation and small anion (2) Large cation and large anion
(3) Small cation and large anion(4) Small cation and small anion

89. Choose the correct statement
(1) Amino polarisation is more pronounced by highly charged cation
(2) Small cation has minimum capacity to polarise an anion.
(3) Small anion has maximum polarizability
(4) None of these

90. Amongst *LiCl*, *RbCl*, $BeCl_2$ and $MgCl_2$ the compounds with the greatest and the least ionic character, respectively, are
(1) *LiCl* and *RbCl* (2) *RbCl* and $BeCl_2$
(3) *RbCl* and $MgCl_2$ (4) $MgCl_2$ and $BeCl_2$

91. Lattice energy of alkali metal chlorides follows the order
(1) LiCl > NaCl > KCl > RbCl > CsCl
(2) CsCl > NaCl > KCl > RbCl > LiCl
(3) Li Cl > CsCl > NaCl > KCl > RbCl
(4) NaCl > LiCl > KCl > RbCl > CsCl

92 Which compound is highest covalent
(1) LiCl (2) LiF (3) LiBr (4) LiI

93. Which among the following elements has the tendency to form covalent compounds
(1) Ba (2) Be (3) Mg (4) Ca

94. A bond with maximum covalent character between non-metallic elements is formed
(1) Between identical atoms
(2) Between chemically similar atoms
(3) Between atoms of widely different electronegativities
(4) Between atoms of the same size

95. The correct sequence of increasing covalent character is represented by
(1) $LiCl < NaCl < BeCl_2$ (2) $BeCl_2 < NaCl < LiCl$
(3) $NaCl < LiCl < BeCl_2$ (4) $BeCl_2 < LiCl < NaCl$

96. Highest covalent character is found in
(1) CaF_2 (2) $CaCl_2$ (3) $CaBr_2$ (4) CaI_2

97. The following salt shows maximum covalent character
(1) ACl_3 (2) $MgCl_2$ (3) CsCl (4) $LaCl_3$

98. Which of the following has covalent bond
(1) Na_2S (2) $AlCl_3$ (3) NaH (4) $MgCl_2$

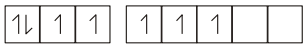
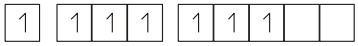
99. Which of the following compound has maximum covalent character
(1) PbI_2 (2) AgI (3) HgI_2 (4) CsI

100. Compound with maximum ionic character is formed from:
(1) Na and Cl (2) Cs and F (3) Cs and I (4) Na and F

Covalent Bond and Covalency

101. The maximum covalency for p-block elements is equal to -
(1) The number of unpaired p-electrons
(2) The number of paired d-electrons
(3) The number of unpaired s-and p-electrons
(4) The actual number of s-and p-electrons in the outermost shell

102. In a triple bond there is sharing of:
(1) 3 electrons (2) 4 electrons
(3) Several electrons (4) 6 electrons

103. Which of the following configuration shows second excitation state of Iodine: -
(1)  (2) 
(3)  (4) 

104. 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) It's Inert due to presence of triple bond

105. The maximum covalency can be achieved by Br-atom is
(1) 5 (2) 6 (3) 8 (4) 7

106. If 2d orbital were possible, which of the following species would exist?
(1) NF_5 (2) FH_5 (3) BI_6^{3-} (4) SiF_6

107. Which pair of elements does not exhibit variable O.S.
(1) Fe, Pb (2) H, Cl (3) F, Zn (4) O, N

108. When two atoms combine to form a molecule?
(1) Energy is released (2) Energy is absorbed
(3) Energy is neither released nor absorbed
(4) Energy may either released or absorbed

109. Which of the following does not exist -
(1) PCl_5 (2) NCl_3 (3) $NOCl_3$ (4) NCl_5

110. Which of the following ions/ compounds does not exist?
(1) PCl_6^- (2) OF_4 (3) NCl_3 (4) ICl_3

111. Which of the ions does not exist?
(1) PCl_6^- (2) NH_4^+ (3) PBr_6^- (4) I_3^-

112. Which of the following molecule does not exist?
(1) PF_5 (2) NOF_3 (3) FCl_3 (4) NO_2Cl

113. The compound which does not exist is:
(1) IBr_7 (2) IF_7 (3) SF_6 (4) PbF_4

114. Which type of bond is formed between similar atoms
(1) Ionic (2) Covalent (3) Coordinate (4) Metallic

115. Covalent compounds are generally ..... in water
(1) Soluble (2) Insoluble (3) Dissociated (4) Hydrolysed

116. Which one is the electron deficient compound
(1) ICl (2) NH_3 (3) BCl_3 (4) PCl_3

117. Silicon has 4 electrons in the outermost orbit. In forming the bonds
(1) It gains electrons (2) It loses electrons
(3) It shares electrons (4) None of these

118. Which of the following occurs when two hydrogen atoms bond with each others
(1) Potential energy is lowered (2) Kinetic energy is lowered
(3) Electronic motion ceases (4) Energy is absorbed

119. If the atomic number of element X is 7, the best electron dot symbol for the element is
(1) $\overset{x}{\cdot}$ (2) $\cdot\overset{x}{\cdot}\cdot$ (3) $\cdot\dot{\underset{\cdot}{x}}:$ (4) $:\ddot{\underset{\cdot}{x}}\cdot$

120. The bond between two identical non-metal atoms has a pair of electrons
(1) Unequally shared between the two
(2) Transferred fully from one atom to another
(3) With identical spins (4) Equally shared between them

121. A covalent bond between two atoms is formed by which of the following
(1) Electron nuclear attraction (2) Electron sharing
(3) Electron transfer (4) Electrostatic attraction

122. Which of the following statements regarding covalent bond is not true
(1) The electrons are shared between atoms
(2) The bond is non-directional
(3) The strength of the bond depends upon the extent of overlapping
(4) The bond formed may or may not be polar

123. Which of the following compounds does not follow the octet rule for electron distribution
(1) PCl_5 (2) PCl_3 (3) H_2O (4) PH_3

124. Number of electrons in the valence orbit of nitrogen in an ammonia molecules are
(1) 8 (2) 5 (3) 6 (4) 7

125. Hydrogen atoms are held together to form hydrogen molecules by
(1) Hydrogen bond (2) Ionic bond
(3) Covalent bond (4) Dative bond

126. Which of the following does not obey the octet rule
(1) CO (2) NH_3 (3) H_2O (4) PCl_5

127. Which of the following statements is correct for covalent bond
(1) Electrons are shared between two atoms
(2) It may be polar or non-polar
(3) Direction is non-polar
(4) Valency electrons are attracted

128. Which of the following does not exist?
(1) SF_4 (2) OF_6 (3) OF_2 (4) SF_6

129. The compound which does not exist, is
(1) NCl_3 (2) NCl_5 (3) PCl_5 (4) PH_3

130. Only iodine forms hepta-fluoride IF_7, but chlorine and bromine give penta-fluorides. The reason for this is
(1) low electron affinity of iodine
(2) unusual pentagonal bipyramidal structure of IF_7
(3) that the larger iodine atom can accommodate a greater number of smaller fluorine atom around it
(4) low chemical reactivity of IF_7

131. Which of the following is a covalent compound?
(1) Al_2O_3 (2) AlF_3 (3) $AlCl_3$ (4) $Al_2(SO_4)_3$

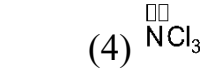
132. Choose the element which show maximum number of covalencies out of the given elements.
(1) F (2) N (3) C (4) C*l*

133. Octet configuration cannot be achieved through:
(1) loss of electrons (2) gains of electrons
(3) sharing of electrons (4) exchange of electrons

134. In which of the following molecules, bonding is not taking place in excited state:
(1) CH_4 (2) BF_3 (3) IF_7 (4) PCl_3

Octet Rule and Formal Charge

135. Which of the following species does not obey octet rule:
(1) SiF_4 (2) PCl_5 (3) ICl (4) BF_4^-

136. Which can follow the octet rule?
(1) $BeCl_2$ (2) BF_3 (3) $AlCl_3$ (4) 

137. Octet rule cannot be followed by:
(1) SF_2 (2) PCl_3 (3) SO_3 (4) CO_2

138. In which species bonding takes place in ground state?
(1) XeF_2 (2) SO_2 (3) CH_4 (4) PF_3

139. Which molecule has odd electron.
(1) NO (2) NO_2 (3) ClO_3 (4) All of these

140. The molecule without any lone pair around the central atom is :
(1) XeO_3 (2) XeO_4 (3) XeF_6 (4) XeO_2F_2

141. Species not obeying octet rule is/are:
(1) CO_3^{2-} (2) BF_3 (3) NO_2^- (4) PCl_3

142. What is the covalency of Carbon in C_2H_4?
(1) 3 (2) 4 (3) 6 (4) 2

143. The molecule with lone pair around the central atom is:
(1) XeO_3 (2) XeO_2F_2 (3) XeF_6 (4) all of these

144. In how many of the following species, the central atoms have two lone pairs of electrons?
XeF_4 XeF_5^- F_2SeO_2 XeF_3^+
$XeOF_4$ $ClOF_3$ ICl_4^- SCl_2
(1) 5 (2) 6 (3) 7 (4) 4

145. Incorrect statement for SF_4
(1) Hypervalent (2) Number of bond pair is four
(3) it forms in first excited state
(4) lp at central sulphur atom are two

146. An ion without pseudo-inert gas configuration is:
(1) Ag^+ (2) Cd^{2+} (3) Zn^{2+} (4) Fe^{3+}

147. Which one is the electron deficient compound:
(1) ICl (2) NH_3 (3) BCl_3 (4) PCl_3

148. The octet rule is not obeyed in:
(1) CO_2 (2) BCl_3 (3) PCl_5 (4) (2) and (3) both

149. Pick out among the following species isoelectronic with CO_2.
(1) N_3^- (2) $(CNO)^-$ (3) $(NCN)^{2-}$ (4) All of these

150. To which of the following species is the octet rule applicable?
(1) BrF_5 (2) SF_6 (3) IF_7 (4) CO_2

151. In NO_3^- ion, the number of bond pair and lone pair of electrons present on Nitrogen atom are:
(1) 2,2 (2) 3,1 (3) 1,3 (4) 4,0

152. How many bonded electron pairs are present in IF_7 molecule?
(1) 6 (2) 7 (3) 5 (4) None of these

153. Which of the following is the electron deficient molecule?
(1) C_2H_6 (2) SiH_4 (3) PH_3 (4) $BeCl_2$ (g)

154. Which is not an exception to the octet rule?
(1) BF_3 (2) $SnCl_4$ (3) XeF_6 (4) ClO_3

155. The combination of atoms occurs because they want -
(1) To decrease number of electrons in the outermost orbit
(2) To attain an inert gas configuration or to attain stability
(3) To increase number of electrons in the outermost orbit
(4) To attain 18 electrons in the outermost orbit

156. Which of the following is an example of super octet molecule?
(1) ClF_3 (2) PCl_5 (3) IF_7 (4) All the three

157. The octet rule is not followed in
(1) F_2 (2) NaF (3) CaF_2 (4) BF_3

158. Which of the molecule is not hypo-valent but completes its octet?
(1) $AlCl_3$ (2) $AlBr_3$
(3) AlF_3 (4) All are hypo-valent and completes their octet.

159. In which of the following molecules central atom involve expansion of octet.
(1) PCl_3 (2) NCl_3 (3) ClF_3 (4) None of these

160. The number of π-bonds and σ-bonds in the Lewis structure of SO_3 is
(1) 3σ, 3π (2) 3σ, 2π (3) 3σ, 1π (4) None of these

161. Which of following molecule/specie is having maximum number of lone pairs in Lewis - dot structure.
(1) BH_4^- (2) BF_4^- (3) CN^- (4) $COCl_2$

162. Which of the following ion has inert gas configuration and having complete octet.
(1) B^{+3} (2) Al^{+3} (3) Ga^{+3} (4) All of these

163. The formal charges on three 'O' atoms in O_3 molecule are.
(1) 0, 0, 0 (2) 0, 0, –1 (3) 0, 0, +1 (4) 0, +1, –1

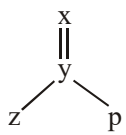
164. Which of the following has incomplete octet?
(1) NH_3 (2) BF_3 (3) $SiCl_4$ (4) CO_2

165. Which of the following is hyper valent compound:
(1) PF_5 (2) $AlCl_3$ (3) AlF_3 (4) CH_3Cl

166. Which of the following obey's lewis octet rule?
(1) CO (2) NO (3) NO_2 (4) BF_3

167. Which does/do not follow Lewis's octet rule?
(1) BCl_3 (2) SF_4 (3) XeF_2 (4) All of these

168. In following structure if each atom has six valence electrons in their valence shell, then identify the addition of formal charge of x, y, z and p elements according to Lewis.



(1) +1 (2) 0 (3) –1 (4) –2

169. Which of the following doesn't obey Lewis's octet rule?
(1) CO (2) NO_3^- (3) O_3 (4) NO

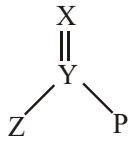
170. In $SnCl_3^-$ ion calculate the formal charge on Sn.
(1) +1 (2) –1 (3) 0 (4) –2

171. Octet is completed in which of the following?
(1) AlF_3 (2) BF_3 (3) PCl_5 (4) SF_6

172. What is formal charge on 'S' in SO_4^{2-}? (Assuming Lewis Octet theory applicable)
(1) 2+ (2) 1– (3) 2– (4) 4+

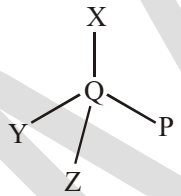
173. Which of the following are hypo-valent compound?
(1) BF_3 (2) BCl_3 (3) $BeCl_2$ (4) All the above

174. In following structure:



If Y element belongs to group number 15 in periodic table and X, Z and P elements belongs to group number 16 then calculate the addition of formal charge of each element [Octet rule is followed]
(1) 0 (2) +1 (3) – 1 (4) – 2

175. In following figure:



If Q atom has five valence electron and X, Y, Z and P atom has six valence electrons in their valence shell then calculate the sum of formal charge of P, X, Y, Z and Q atoms.
(1) –4 (2) –3 (3) +3 (4) –2

176. What is the formal charge on nitrogen in NO_3^-?
(1) + 3 (2) +1 (3) –1 (4) + 4

177. The octet rule is not obeyed in -
(1) CO_2 (2) BCl_3 (3) PCl_5 (4) Both (2) and (3)

178. The compound completing its octet by transfer of electrons is
(1) MgO (2) H_2S (3) PH_3 (4) CCl_4

179. Which of the following compounds is covalent and in which the extension of octet takes place during its formation?
(1) SF_6 (2) NO (3) NH_3 (4) HCl

σ, π and δ Bonds

180. In a sigma bond
(1) Sidewise as well as end to end overlap of orbitals take place
(2) Sidewise overlap of orbitals takes place
(3) End to end overlap of orbitals takes place
(4) None of the above

181. Π-bond is formed
(1) By overlapping of atomic orbitals on the axis of nuclei
(2) By mutual sharing of pi electron
(3) By sidewise overlapping of half-filled *p*-orbitals
(4) By overlapping of *s*-orbitals with *p*-orbitals

182. Two p_Z orbitals from two atoms can form a σ-bond when they approach along.
(1) x-axis (2) z-axis (3) y-axis (4) None

183. If z - axis is the internuclear axis, π-bond is formed by overlap between:
(1) d_{z^2} and d_{z^2} (2) p_Z and p_Z (3) p_X and p_X (4) s and p_Z

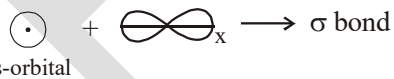
184. If z-axis is internuclear axis then which of the following d-orbital used in a π-bond formation
(1) d_{xy} & d_{xz} (2) p_z & p_z (3) d_{xz} & d_{xz} (4) all of these

185. If z-axis be the internuclear axis, which of the following combination of orbitals would not form π-bond?
(1) $p_x + p_x$ (2) $d_{xy} + d_{xy}$ (3) $d_{xz} + d_{zx}$ (4) $d_{yz} + d_{yz}$

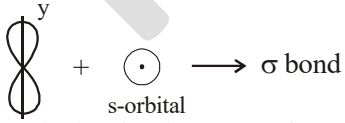
186. If 'y' is the internuclear axis then by which of the following combination π bond is formed.
(1) $s + p_z$ (2) $p_x + p_y$ (3) $d_{xy} + d_{xy}$ (4) $p_y + p_y$

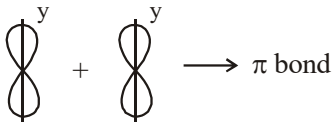
187. If internuclear axis is y then π - bond is form by -
(1) $p_x + p_x$ (2) $s + p_x$ (3) $p_y + p_y$ (4) $p_x + p_y$

188. Which of the following is the correct representation of orbital orientation diagram, if internuclear axis is 'Y':

(1) 

(2) 

(3) 

(4) 

189. If x-axis is the internuclear axis, π-bond is formed by overlap between:
(1) p_y and d_{xy} (2) p_x and d_{xy}
(3) p_x and $d_{x^2-y^2}$ (4) None of these

190. Which of the following overlapping is correct [assuming X-axis to be the internuclear axis]:
(1) $2p_z + 2p_z \rightarrow \sigma$ (2) $2p_y + 2p_y \rightarrow \pi$
(3) $1s + 2p_y \rightarrow \pi$ (4) $2p_y + 2p_z \rightarrow \pi$

191. Which of the following overlaps is **<u>incorrect</u>** [assuming z-axis to be the internuclear axis]?
(1) $2p_y + 2p_y \rightarrow \pi 2p_y$ (2) $2p_z + 2p_z \rightarrow \sigma 2p_z$
(3) $2p_x + 2p_x \rightarrow \pi 2p_x$ (4) $1s + 2p_y \rightarrow \pi\ (1s\text{–}2p_y)$
(1) 'a' & 'b' (2) 'b' & 'd' (3) only 'd' (4) None of these

192. Which of the following overlaps of atomic orbitals does not form π-bond if z-axis is the internuclear axis?
(1) $d_{zx} + p_x$ (2) $p_y + p_y$ (3) $d_{yz} + p_y$ (4) $d_{z^2} + d_{z^2}$

193. Which of the following set of orbitals cannot form π-bond between them.
(1) 2p & 3d (2) 2s & 2p (3) 3p & 3d (4) 2p – 3p

194. Which of the following overlaps of orbitals would lead to formation of σ -bond?
(1) $d_{yz} + d_{zx}$ (2) $d_{xy} + d_{xy}$ (3) $d_{yz} + d_{zx}$ (4) $d_{z^2} + d_{z^2}$

195. Which of the following orbital cannot form π as well as δ bond.
(1) d_{xy} (2) d_{z^2} (3) $d_{x^2-y^2}$ (4) d_{yz}

196. Assuming the bond direction to be z-axis, which of the overlapping of atomic orbitals of two atom (1) and (2) will result in bonding?
(I) s-orbital of A and p_x orbital of B
(II) s-orbital of A and p_z orbital of B
(III) p_y-orbital of A and p_z orbital of B
(IV) s-orbitals of both (1) and (2)
(1) I and IV (2) I and II (3) III and IV (4) II and IV

197. Which of them can form only one type of bond if INA (Inter nuclear axis) is perpendicular to z-axis.
(1) $d_{x^2-y^2} + d_{x^2-y^2}$ (2) $d_{xz} + d_{xz}$ (3) $p_x + p_x$ (4) $d_{xz} + p_x$

198. Which of the following set of orbital overlap cannot form π- bond.
(1) $d_{x^2-y^2}$ and p_y (2) d_{xy} and py (3) p_x and p_x (4) d_{xy}

199. Which of the following set of overlap cannot provide π-bond formation.
(1) 3d and 2p (2) 2p and 3p (3) 2p and 2p (4) 3p and 1s

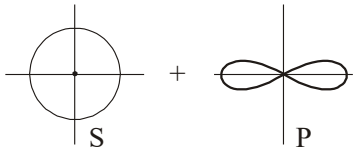
200. Which type of overlapping results the formation of a π bond
(1) Axial overlapping of s-s orbitals
(2) Lateral overlapping of p-p orbitals
(3) Axial overlapping of p-p orbitals
(4) Axial overlapping of s-p orbitals

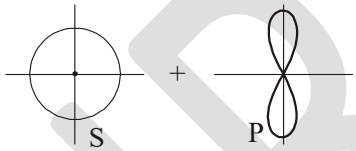
201. In a double bond connecting two atoms, there is a sharing of
(1) 2 electrons (2) 1 electron (3) 4 electrons (4) All electrons

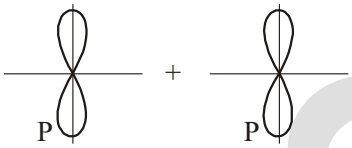
202. Which combination(s) results in formation of π-bonds?
(1) ($d_{z^2} + p_z$) along x-axis (2) ($d_{xy} + d_{x^2-y^2}$) along z-axis
(3) ($d_{xy} + p_y$) along x-axis (4) ($d_{x^2-y^2}$ + P_y) along y-axis

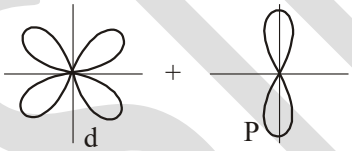
203. If the molecular axis is Z then which of the following overlapping is not possible.
(1) $p_z + p_z = \sigma$ bond (2) $p_x + p_y = \pi$ bond
(3) $p_x + p_x = \pi$ bond (4) $p_y + p_y = \pi$ bond

204. Which of the following is the correct representation of formation of σ bond?

(1) 

(2) 

(3) 

(4) 

205. If y-axis is the approaching axis between two atoms, then which of the set of orbitals cannot form the p bond between two atoms in general.
(1) $p_z - p_z$ (2) $p_x - p_x$ (3) $p_x - p_y$ (4) None of these

206. The maximum number of bond and π-bond can be formed between two atoms are respectively.
(1) 4, 3 (2) 3, 2 (3) 2, 3 (4) 3, 1

Strength of s, p and d Bonds

207. The strength order of π– bond is
(1) 2p–2p > 2p–3d > 2p–3p > 3p–3p
(2) 2p–2p < 2p–3d < 2p–3p < 3p–3p
(3) 2p–2p < 2p–3d < 2p–3p > 3p–3p
(4) 2p–2p < 2p–3d > 2p–3p < 3p–3p

208. Which is correct order of bond strength?
(1) 1s – 1s > 2p – 2p (2) $2p_\pi - 2p_\pi < 2p_\pi - 3d_\pi$
(3) $2p_\pi - 3p_\pi > 2p_\pi - 3d_\pi$ (4) 2s – 2s > 2p – 2p

209. Choose the correct order of bond strength by overlapping of atomic orbitals
(1) 1s-1s > 1s-2s > 1s-2p (2) 2s-2s > 2s-2p > 2p-2p
(3) 2s-2p > 2s-2s > 2p-2p (4) 1s-1s > 1s-2p > 1s-2s

210. Choose the incorrect option for bond strength.
(1) $2p_\pi - 2p_\pi > 2p_\pi - 3p_\pi$ (2) $2p_\pi - 3p_\pi > 2p_\pi - 3d_\pi$
(3) 1s– 2p > 2s – 2p (4) 2s– 2p > 3s – 3p

211. The strength of bonds by s-s, s-p, p-p overlap is generally in the order:
(1)p–p>s–p>s–s (2) s-s >s-p > p-p
(3) s-p > s-s > p-p (4) p-p > s-s > s-p

212. Indicate the correct statement according to VBT:
(1) A sigma bond has no free rotation about the inter-nuclear axis.
(2) p-orbitals always have only sidewise overlapping.
(3) s-orbitals never form π - bonds.
(4) There can be more than one sigma bond between two atoms.

213. Which statement is correct?
(1) one π bond contains four electrons.
(2) π bond is stronger than σ bond.
(3) shape of molecule is determined by sigma bond.
(4) σ bond is formed by sideways overlapping.

214. Indicate the wrong statement according to Valence bond theory:
(1) A sigma bond is stronger than π-bond
(2) p-orbitals always have only sidewise overlapping
(3) s-orbitals never form π-bonds
(4) There can be only one sigma bond between two atoms

215. Which of the following is not correct
(1) A sigma bond is weaker than π-bond
(2) A sigma bond is stronger than π-bond
(3) A double bond is stronger than a single bond
(4) A double bond is shorter than a single bond

216. Which of the following statements is not correct for sigma and pi bond formed between two carbon atoms?
(1) Free rotation of atoms about a sigma - bond is allowed but not in case of a pi-bond
(2) Sigma -bond determines the direction between carbon atoms but a pi-bond has no
primary effect in this regard
(3) Sigma-bond is stronger than a pi-bond
(4) Bond energies of sigma- and pi-bonds are of the order of 264 kJ/mol and 347 kJ/mol. respectively.

217. Strongest bond formed when atomic orbitals
(1) Maximum overlap (2) Minimum overlap
(3) Overlapping not done (4) None of them

218. Which type of overlapping is not present in N_2molecule?
(1) 2s + 2s (2) $2p_X + 2p_X$ (3) $2p_Y + 2p_Y$ (4) $2p_Z + 2p_Z$

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

220. In which of the following pair of elements the π-bond formation tendency is maximum.
(1) S and O (2) Si and O (3) P and O (4) Cl and O

221. Select the combination of orbitals having highest strength.
(1) $2p_x - 2p_x$ (2) $3p_y - 2p_y$ (3) $3p_z - 3p_z$ (4) 4s – 4s

222. Nodal planes are present in s, px, py, pz are respectively.
(1) 0, 1, 1, 1 (2) 0, 2, 1, 1 (3) 0, 2, 2, 2 (4) 0, 0, 0, 0

223. Which of the following is maximum thermal stable?
(1) HF (2) HCl (3) HBr (4) HI

224. Which of the following orbitals does not participate in the hybridisation in IF_7?
(1) $d_{x^2-y^2}$ (2) d_{xy} (3) p_z (4) d_{yz}

225. Which of the molecule has p – p overlapping?
(1) Cl_2 (2) HCl (3) H_2O (4) NH_3

226. Number of σ and π bonds present in: $CH_3 - CH = CH - C \equiv CH$
(1) 10σ, 3π (2) 10σ, 2π (3) 9σ, 2π (4) 8σ, 3π

227. The ratio of σ and π bond in benzene is:
(1) 2 (2) 6 (3) 4 (4) 8

228. How many π bonds are present in SO_2Cl_2?
(1) 2 (2) 4 (3) 1 (4) π bond is absent

229. The ratio of π - bonds in NO_3^- and CO_3^{2-} respectively:
(1) 1: 1 (2) 2: 4 (3) 1 : 2 (4) 2 : 3

230. Which of the following has the least bond energy?
(1) HF (2) HCl (3) HBr (4) HI

231. Which of the following is maximum thermal stable compound?
(1) HF (2) HCl (3) HBr (4) HI

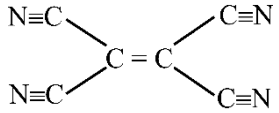
232. Which of the following gives correct arrangement of compounds involved based on their bond strength
(1) HF> HCl > HBr > HI (2) HI > HBr > HCl > HF
(3) HF > HBr > HCl > HI (4) HCl > HF > HBr > HI

233. The ratio of number of σ-bond to π-bond in N_2 and CO molecules are
(1) 2.0, 2.0 (2) 2, ½ (3) ½, ½ (4) ½ ,2

234. C_3^{4-} has:
(1) two σ and two π-bond (2) three σ and one π-bond
(3) two σ and one π-bond (4) two σ and three π-bond

235. Which cannot be explained by VBT -
(1) Overlapping (2) Bond formation
(3) Paramagnetic nature of oxygen (4) Shapes of molecules

236. How many σ and π bonds are there in the molecule of tetracyanoethylene



(1) Nine σ and nine π (2) Five σ and nine π
(3) Nine σ and seven π (4) Five σ and eight π

237. Triple bond in ethyne is formed from
(1)Three sigma bonds (2) Three pi bonds
(3) One sigma and two pi bonds (4) Two sigma and one pi bond

238. The bond in the formation of fluorine molecule will be
(1) Due to s-s overlapping (2) Due to s-p overlapping
(3) Due to p-p overlapping (4) Due to hybridization

239. Strongest bond is
(1) C-C (2) C=C (3) C≡C (4) All are equally strong

240. The double bond between the two carbon atoms in ethylene consists of
(1) Two sigma bonds at right angles to each other
(2) One sigma bond and one pi bond
(3) Two pi bonds at right angles to each other
(4) Two pi bonds at an angle of 60^0 to each other

241. The p-p orbital overlapping is present in the following molecule
(1) Hydrogen (2) Hydrogen bromide
(3) Hydrogen chloride (4) Chlorine

242. In N_2 molecule, the atoms are bonded by
(1) One σ, Two π (2) One σ, One π
(3) Two σ, One π (4) Three π bonds

243. Number of bonds in SO_2
(1) Two σ and two π (2) Two σ and one π
(3) Two σ, two π and one lone pair (4) None of these

244. Which of the following halogens has the highest bond energy
(1) F_2 (2) Cl_2 (3) Br_2 (4) I_2

Hybridization

245. In which of the hybridisation sate different quantum No. are used -
(1) sp^3d^3 (2) sp^3d (3) d^2sp^3 (4) sp

246. The d-orbital involved in sp^3d hybridisation in trigonal bipyramidal geometry:
(1) $d_{x^2-y^2}$ (2) d_{z^2} (3) d_{xy} (4) d_{yz}

247. The orbital involved in case of sp^3d^2 hybridisation is
(1) s + p_x + p_y + d_{xy} + p_z + d_{z^2} (2) s + p_x + p_y + d_{xy} + p_z + d_{yz}
(3) s + p_x + p_y + p_z + $d_{x^2-y^2}$ + d_{z^2} (4) s + p_x + p_y + p_z + d_{yz} + d_{xz}

248. The d-orbital which is not involved in sp^3d^3 hybridisation in pentagonal bipyramidal geometry is:
(1) d_{xy} (2) $d_{x^2-y^2}$ (3) d_{z^2} (4) d_{yz}

249. Trigonal bi pyramidal geometry has
(1) 90°, 120° (2) 90°, 72° (3) 90° only (4) 72° only

250. **Statement-1**: All adjacent bond angles are equal in sp^3d^2 hybridisation.
Statement-2: All bond angles are equal in sp^3d^2 hybridisation.
(1) Statement-1 is true, statement-2 is true, and statement-2 is correct explanation for statement-1.
(2) Statement-1 is true, statement-2 is true, and statement-2 is NOT the correct explanation for statement-1.
(3) Statement-1 is true, statement-2 is false.
(4) Statement-1 is false, statement-2 is true.

251. A sp^3 hybrid orbital contains: -
(1) ¾ s- character (2) ¼ p - character
(3) ¾ p - character (4) ½ s - character

252. orbital is present in which of the following hybridisation.
(1) sp^3d (Square pyramidal) (2) sp^3
(3) sp^3d^2 (4) None of these

253. Which of the following d-orbitals is involved in dsp^3 hybridisation leading to square pyramidal geometry?
(1) d_{z^2} (2) $d_{x^2-y^2}$ (3) d_{xy} (4) d_{yz}

254. The d-orbital involved in sp^3d (trigonal bipyramidal) hybridisation is:
(1) d_{z^2} (2) $d_{x^2-y^2}$ (3) d_{xy} (4) d_{zx}

255. The trigonal bipyramidal geometry results from the hybridisation
(1) dsp^3 or sp^3d (2) dsp^2 or sp^2d (3) d^2sp^3 or sp^3d^2. (4) d^3sp^3 or sp^3d^3

256. In an octahedral structure, the pair of *d* orbitals involved in d^2sp^3 hybridization is
(1) d_{xy}, $d_{x^2-y^2}$ (2) d_{xz} , d_{z^2} (3) $d_{x^2-y^2}$, d_{z^2} (4) d_{yz}, d_{xz}

257. A square planar complex is formed by hybridisation of which atomic orbitals
(1) s,p_x,p_y, d_{xz} (2) s,p_x,p_y, $d_{x^2-y^2}$
(3) s,p_x,p_y, d_{z^2} (4) s,p_x,p_y, d_{xy}

258. sp^3d^2 hybrid orbitals are
(1) Linear bipyramidal (2) Pentagonal
(3) Trigonal bipyramidal (4) Octahedral

259. The geometry of the molecule with sp^3d^2 hybridised central atom is
(1) Square planar (2) Trigonal bipyramidal
(3) Octahedral (4) Square pyramidal

260. In sp hybridisation, shape is
(1) Angular (2) Tetrahedral (3) Bipyramidal
(4) Linear (E) None of these

261. The bond angle in sp^2 hybridisation is
(1) 180^0 (2) 120^0 (3) 90^0 (4) $109^028'$

262. sp^3 hybridization leads to which shape of the molecule
(1) Tetrahedron (2) Octahedron
(3) Linear (4) Plane triangle

263. Out of the following hybrid orbitals, the one which forms the bond at angle, 180^0 is
(1) d^2sp^3 (2) sp^3 (3) sp^2 (4) sp

264. Octahedral molecular shape exists in ..... hybridisation
(1) sp^3d (2) sp^3d^2 (3) sp^3d^3 (4) None of these

265. Which of the following hybridisation results in non-planar orbitals
(1) sp^3 (2) dsp^2 (3) sp^2 (4) sp

266. Which of the following statement is not correct
(1) Hybridization is the mixing of atomic orbitals prior to their combining into molecular orbitals
(2) sp^2 hybrid orbitals are formed from two p atomic orbitals and one s atomic orbital
(3) sp^3d^2 hybrid orbitals are directed towards the corners of a regular octahedron
(4) dsp^3 hybrid orbitals are all at 90^0 to one another

267. Compound formed by hybridization sp^3d^2 will have structure
(1) Planar (2) Pyramidal
(3) Angular (4) Trigonal bipyramidal

268. The central atom in a molecule is in sp^2 hybrid state. The shape of molecule will be
(1) Pyramidal (2) Tetrahedral
(3) Octahedral (4) Trigonal planar

269. sp^3d hybridization is considered to be a combination of two hybridization. They are
(1) $p^3 + sd$ (2) $sp^2 + pd$ (3) $spd + p^2$ (4) none of these

270. If the equatorial plane is x–y plane in sp^3d hybridisation then the orbital used in pd hybridisation are -
(1) p_z and d_{z^2} (2) p_x and d_{xy} (3) p_y and d_{yz} (4) none of these

271. Match List-I (Hybridisation) with List-II (shapes) and select the correct answer
using the codes given below the lists -

List-I	**List-II**
(1) dsp^2	(1) Square planar
(2) sp^3	(2) Tetrahedral
(3) d^2sp^3	(3) Octahedral
(4) sp^3d	(4) Trigonal bipyramidal

(1) a → 1 ; b → 2 ; c → 3 ; d → 4
(2) a → 4; b → 2 ; c → 3 ; d → 1
(3) a → 1; b → 3 ; c → 2 ; d → 4
(4) a → 1; b → 4 ; c → 3 ; d → 3

Hybrid Of Molecules

272. Which of the following hybridisation results in non-planar orbitals
(1) sp^3 (2) dsp^3 (3) sp^2 (4) sp

273. Octahedral molecular shape exists in ..... hybridisation
(1) sp^3d (2) sp^3d^2 (3) sp^3d^3 (4) None of these

274. sp^3 hybridization leads to which shape of the molecule
(1) Tetrahedron (2) Octahedron
(3) Linear (4) Plane triangle

275. The geometry of the molecule with sp^3d^2 hybridised central atom is
(1) Square planar (2) Trigonal bipyramidal
(3) Octahedral (4) Square pyramidal

276. The mode of hybridisation of carbon in $CO_2$is
(1) sp (2) sp^2 (3) sp^3 (4) None of these

277. The hybridisation in BF_3 molecule is
(1) sp (2) sp^2 (3) sp^3 (4) sp^3d

278. The nature of hybridization in the NH_3 molecule is
(1) sp (2) sp^2 (3) sp^3 (4) sp^3d

279. The electronic structure of molecule OF_2 is a hybrid of
(1) sp (2) sp^2 (3) sp^3 (4) sd^3

280. The state of hybridisation of B in BCl_3 is
(1) sp (2) sp^2 (3) sp^3 (4) sp^2d^2

281. The hybrid state of sulphur in SO_3 molecule is
(1) sp^3d (2) sp^3 (3) sp^3d^2 (4) sp^2

282. In XeF_4 hybridization is
(1) sp^3d^2 (2) sp^3 (3) sp^3d (4) sp^2d

283. The hybridization in PF_3 is
(1) sp^3 (2) sp^2 (3) dsp^3 (4) d^2sp^3

284. CCl_4 has the hybridisation
(1) sp^3d (2) dsp^2 (3) sp (4) sp^3

285. The PCl_5 molecule is a result of the hybridisation of
(1) sp^2d^2 (2) sp^3d (3) spd^3 (4) sp^2d^3

286. The structure of Br_3^- involves hybridisation of the type -
(1) sp^3d (2) sp^3d^2 (3) dsp^3 (4) d^2sp^3

287. What is the hybridisation of central atom of perxenate XeO_6^{4-} ion.
(1) sp^3d (2) sp^3d^2 (3) sp^3 (4) No hybridisation

288. What is the hybridisation of XeO_3.
(1) sp^3 (2) sp^3d (3) sp^3d^2 (4) sp^2

289. $BF_3 + F^- \rightarrow BF_4^-$
Hybridisation of central atom in NF_3 is
(1) sp^3 (2) sp (3)sp^2 (4) dsp^2

290. The hybrdization of IF_7 is
(1) sp^3d^3 (2) sp^2d (3) d^2sp^3 (4) sp^3

291. The hybridisation of Xe in XeF_5^- is
(1) sp^3 (2) sp^3d^2 (3) sp^3d^3 (4) sp^2

292. Hybridisation of sulphur in SF_4 is :
(1) sp^3d^2 (2) sp^3 (3) sp^3d (4) sp^3d^3

293. In $SOCl_2$ hybridisation of central atom is
(1) sp^3d^2 (2) sp^3d (3) sp^3 (4) None of these

294. What is the hybridization of Te in $TeCl_6$
(1) sp (2) sp^2 (3) sp^3d (4) sp^3d^2

295. What is the hybridiation state of B in BF_3 and BF_4^-:
(1) sp^2, sp^3 (2) sp^3, sp^3 (3) sp^2, sp^2 (4) sp^3, sp^3d

296. In which of the following the central atom does not use sp^3 hybrid orbitals in its bonding
(1) BF_3^- (2) OH_3^+ (3) NH_2^- (4) NF_3

297. Which species do not have sp^3 hybridization
(1) Ammonia (2) Methane (3) Water (4) Carbon dioxide

298. The species in which the central atom uses sp hybrid orbitals in its bonding is
(1) PH_3 (2) NH_3 (3) H_3C^+ (4) SbH_3

299. Which has sp^2 hybridization of central atom
(1) PCl_3 (2) SO_3 (3) BF_3 (4) NO_3^-

300. Which one has sp^{2-} hybridisation
(1) CO_2 (2) N_2O (3) SO_2 (4) CO

301 Which set hydridisation is correct for the following compounds
NO_2, SF_4 , PF_6^-
(1) sp, sp^2, sp^3 (2) sp, sp^3d, sp^3d^2
(3) sp^2, sp^3, d^2sp^3 (4) sp^3, sp^3d^2, sp^3d^{2S}

302. In which of the following cases orbital is involved in their hybridisation.
(1) NO_2^+ (2) $SnCl_3^-$ (3) XeF_5^+ (4) SO_3Cl^-

303. In which of the following cases orbital is involved in their hybridisation.
(1) NO_2^+ (2) I_3^- (3) XeF_5^+ (4) PCl_3F_2

304. In which of the following orbitals will take part in hybridisation?
(1) PCl_5 (2) SF_6 (3) IF_7 (4) All the above

305. The correct order of hybridisation of the central atom in the following species:
NH_3, XeO_2F_2, SeF_4, NO_2^+
(1) sp^3, sp^3, sp^3d, sp (2) sp^3, sp^3d, sp^3d, sp
(3) sp^3, sp^3d^2, sp^3d, sp^2 (4) sp^2, sp^3d, sp^3d^2, sp

306. What is the correct mode of hybridization of the central atom in the following compounds:
NO_2^+, SF_4, PF_6^-
(1) sp^2, sp^3, d^2sp^3 (2) sp^3, sp^3d^2, sp^3d^2
(3) sp, sp^3d, sp^3d^2 (4) sp, sp^2, sp^3

307. Which option is correct for hybridisation in ClO_3^-, ClO_4^- & NH_3.
(1) sp^2, sp^3, sp^3 (2) sp^2, sp^2, sp^3
(3) sp^3, sp^2, sp^3 (4) sp^3, sp^3, sp^3

308. $CH_3–CH_2–CH=CH_2$ has hybridisation
(1) sp, sp, sp^2, sp^2 (2) sp^3, sp^3, sp^2, sp
(3) sp^3, sp^3, sp^2, sp^2 (4) sp^3, sp^2, sp^2, sp

309. Consider the compound given below
$H_2C = CH – CH = CH – CH_2 – OH$
The number of sp^2 hybridised atoms is
(1) 5 (2) 3 (3) 4 (4) 6

310. In which of the following orbital has **not** participated in its hybridisation?
(1) PCl_5 (2) SF_6 (3) XeF_4 (4) IF_7

311. The hybridisation of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ are:
(1) sp, sp^3 and sp^2 respectively (2) sp, sp^2 and sp^3 respectively
(3) sp^2, sp and sp^3 respectively (4) sp^2, sp^3 and sp respectively

312. Which one of the following specie is sp^2 hybridised?
(1) BF_3 (2) PCl_3 (3) NH_3 (4) H_3O^+

313. Which of the following molecule has sp^3d^2 hybridisation.
(1) ClF_3 (2) SF_4 (3) XeF_5^+ (4) IF_7

314. Which of the following molecule has sp^3d hybridisation
(1) SOF_4 (2) SF_4 (3) XeF^+_3 (4) All

315. The hybridization of S in SO_4^{2-} is same as in
(1) Xe in XeF_4 (2) S in SO_3^{2-} (3) C is CO_3^{2-} (4) As in AsF_4^-

316. Which of the following compound in which central atom assumes sp^3 hybridization?
(1) NH_4^+ (2) SO_4^{-2} (3) CCl_4 (4) All of these

317. The hybridization of phosphorous in $POCl_3$ is the same as in:
(1) P in PCl_3 (2) S in SF_4 (3) Cl in ClF_3 (4) B in BCl_3

318. sp^3 hybridisation is found in:
(1) CH_3^+ (2) CH_3^- (3) ClO_3^- (4) SO_3
(1) A & C (2) B & C (3) B & D (4) C & D

319. In which of the following compounds carbon atom undergoes hybridization of more than one type
(i) $CH_3CH_2CH_2CH_3$ (ii) $CH_3—CH=CH–CH_3$
(iii) $CH_2=CH–CH_2–CH_3$ (iv) $H–C\equiv C–H$
(1) (iii) and (iv) (2) (i) and (iv) (3) (ii) and (iii) (4) Only (ii)

320. The type of hybridization of Xe in XeF_6 will be the same as that of the central atom in the following molecule:
(1) PCl_5 (2) SF_6 (3) IF_7 (4) CCl_4

321. In the compound
$\overset{1}{C}H_2=\overset{2}{C}H-\overset{3}{C}H_2-\overset{4}{C}H_2-\overset{5}{C}\equiv\overset{6}{C}H$
, 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) $sp^2 - sp^3$

322. Which of the following elements cannot exhibit sp^3d hybridisation state: -
(1) C (2) P (3) Cl (4) B
Correct answer is: -
(1) a, c (2) a, d (3) b, c (4) b, d

323. Which among the following molecules have sp^3d hybridisation with one lone pair of electrons on the central atom ?
(i) SF_4 (ii) $[PCl_4]^+$ (iii) XeO_2F_2 (iv) $ClOF_3$
(1) (i), (ii) and (iii) only (2) (i), (iii) and (iv) only
(3) (i) and (iii) only (4) (iii) and (iv) only.

324 S_1: $[XeF_7]^+$ has sp^3d^3 hybridisation
S_2: $[PCl_4]^+$ has sp^3d^2 hybridisation
S_3: $[SF_6]$ has sp^3d^2 hybridisation
S_4: $[PF_4]^+$ has sp^3 hybridisation
(1) T F F T (2) T T F T (3) T F T T (4) F F F T

325. sp^3 hybridisation is found in
(1) CO_2^{3-} (2) BF_3 (3) NO_3^- (4) NH_3

326. The hybridisation of P in phosphate ion (PO_4^{3-}) is the same as :
(1) I in ICl_4^- (2) S in SO_3 (3) N in NO_3^- (4) S in SO_3^{2-}

327. Molecule in which central atom has sp^3d^2 hybridization is present.
(1)IF_7 (2) IO_6^{-5} (3) XeF_2 (4) XeO_4

328. The hybridization of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ are:
(1) sp, sp^3 and sp^2 respectively (2) sp, sp^2 and sp^3 respectively
(3) sp^2, sp and sp^3 respectively (4) sp^2, sp^3 and sp respectively

329. The hybrid orbitals used by central atoms in $BeCl_2$, $BeCl_3$ and CCl_4 molecules are respectively
(1) sp^2,sp^3 and sp (2) sp,sp^2 and sp^3
(3) sp^3,sp and sp^2 (4) sp^2,sp and sp^3

330. The structural formula of a compound is $CH_3 – CH = C = CH_2$ The type Of hybridization at the four carbons from left to right are
(1) sp^2, sp, sp^2, sp^3 (2) sp^2, sp^3, sp^2, sp
(3) sp^3, sp^2, sp, sp^2 (4) sp^3, sp^2, sp^2, sp^2

331. The hybridization of carbon atoms in $C_2 – C_3$ single bond of $\overset{4}{H}\overset{3}{C}\equiv\overset{2}{C}-\overset{1}{C}H=CH_2$ is:
(1) $sp^3 – sp^3$ (2) $sp^2 – sp$ (3) $sp – sp^2$ (4) $sp^3 – sp$

332. The bond between carbon atom (1) and carbon atom (2) in compound, $N\equiv C_{(1)}-C_{(2)}= CH_2$ involves the hybrid as-
(1) sp and sp^2 (2) sp^2 and sp^3 (3) sp and sp^3 (4) sp and sp

333. Specify the hybridisations of central atom in the following species respectively {N_3^-, NOCl, N_2O}
(1) sp, sp^2, sp (2) sp, sp, sp^3 (3) sp^2, sp, sp (4) sp^2, sp^2, sp.

334. In which of the following, 'N' atom is sp^2 hybridised:
(1) NH_3 (2) NH_4^+ (3) NH_2^- (4) NOCl

335. Choose the molecules in which hybridisation occurs in the ground state - Among the compounds, BF_3, NCl_3, F_2S, SF_4 and $BeCl_2$, identify the ones in which the central atom has the same type of hybridisation
(1) BF_3 and NCl_3 (2) F_2S and $BeCl_2$
(3) NCl_3 and F_2S (4) SF_4 and $BeCl_2$

Shape Of Molecules

336. Percentage of s-character in sp^3 hybrid orbital is
(1) 25 (2) 50 (3) 66 (4) 75

337. s-character in sp hybridised orbitals is
(1) $\frac{1}{3}$ (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) $\frac{2}{3}$

338. Which of the following hybridisation has maximum *s*-characters
(1) sp^3 (2) sp^2 (3) sp (4) None of these

339. For which of the following hybridisation the bond angle is maximum
(1) sp^2 (2) sp (3) sp^3 (4) dsp^3

340. Hybrid orbitals, the one which forms the bond at angle 120^0, is
(1) d_2sp^3 (2) sp^3 (3) sp^2 (4) sp

341. The minimum number of 90° angles between hybrid orbitals is observed in
(1) sp^3d^2 (2) d^2sp^3 (3) dsp^2 (4) sp^3d

342. A sp^3 hybrid orbital contains:
(1) 1/4 s-character (2) 1/2 s-character
(3) 2/3 s-character (4) 3/4 s-character

343. For which of the hybridisation the given statement is true for maximum number of angles and the statement is "hybrid orbitals are at the angle of x° to one another".
(1) sp^3d^2 (2) sp^3 (3) sp^2 (4) sp^3d

344. Which one of the following molecular geometries (i.e., shapes) is not possible for the sp^3d^2 hybridisation?
(1) See-saw (2) Octahedral
(3) Square planar (4) Square pyramidal

345. The central atom in a molecule is in sp^2 hybrid state. The shape of molecule will be
(1) Pyramidal (2) Tetrahedral
(3) Octahedral (4) Trigonal planar

346. Compound formed by sp^3d hybridization will have structure
(1) Planar (2) Pyramidal
(3) Angular (4) Trigonal bipyramidal

347. Shape of methane molecule is
(1) Tetrahedral (2) Pyramidal
(3) Octahedral (4) Square planer

348. The structure of PF_5 molecule is
(1) Tetrahedral (2) Trigonal bipyramidal
(3) Square planar (4) Pentagonal bipyramidal

349. The bent or V–shape of the molecule can be resulted from which of the following hybridization.
(1) sp^3 (2) sp^2 (3) Both (1) and (2) (4) None of these

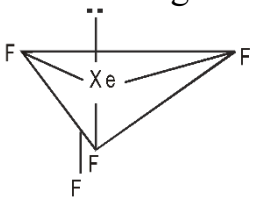
350. Structure of ammonia is
(1) Trigonal (2) Tetrahedral
(3) Pyramidal (4) Trigonal pyramidal

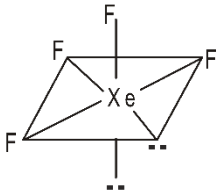
351. The shape of CH_3^+ species is:
(1) Tetrahedral (2) Square planar
(3) Trigonal planar (4) Linear

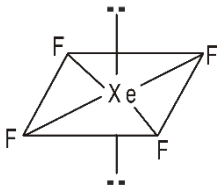
352. The shape of SO_4^{2-} ion is:
(1) Square planar (2) Tetrahedral
(3) Trigonal bipyramidal (4) Hexagonal

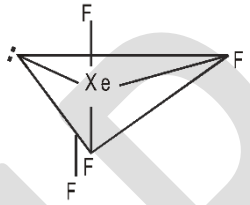
353. XeF_2 molecule is :
(1) Linear (2) Triangular planar
(3) Pyramidal (4) Square planar

354. Which is the right structure of XeF_4?

(1) 

(2) 

(3) 

(4) 

355. The structure of ICl_2^- is -
(1) Trigonal (2) Octahedral (3) Square planar (4) Linear

356. The geometry of sulphur trioxide molecule is
(1) Tetrahedral (2) Trigonal planar (3) Pyramidal (4) Square planar

357. The ammonium ion is
(1) Tetrahedral (2) Octahedral (3) Square planar (4) Linear

358. Which of the following molecule is linear
(1) SO_2 (2) NO_2^+ (3) NO_2^- (4) SCl_2

359. Pyramidal shape would be of
(1) NO_3^- (2) H_2O (3) H_3O^+ (4) NH_4^+

360. Which of the following molecule does not show tetrahedral shape
(1) CCl_4 (2) $SiCl_4$ (3) SF_4 (4) CF_4

361. Which of the following compounds is not linear
(1) $SnCl_2$ (2) HCl (3) CO_2 (4) $HgCl_2$

362. The shape of IF_7 molecule is
(1) Octahedral (2) Pentagonal bipyramidal
(3) Trigonal bipyramidal (4) Tetrahedral

363. Be in $BeCl_2$ undergoes
(1) Diagonal hybridization (2) Trigonal hybridization
(3) Tetrahedral hybridization (4) No hybridization

364. Which of the following molecules has pyramidal shape
(1) PCl_3 (2) SO_3 (3) CO_3^{2-} (4) NO_3^-

365. Geometry of ammonia and the hybridization of nitrogen involved in it are
(1) sp^3 -hybridization and tetrahedral geometry
(2) sp^3 -hybridization and distorted tetrahedral geometry
(3) sp^2 -hybridization and triangular geometry
(4) None of these

366. Which of the following is non-linear molecule
(1) CO_3 (2) CO_2 (3) CS_2 (4) $BeCl_2$

367. The linear structure is assumed by
(1) $SnCl_2$ (2) NCO^- (3) CS_2 (4) NO_2^-

368. The pair having similar geometry is
(1) PCl_3, NH_3 (2) $BeCl_2$, H_2O (3) CH_4 , CCl_4 (4) IF_5 , PF_5

369. The shape of H_3O^+ ion is
(1) Linear (2) Angular (3) Trigonal planar (4) Triangular pyramidal

370. The geometry of ClO_3^- according to valence shell electron pair repulsion (VSEPR) theory will be
(1) Planar triangle (2) Pyramidal (3) Tetrahedral (4) Square planar

371. The geometry of AlF_6^{-3} is as follows:
(1) Tetrahedral (2) Hexagonal (3) Pyramidal (4) Octahedral

372. 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

373. Amongst the following the molecule that is linear, is:
(1) CO_2 (2) NO_2 (3) SO_2 (4) SiO_2

374. Which of the following is that molecule whose shape is pyramidal?
(1) PCl_3 (2) SO_2 (3) CO_3^{-2} (4) NO_3^-

375. Which molecule has linear structure?
(1) CO_2 (2) NO_2 (3) SO_2 (4) SiO_2

376. CO_2 is iso structural with:
(1) $HgCl_2$ (2) $SnCl_2$ (3) SO_2 (4) NO_2^-

377. The bonding and lone pairs of electrons present in ClF_3 are arranged in the following shape:
(1) Square pyramidal (2) Trigonal planar
(3) Trigonal bipyramidal (4) Octahedral

378. Ammonia molecule is formed by the following type of hybrid orbitals :
(1) dsp^2 (2) sp^3 (3) sp^3d (4) d^2sp

379. XeF_6 is:
(1) Octahedral (2) distorted octahedral (3) Planar (4) Tetrahedral

380 Mark out the correct match of shape?
(1) $XeOF_2$ - Trigonal planar (2) ICl_4^- - Square planar
(3) $[SbF_5]^{2-}$ - Pentagonal (4) $NH_2^{\ominus}$ - Pyramidal

381. Shape of a molecule having 4 bond pairs and two lone pairs of electrons, will be
(1) Square planar (2) Tetrahedral
(3) Linear (4) Octahedral

382. Hybridisation in $XeOF_2$, XeO_2F_2 is sp^3d. But shape will be respectively: -
(1) T, 'V' shape (2) T shape, (See-Saw)
(3) Both have T shape (4) T shape, irregular octahedral

383. Which of the following has pyramidal shape?
(1) BF_3 (2) H_3O^+ (3) NO_3^- (4) CO_3^{2-}

384. In BrF_3 molecule, the lone pairs occupy equatorial positions to minimize
(1) Lone pair- lone pair repulsion and lone pair-bond pair repulsion
(2) Lone pair- lone pair repulsion only
(3) Lone pair- bond pair repulsion only
(4) Bond pair- bond pair repulsion only

385. Which of the following having a square planar structure is
(1) NH_4^+ (2) BF_4^- (3) XeF_4 (4) CCl_4

386. The shape of I_3^- is
(1) Tetrahedral (2) Linear (3) T-shape (4) Trigonal

387. I_3^+ and I_3^- have same:
(1) Geometry (2) Number of lone pair (s)
(3) Bond angle (4) None of these

388. Which of the following will be octahedral?
(1) SF_6 (2) BF_4^- (3) PCl_5 (4) XeF_6

389. The electronic geometrical arrangement and shape of I_3^- are respectively
(1) Trigonal bipyramidal geometry, linear shape
(2) Hexagonal geometry, T-shape
(3) Triangular planar geometry, triangular shape
(4) Tetrahedral geometry, pyramidal shape

390. The shapes of XeF_4, XeF_5^- and $SnCl_2$ are -
(1) octahedral, trigonal bipyramidal and bent
(2) Sq. pyramidal, pentagonal planar and linear
(3) Sq. Planar, pentagonal planar and angular
(4) See-saw, T-shaped and linear

391. Which of the following pairs are iso-structural?
(1) CH_3^- and CH_3^+ (2) NH_4^+ and BH_4^-
(3) SO_4^{2-} and BF_3 (4) NH_2^- and BeF_2

392. Molecular shape of ClF_3, I_3^- and XeO_3 respectively are
(1) T-shape, Linear, Pyramidal (2) Planar, Linear, Tetrahedral
(3) T-shape, Planar, Pyramidal
(4) Trigonal bipyramidal, Linear, Tetrahedral

393. The type of hybrid orbitals used by chlorine atom in ClO_2^- is
(1) sp^3 (2) sp^2 (3) sp (4) sp^3d

394. In case of XeO_2F_2 and XeF_6, Xe is with
(1) Same hybridization but with different geometry
(2) Different hybridization with same geometry
(3) Different hybridization and different geometry
(4) Same geometry and same hybridization

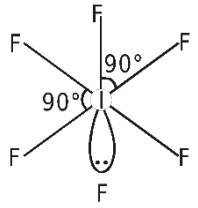
395. Which of the following molecule is of T shape?
(1) I_3^- (2) ClF_3 (3) SF_4 (4) XeF_4

396. The molecule which has pyramidal shape is
(1) SO_3 (2) NO_3^- (3) CO_3^{-2} (4) PF_3

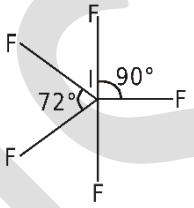
397. Molecules with see-saw shape is
(1) SF_4 (2) $XeOF_4$ (3) XeO_2F_2 (4) $HgCl_2$

398. Isostructural group of molecules is
(1) NH_3, NF_3, BF_3 (2) NO_3^-, NO_2^+, SF_4
(3) XeO_4, NH_4^+, CH_4 (4) CH_3^-, NH_3, NF_3

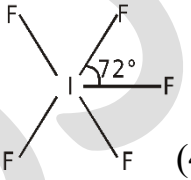
399. The structure of IF_5 can be best described as :-



(1)



(2)



(3) (4) none of these

400. The shapes of PCl_4^+, PCl_4^- and $AsCl_5$ are respectively: -
(1) square planar, tetrahedral and see-saw
(2) tetrahedral, see-saw and trigonal bipyramidal
(3) tetrahedral, square planar and pentagonal bipyramidal
(4) trigonal bipyramidal, tetrahedral and square pyramidal

401. The shapes of IF_5 and IF_7 are respectively: -
(1) tetragonal pyramidal and pentagonal bipyramidal
(2) octahedral and pyramidal
(3) trigonal bipyramidal and square antiprismatic
(4) distorted square planar and distorted octahedral

402. The geometry and the type of hybrid orbital present about the central atom in BF_3 is
(1) Linear, sp (2) Trigonal planar, sp^2
(3) Tetrahedral, sp^3 (4) Pyramidal, sp^3

403. Shape of NH_3 is very similar to:
(1) BF_3 (2) CH_3^- (3) SO_3 (4) $CH_3^{\oplus}$

408. The number of 90° angle in SF_6 are:
(1) 4 (2) 8 (3) 12 (4) 16

405. Which of the following statement is/are not correct -

(1) CH_3^+ shows sp^2-hybridisation whereas CH_3^- shows sp^3-hybridisation
(2) NH_4^+ has a regular tetrahedral geometry
(3) sp^2-hybridised orbitals have equal s and p character.
(4) Hybridised orbitals always form σ-bonds

406. In sp hybridisation, shape is
(1) Angular (2) Tetrahedral
(3) Bipyramidal (4) Linear

407. The structure and hybridisation of $Si(CH_3)_4$ is
(1) Bent, sp (2) Trigonal, sp^2
(3) Octahedral, sp^3d (4) Tetrahedral, sp^3

408. Which of the following statement is true for $IO_2F_2^-$:
(1) The electrons are located at the corners of a trigonal bipyramidal but one of the equatorial pairs is unshared.
(2) It has sp^3d hybridisation and is T-shaped.
(3) Its structure is analogous to SF_4
(4) (1) and (3) both

409. Which of the following structure is most expected for molecule $XeOF_4$?
(1) Tetrahedral (2) Square pyramidal
(3) Square planar (4) Octahedral

410. Which of the following is not correctly match?
(1) ICl_2^- – Linear (2) XeF_6 – Distorted Octahedral
(3) ICl_3 –Trigonal bipyramidal (4) SF_4 – See-Saw

411. How many bond angles of 90° are present in trigonal bipyramidal shape of PCl_5?
(1) 9 (2) 6 (3) 4 (4) None of these

412. Which of the following has square pyramidal geometry.
(1) XeF_5^- (2) PF_6^-
(3) IF_5 (4) All are having square pyramidal geometry

413. Select pair of compounds in which both have different hybridization but have same molecular geometry: -
(1) BF_3, BrF_3 (2) $ICl_2^{\oplus}$, $BeCl_2$ (3) $BeCl_3$, PCl_3 (4) PCl_3, NCl_3

414. 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, dz^2 (4) $d_{x^2-y^2}$, s, p_x, p_y

415. The pair of compounds having similar geometry.
(1) BF_3, NF_3 (2) BeF_2, H_2O (3) BCl_3, PCl_3 (4) BF_3, CH_3^+

416. The shape of IF_4^- will be: -
(1) Square planar (2) Tetrahedral
(3) Pentagonal bipyramidal (4) Distorted tetrahedral

417. $XeOF_4$ contains: -

(1) six electron pairs forming an octahedron with two positions occupied by lone pairs

(2) two π-bonds and the remaining six electron pairs, forming an octahedron

(3) three π-bonds and the remaining four electron pairs forming an tetrahedron

(4) one π-bonds and the remaining six electron pairs forming an octahedron with one position occupied by a lone pair

418. Which of the following statements is/are correct?

(1) NH_2^+ shows sp^2 – hybridisation whereas NH_2^- shows sp^3 – hybridisation

(2) Al $(OH)_4^-$ has a regular tetrahedral geometry

(3) sp^2–hybridized orbitals have equal s-and p-character

(4) usually hybridized orbitals form σ-bonds

419. H_2O is:

(1) A linear triatomic molecule

(2) A bent (angular) triatomic molecule

(3) Both of these (4) None of these

420. According to VSEPR theory, the most probable shape of the molecule having 4 electron pairs in the outer shell of the central atom is:

(1) Linear (2) Tetrahedral (3) Hexahedral (4) Octahedral

422. Which molecule is not linear

(1) BeF_2 (2) BeH_2 (3) CO_2 (4) H_2O

423. Which molecule is linear

(1) NO_2^- (2) ClO_2^- (3) CO_2 (4) H_2S

424. Which of the following molecules has trigonal planer geometry

(1) IF_3 (2) PCl_3 (3) NH_3 (4) BF_3

425. Which of the following will be octahedral

(1) SF_6 (2) BF_4^- (3) PCl_5 (4) BO_3^{3-}

426. The shapes of BCl_3, PCl_3 and ICl_3 molecules are all

(1) Triangular (2) Pyramidal

(3) T-shaped (4) All above are incorrect

427. Which of the following pairs has same structure

(1) PH_3 and BCl_3 (2) SO_2 and NH_3

(3) PCl_5 and SF_6 (4) NH_4^+ and SO_4^{2-}

428. Which of the following compounds doesn't have linear structure

(1) CO_2 (2) SO_2 (3) $BeCl_2$ (4) C_2H_2

429. The molecule which is pyramid shape is

(1) PCl_3 (2) CO_3^{2-} (3) SO_3 (4) NO_3^-

430. The species which is not tetrahedral in shape is

(1) $NF_4^{\oplus}$ (2) AlH_4^- (3) BF_4^- (4) ICl_4^-

431. The orbitals occupy more space will have more "s" character and accordingly which is incorrect statement.
(1) l.p. will go to the axial position of PBP geometry.
(2) l.p. will go to the equitorial position of TBP geometry.
(3) Axial orbital of PBP geometry is longer than equatorial.
(4) Equatorial orbital of TBP geometry is shorter than axial.

432. Which of the following species given below have shape similar to $XeOF_4$?
(1) XeO_3 (2) IOF_4^+ (3) PCl_5 (4) $XeF_5^{\oplus}$

433. Which of the following pair of species is not isostructural?
(1) KrF_2, ICl_2^- (2) SO_3, SO_3^{2-} (3) CO_3^{2-}, BO_3^{3-} (4) SiO^{4-}, IO_4^-

434. Find the pair of species having same shape but different hybridisation.
(1) SO_3, CO_3^{2-} (2) NO_2^-, ClO_2^-
(3) $BeCl_2$, HCN (4) XeF_2, $SnCl_2$

435. Shape of NH_4^+ and BF_4^- are:
(1) Tetrahedral & Tetrahedral (2) Pyramidal & Tetrahedral
(3) Square planar & Tetrahedral (4) Tetrahedral & Trigonal planar

436. Which of the following is T-shaped?
(1) PCl_3 (2) BCl_3 (3) NH_3 (4) ClF_3

437. Which of the following is linear?
(1) CO_2 (2) $BeCl_2$ (3) NO_2^+ (4) All of these

438. The pair of compounds having similar geometry.
(1) BF_3, NF_3 (2) BeF_2, H_2O (3) BCl_3, PCl_3 (4) BF_3, CH_3^+

439. TeF_5^-, XeF_2, I_3^+, XeF_4, PCl_3
Which of the following shape does not describe to any of the above species?
(1) Square pyramidal (2) Square planar
(3) Trigonal planar (4) Linear

440. The hybridisation and shape of XeO_3F_2 molecule is
(1) sp^3 and tetrahedral (2) sp^3d and see-saw
(3) sp^3d and TBP (4) sp^3d^2 and octahedral

441. The pyramidal species / molecule is
(1) $SnCl_3^-$ (2) CO_3^{2-} (3) NO_3^- (4) SO_3

442. Choose the correct set from the following options regarding the hybridisation of central atom and shape.
(1) $SnCl_2$, sp^2, linear (2) $AlCl_4^-$, sp^3, square planar
(3) $SOCl_2$, sp^2, planar (4) COF_2, sp^2, planar

443. The species which is not tetrahedral in shape is
(1) $NF_4^{\oplus}$ (2) AlH_4^- (3) BF_4^- (4) ICl_4^-

444. Molecules with See-Saw shape is
(1) CH_2F_2 (2) $XeOF_4$ (3) XeO_2F_2 (4) $HgCl_2$

445. Find the pair of species having same shape but different hybridisation.

(1) SO_3, CO_3^{2-} (2) NO_2^-, ClO_2^- (3) $BeCl_2$, HCN (4) XeF_2, $SnCl_2$

446. Which of the following compounds are having same shape.
(1) SF_4 (2) XeF_4 (3) $[AsF_4]^-$ (4) $[SnCl_3]^-$

447. Which of the following is linear shape?
(1) SO_2 (2) NO_2^+ (3) O_3 (4) NO_2^-

448. Which of the following has linear shape?
(1) NO_2^- (2) CO_2 (3) H_2O (4) OF_2

449. The pair of species having identical shapes for molecules of both species is:
(1) CF_4, SF_4 (2) XeF_2, CO_2 (3) BF_3, PCl_3 (4) PF_5, IF_3

450. The structure of O_3 and N_3^- are
(1) both linear (2) Linear and bent respectively.
(3) both bent (4) Bent and linear respectively.

451. Choose the correct set from the following options regarding the hybridisation of central atom and Shape.
(i) $SnCl_2 \rightarrow sp^2$, Linear (ii) $SnCl_3^- \rightarrow sp^3$, Pyramidal
(iii) $COF_2 \rightarrow sp^2$, Planar (iv) $SOCl_2 \rightarrow sp^3$, Pyramidal
(1) (ii), (iii) & (iv) (2) (ii) & (iii)
(3) (i), (ii) & (iii) (4) (i) & (ii)

452. The geometry of ammonia molecule can be best described as
(1) nitrogen at one vertex of a regular tetrahedron, the other three vertices being occupied by the three hydrogens
(2) nitrogen at the centre of the tetrahedron, three of the vertices being occupied by three hydrogens
(3) nitrogen at the centre of an equilateral triangle, three corners being occupied by three hydrogens
(4) nitrogen at the junction of a T, three open ends being occupied by three hydrogens

453. Which molecular geometry is least likely to result from a trigonal bipyramidal electron geometry?
(1) trigonal planar (2) see–saw (3) linear (4) T–shaped

454. Select pair of compounds in which both have different hybridisation but have same molecular geometry.
(1) BF_3, BrF_3 (2) $BeCl_2$ (3) BCl_3, PCl_3 (4) PCl_3, NCl_3

455. Which molecular geometry are most likely to result, from a octahedral electron geometry?
(I) square planar (II) square pyramidal (III) linear (IV) V–shaped
Choose the correct code:
(1) I & II (2) I, II & III (3) I, III & IV (4) All

461. What is the shape of SF_2 molecule.
(1) Linear (2) Bent (3) T.B. P (4) See-Saw

457. Which is not correctly matched?

(1) XeO_3 ; Trigonal bipyramidal (2) ClF_3 ; bent T-shape
(3) $XeOF_4$; Square pyramidal (4) XeF_2 ; Linear shape

458. Which of the following pairs of species have identical shapes?
(1) NO_2^+ and NO_2^- (2) PCl_5 and BrF_5
(3) XeF_4 and ICl_4^- (4) $TeCl_4$ and XeO_4

459. Among the following the pair in which the two species are not isostructural is:
(1) BH_4^- and NH_4^+ (2) PF_6^- and SF_6
(3) SiF_4 and SF_4 (4) IO_3^- and XeO_3

460. Which of the following shape cannot be obtained from sp^3d^2 hybridisation.
(1) Square planar (2) Square pyramidal
(3) Tetrahedral (4) Octahedral

461. Which is not correctly matched?
(1) IOF_4^+ ; Trigonal bipyramidal
(2) IO_2F_2 ; T–shape
(3) XeO_6^{4-} ; Square bipyramidal
(4) XeF_2 ; Linear

462. S_1: I_3^+ is a linear molecule with two lone pairs of electrons on central atom.
S_2: I_3^- is a linear molecule with three lone pair of electrons on central atom.
S_3: Br_3^+ is a bent molecule with two lone pair of electrons on central atom.
S_4: ICl_4^- is a pyramidal molecule with one lone pair of electrons on central atom.
(1) T F T F (2) F T F T (3) T F F T (4) F T T F

463. Which one of the following is the correct set with respect to molecule, hybridization, and shape?
(1) $BeCl_2$, sp^2, linear (2) $BeCl_2$, sp^2, triangular planar
(3) BCl_3, sp^2, triangular planar (4) BCl_3, sp^3, tetrahedral

464. Of the following species the one having a square planar structure is
(1) NH_4^+ (2) BF_4^- (3) XeF_4 (4) SCl_4

465. T-type of shape is exhibited by the molecule
(1) ICl_3 (2) $CHCl_3$ (3) CCl_4 (4) PCl_5

466. Which of the following molecular geometry is not possible from a octahedron electron geometry.
(1) Square planar (2) Square pyramidal
(3) Octahedron (4) Linear

467. Which of the following geometry the molecule is not possible when the central atom is having sp^3d hybridisation:
(1) TBP (2) Trigonal planer (3) Linear (4) T-shaped

468. Which of the following set of molecules are having square pyramidal and pyramidal shape respectively.

(1) ICl_4^- and SiF_4 (2) NF_3 and IF_5

(3) $XeOF_4$ and H_3O^+ (4) BrF_5 and NF_4^+

469. Select the correct statement.

(1) SF_4, CH_4, $SiCl_4$ and CCl_4 have tetrahedral structure.

(2) BF_3, ClF_3 and ICl_3 have trigonal planar structure.

(3) XeF_2, $BeCl_2$ and ICl_2^- have linear structure.

(4) All are correct

470. Which of the following pair has same geometry but different hybridisation?

(1) $BeCl_2$, C_2H_2 (2) $SnCl_2$, XeF_2 (3) ICl_2^-, CO_2 (4) CCl_4, NH_4^+

471. Which of the following compounds or ions have bent shape?

(1) I_3^+, I_3^- , H_2O, O_3 (2) H_2O, O_3 , H_2F^+

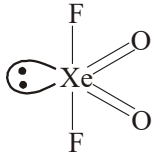
(3) I_3^+, H_2O, N_3^- , O_3 (4) H_2F^+, H_2O, N_3^- , I_3^+

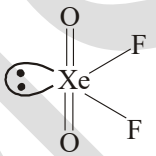
472. Shape of XeF_4 is:

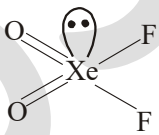
(1) tetrahedral (2) square planar

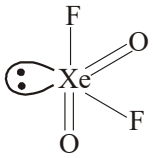
(3) See-saw (4) trigonal pyramidal

473. The correct structure of XeO_2F_2 is

(1) 

(2) 

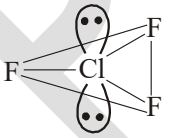
(3) 

(4) 

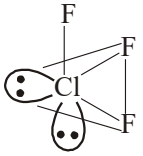
474. Which of the following has T-shape structure?

(1) ClF_3 (2) SF_4 (3) PCl_5 (4) SF_6

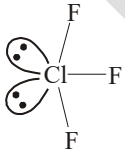
475. Indicate for ClF_3 molecule, the shape & the type of hybridisation of the Cl-atom respectively are

(1) 

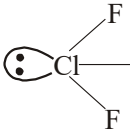
, sp^2

(2) 

, sp^3d

(3) 

, sp^3d

(4) 

, sp^3 one lone pair in 'd' orbital

476. Which of the following pair of species having different hybridisation but similar in shape?

(1) CO_2 & XeF_2 (2) SO_3 & SO_2 (3) CF_4 & XeF_4 (4) N_2O & CO_2

477. Which of the following is 'T' shaped?

(1) IOF_4^+ (2) IOF_2^- (3) XeO_6^{4-} (4) XeF_2

478. Which of the following is isoelectronic and isostructural with CO_2?
(1) NO_2 (2) NO_3^- (3) NO_2^- (4) N_2O

479. Which of the following is sp^2 hybridised and bent in shape?
(1) H_2O (2) NO_3^- (3) BF_3 (4) NO_2^-

480. Which of the following is linear?
(1) XeF_2 (2) XeF_5^- (3) $C_2O_2^{2-}$ (4) both (1) and (3)

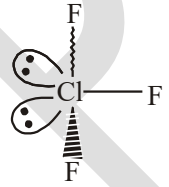
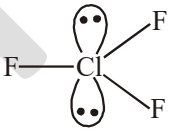
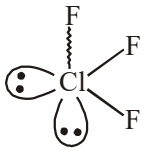
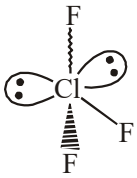
481. How many molecules are linear in following compounds but does not have any lone pair on central atom.
CO_2, XeF_2, $[I(CN)_2]^-$, $[I_2(CN)]^+$, I_3^-, C_2H_2, $SnCl_2$, OF_2, $HgCl_2$
(1) 4 (2) 2 (3) 5 (4) 3

482. Which of the following is V-shaped:
(1) S_3^{2-} (2) I_3^- (3) N_3^- (4) none of these

483. Select the molecule which has Seen-Saw shape.
(1) $XeOF_4$ (2) $[O_2IF_2]^-$ (3) SOF_4 (4) $POCl_3$

484. The xenon compound that are iso-structural with IBr_2^- and BrO_3 respectively
(1) linear XeF_2 and pyramidal XeO_3
(2) bent XeF_2 and pyramidal XeO_3
(3) bent XeF_2 and planar XeO_3
(4) linear XeF_2 and tetrahedral XeO_3

485. Which of the following molecules have perfect octahedral structure?
(1) $XeOF_4$ (2) XeF_6 (3) BrF_6^- (4) SbF_6^{3-}

486. Which of the following ClF_3 geometry has maximum 90° lone pair - bond pair repulsion?
(1) 
(2) 
(3) 
(4) 

487. What is the shape of $[F_2IO_2]^-$ ion?
(1) trigonal bipyramidal (2) See-Saw (3) T- shape (4) square planar

488. The shape of a molecule of NH_3, in which central atoms contains lone pair of electrons, is
(1) Tetrahedral (2) Planar trigonal
(3) Square planar (4) Pyramidal

489. Which one has a pyramidal structure
(1) CH_4 (2) NH_3 (3) H_2O (4) CO_2

490. BCl_3 is a planar molecule while NCl_3 is pyramidal, because

(1) $BeCl_3$has no lone pair of electrons but NCl_3 has a lone pair of electrons
(2) B-Cl bond is more polar than N-Cl bond
(3) Nitrogen atom is smaller than boron atom
(4) N-Cl bond is more covalent than B-Cl bond

491. Match the items under list (1) with items under list (2) select the correct answers from the sets (1), (2), (3) and (4) -

List (1) molecule	List (2) shape
(1) PCl_5	(i) V-shaped
(2) F_2O	(ii) Triangular planar
(3) BCl_3	(iii) Trigonal bipyramidal
(4) NH_3	(iv) Trigonal pyramidal
	(v) Tetrahedral

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

492. Match List-I with List-II and select the correct answer using the codes given below the lists -

List I	List II (shape)
(1) CS_2	1. Bent
(2) SO_2	2. Linear
(3) BF_3	3. Trigonal planar
(4) NH_3	4. Tetrahedral
	5. Trigonal pyramidal

(1) a → 2; b → 1; c → 3; d → 5 (2) a → 1; b → 2; c → 3; d → 5
(3) a → 2; b → 1; c → 5; d → 4 (4) a → 1; b → 2; c → 5; d → 4

Bents Rule

493. Which of the following molecule has regular geometry –
(1) H_2O (2) PF_3 (3) SF_6 (4)XeF_6

494. In a regular octahedral molecule, MX_6, the number X-M-X bonds at 180° is
(1) Six (2) Four (3) Three (4) Two

495. Which of the following does not have regular tetrahedral geometry?
(1) CH_4 (2) BF_4^- (3) PCl_4^+ (4) CH_2F_2

496. Geometry of the molecule is distorted according to VSEPR theory for -
(I) H_2O (II) NH_3 (III) XeF_2
(1) I, III, (2) II, III, (3) I, II, III (4) I, II

497. The regular geometry of XeO_2F_2 is: –
(1) Plane triangular (2) Trigonal bipyramidal
(3) Square planar (4) Tetrahedral

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

Planar And Nonplanar

499. Which of the following is planar?
(1) BCl_3 (2) $SOCl_2$ (3) NH_3 (4) NF_3

500. Which of the following has not planar structure?
(1) CH_3^+ (2) I_3^+ (3) XeF_4 (4) XeF_6

501. How many maximum numbers of atoms are present in single plane of $Al(CH_3)_3$ molecule.
(1) 7 (2) 4 (3) 10 (4) 6

502. The molecule which is planar.
(1) SF_4 (2) BrF_5 (3) ICl_4^- (4) NH_4^+

503. Which of the following molecule is planar.
(1) $[I(CN)_2]^-$ (2) PCl_3F_2 (3) PCl_5 (4) SF_4

504. Which of the following molecules is planar?
(1) NF_3 (2) NCl_3 (3) PH_3 (4) BF_3

505. The non-planar shape is possessed by
(1) ClF_3 (2) BF_4^- (3) $SnCl_2$ (4) NO_2^-

506. Which of the hexa-atomic species contains two lone pair on central atom and planar?
(1) XeF_5^+ (2) XeF_4 (3) XeF_5^- (4) XeF_6

507. 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-}

508. Which of the following species is planar
(1) CO_3^{2-} (2) NH_2^- (3) PCl_3 (4) None of these

509. The element A has 3 electrons in valence shell and its principal quantum number for last electron is 2 and element B has 7 electrons in valence shell and its principal quantum number for last electron is 3. Which option is true for compound of element A and B.?
(1) Compound is AB_3 type (2) Compound is nonplanar
(3) Compound has 107° bond angle. (4) All are correct

510. Which of the following species are expected to be planar: -
(1) NH_3 (2) CH_3^+ (3) NH_2^- (4) PCl_3
the correct answer is: -
(1) b and c (2) c and d (3) b and d (4) a and d

511. In which molecule are all atoms coplanar
(1) CH_4 (2) BF_3 (3) PF_3 (4) NH_3

pπ – pπ and pπ – dπ Bonds

512. How many π bonds are present in SO_2Cl_2?
(1) 2 (2) 4 (3) 1 (4) π bond is absent

513. In SO_2 molecule, there are two σ-bonds and two π-bonds. The two π-bonds are formed by:

(1) pπ – pπ overlap between S and O atoms
(2) sp^2 – p overlaps between S and O atoms
(3) one by pπ – pπ overlap and other by pπ – dπ overlap
(4) both by pπ – dπ overlap

514. Example of pπ-pπ bonding is -
(1) BF_3 (2) SO_2 (3) SO_3 (4) All of these

515. The nature of π-bond in perchlorate (ClO^-_4) ion is: -
(1) $O_{(d\pi)}$ — $Cl_{(p\pi)}$ (2) $O_{(p\pi)}$ — $Cl_{(p\pi)}$ (3) $O_{(p\pi)}$ — $Cl_{(d\pi)}$ (4) $O_{(d\pi)}$ — $Cl_{(d\pi)}$

516. Which of the following compound having number of pπ-pπ bond is equal to pπ-dπ bonds?
(1) SO_2 (2) SO_3 (3) O_3 (4) $POCl_3$

517. The structure of the SO_3 molecule in the gaseous phase contains: -
(1) only σ-bonds between sulphur and oxygen
(2) σ-bonds and a (pπ-pπ) bonds between sulphur and oxygen
(3) σ-bonds and a (dπ-pπ) bonds between sulphur and oxygen
(4) σ-bonds, and a (pπ-pπ) and a (pπ-dπ) bonds between sulphur and oxygen

518. Which of the following statements regarding the structure of $SOCl_2$ is not correct?
(1) The sulphur is sp^3 hybridised and it has a tetrahedral shape.
(2) The sulphur is sp^3 hybridised and it has a trigonal pyramid shape.
(3) The oxygen-sulphur bond is pπ-dπ bond.
(4) It contains one lone pair of electrons in the sp^3 hybrid orbital of sulphur.

519. Which of the following statements is correct in the context of the allene molecule, C_3H_4?
(1) The central carbon is sp hybridized
(2) The terminal carbon atoms are sp^2 hybridized
(3) The planes containing the CH_2 groups are mutually perpendicular to permit the formation of two separate p-bonds. (4) All correct

520. Which of the following molecule is planar?
(1) $F_2C = C = C = C = CF_2$ (2) $H_2C = C = CH_2$
(3) C_2H_2 (4) All of these

521. Which of the following statements are correct:
(1) The number of sigma bonds in $CH_2 = C = C = CH_2$ is 7.
(2) All the hydrogen atoms in $CH_2 = C = C = CH_2$ lie in the same plane.
(1) Only (1) (2) Only (2)
(3) Both (1) and (2) (4) Neither (1) nor (2)

522. The nodal plane in the π-bond of ethene is located in
(1) the molecular plane

(2) a plane parallel to the molecular plane
(3) a plane perpendicular to the molecular plane which bisects the carbon-carbon σ bond at right angle.
(4) a plane perpendicular to the molecular plane which contains the carbon-carbon bond.

523. Nodal planes of π-bonds (s) in $CH_2 = C = C = CH_2$ are located in:
(1) all are in molecular plane
(2) two in molecular plane and one in a plane perpendicular to molecular plane which contains C – C σ-bond
(3) one in molecular plane and two in a plane perpendicular to molecular plane which contains C – C σ-bonds
(4) two in molecular plane and one in a plane perpendicular to molecular plane which bisects C – C σ-bonds at right angle

Polar and Nonpolar Molecules

524. The electronegativity of C, H, O, N and S are 2.5, 2.1, 3.5, 3.0 and 2.5 respectively. Which of the following bond is most polar?
(1) O-H (2) S-H (3) N-H (4) C-H

525. Which of the following bond has the most polar character?
(1) C-O (2) C-Br (3) C-S (4) C-F

526. Select the correct statement for H_2 molecule
(1) On time average the molecule is non-polar but at the particular moment it may act as a dipole which is equally probable in all directions
(2) On time average the molecule is polar but at the particular moment it does not act as a dipole.
(3) On time average the molecule is non-polar and the particular moment it does not act as dipole.
(4) All are incorrect

527. Which of the following are incorrect for dipole moment?
(1) Lone pair of elements present on central atom can give rise to dipole moment
(2) Dipole moment is vector quantity
(3) PF_5 (g) molecule has nonzero dipole moment
(4) Difference in electronegativities of combining atom can lead to dipole moment

528. Which of the following bond is more polar.
(1) H–F (2) H–Cl (3) H–Br (4) H–I

529. Which of the following molecule / ion has zero dipole moment.
(1) ClF_3 (2) ICl_2^- (3) SF_4 (4) None of these

530. Which of the following has non-zero dipole moment?
(1) CCl_4 (2) C_2H_6 (3) CO_2 (4) SO_2

531. Which of the following compounds are planar as well as non-polar.
(1) XeF_4 (2) XeF_2 (3) XeF_5^- (4) XeF_5^+

532. Which of the following has non-zero dipole moment?
(1) CCl_4 (2) C_2H_6 (3) CO_2 (4) SO_2

533. Which of the following molecule have nonzero dipole moment?
(1) $P(CH_3)_3(CF_3)_2$ (2) PF_3Cl_2 (3) BF_3, (4) CCl_4

534. Which of the following has zero dipole moment?
(1) NH_3 (2) H_2O (3) BCl_3 (4) SO_2

535. BF_3 and NF_3 both molecules are covalent, but BF_3 is non-polar and NF_3 is polar. Its reason is:
(1) in uncombined state boron is metal and nitrogen is gas
(2) B–F bond has no dipole moment whereas N–F bond has dipole moment
(3) the size of boron atom is smaller than nitrogen
(4) BF_3 is planar whereas NF_3 is pyramidal

536. Which of the following compound has zero dipole moment?
(1) BF_3 (2) $SnCl_2$ (3) H_2O (4) NH_3

537. Which molecules has zero dipole moment
(1) H_2O (2) CO_2 (3) HF (4) HBr

538. In the following which one has zero dipole moment
(1) BF_3 (2) CCl_4 (3) $BeCl_2$ (4) All of these

539. Pick out the molecule which has zero dipole moment
(1) NH_3 (2) H_2O (3) BCl_3 (4) SO_2

541. Which one of the following is having zero dipole moment
(1) CCl_4 (2) CH_3Cl (3) CH_3F (4) $CHCl_3$

542. Which of the following has zero dipole moment
(1) CH_2Cl_2 (2) CH_4 (3) NH_3 (4) PH_3

543. Which molecule does not show zero dipole moment
(1) BF_3 (2) NH_3 (3) CCl_4 (4) CH_4

544. Which of the following has zero dipole moment?
(1) CO_2 (2) NH_3 (3) NF_3 (4) H_2O

545. PCl_5 is nonpolar 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

546. 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

547. Species having zero dipole moment:

(1) XeF_4 (2) SO_2 (3) SF_4 (4) CH_2Cl_2

548. If the molecule AX_4 is having zero dipole moment value, then the probable geometry is
(1) Tetrahedral (2) Square planar (3) (1) & (2) both (4) None

549. What may be the geometry of molecule if AX_3 molecule has non-zero dipole moment.
(1) Trigonal planar (2) Bent T-shape (3) Pyramidal (4) Both (2) and (3)

550. If the measured dipole moment for the molecule is zero then for which of given formula the shape of the molecule cannot predicted.
(1) AX_3 (2) AX_4 (3) AX_5 (4) None of these

551. If the measured dipole moment for the molecule is zero then for which of given formula the shape of the molecule can be predicted.
(1) AX_3 (2) AX_4 (3) AX_5 (4) AX_2

552. BeF_2 has zero dipole moment whereas H_2O has 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

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

554. Which of the following pair of molecules have same shape but different in polarity (Polar or nonpolar)
(1) H_2O & NH_3 (2) $SnCl_2$ & SO_2 (3) CO_2 & N_2O (4) SO_2 & SO_3

555. The dipole moment is zero for the molecule
(1) Ammonia (2) Boron trifluoride
(3) Sulphur dioxide (4) Water

556. The geometry of H_2S and its dipole moment are -
(1) angular and non-zero (2) angle and zero
(3) linear and non-zero (4) linear and zero

557. Which of the following is non-polar
(1) PCl_5 (2) PCl_3 (3) SF_6 (4) IF_7

558. Which of the following compound is non-polar?
(1) CCl_4 (2) CH_2Cl_2 (3) $CHCl_3$ (4) CH_3Cl

559. Which of the following is nonpolar and pentagonal planar species?
(1) XeF_6 (2) $XeOF_4$ (3) XeF_5^- (4) XeF_4

560. Which of the following is non-polar molecule?
(1) BF_3 (2) ClF_3 (3) PCl_3 (4) SO_2

561. 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

562. Which statement is correct

(1) All the compounds having polar bond, have dipole moment
(2) SO_2 is non-polar
(3) H_2O molecule is nonpolar, having polar bonds
(4) PH_3 is polar molecule having nonpolar bonds

563. Which contains both polar and non-polar bonds?
(1) NH_4Cl (2) HCN (3) H_2O_2 (4) CH_4

564. Which of the following species are polar:
(1) C_6H_6 (2) XeF_2 (3) SO_2 (4) SF_4 (E) SF_6
correct answer is:
(1) (2) & (4) (2) (1), (2) & (E) (3) (1) & (E) (4) (3) & (4)

565. Which of the following molecules has polar character
(1) CO_2 (2) CH_4 (3) PF_5 (4) NH_3

566. 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

567. The polarity of a covalent bond between two atoms depends upon
(1) Atomic size (2) Electronegativity
(3) Ionic size (4) None of the above
(5) *cis* 1, 2-dichloroethene (6) *trans* 1, 2-dichloroethene

568. Which of the following is the most polar
(1) CCl_4 (2) $CHCl_3$ (3) CH_3OH (4) CH_3Cl

569. Non-polar solvent is
(1) Dimethyl sulphoxide (2) Carbon tetrachloride
(3) Ammonia (4) Ethyl alcohol

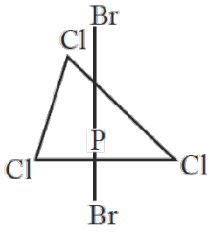
570. Which of the following is a non-polar compound
(1) HCl (2) H_2Se (3) CH_4 (4) Hl

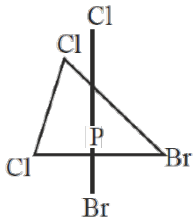
571. Which of the following molecule/ion is planar and polar both; -
(1) NO_3^{Θ} (2) NO_2^{Θ} (3) PF_5 (4) NH_3

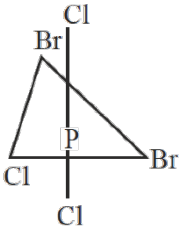
572. Which of the following molecules does not possess a permanent dipole moment
(1) H_2S (2) SO_2 (3) CS_2 (4) SO_3

573. What conclusion can be draw from the fact that BF_3 has no dipole moment but PF_3 is does:
(1) BF_3 is not symmetrical but PF_3 is symmetrical
(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

574. PBr_2Cl_3 can exhibit geometrical isomerism, Geometrical isomers are as follows:

I. 

II. 

III. 

Which of the above-mentioned geometrical isomer(s) has/have no dipole(s)?

(1) Only II and III (2) Only III (3) Only I and III (4) Only I

575. Which of the possible molecule / species is having maximum values for dipole moment. (where "A" is the central atom).
(1) AX_3 (having one lone pair on central atom)
(2) AX_4 (Tetrahedral)
(3) AX_4Y (having no lone pair on central atom)
(4) Can't be predicted

576. Carbon tetrachloride has no net dipole moment because of
(1) Its planar structure
(2) Its regular tetrahedral structure
(3) Similar sizes of carbon and chlorine atoms
(4) Similar electron affinities of carbon and chlorine

577. Fluorine is more electronegative than either boron or phosphorus. What conclusion can be drawn from the fact that BF_3 has no dipole moment but PF_3 does
(1) $BF_3$is not spherically symmetrical but PF_3 is
(2) BF_3molecule must be linear
(3) The atomic radius of P is larger than the atomic radius of B
(4) The BF_3 molecule must be planar triangular

578. Which of the following has no dipole moment
(1) CO_2 (2) SO_3 (3) O_3 (4) H_2O

579. Of the following molecules, the one, which has permanent dipole moment, is -
(1) SiF_4 (2) BF_3 (3) PF_3 (4) PF_5

580. Dipole moment is highest in:
(1) $CHCl_3$ (2) CH_4 (3) CHF_3 (4) CCl_4

581. The polar and planar compound is :
(1) SF_4 (2) BF_2Cl (3) CH_2F_2 (4) O_2F_2

582. Choose the incorrect statement.
(1) Electronegativity of Cl is less than F
(2) Electron affinity of Cl is greater than F
(3) Bond energy of σ-bond is greater than π bond.
(4) The net dipole moment direction of NF_3 is towards l.p. of N-atom.

583. The correct order of dipole moment is:
(1) $CH_3Cl < CH_3F < CH_3Br < CH_3I$

(2) $CH_3Cl > CH_3F > CH_3Br > CH_3I$
(3) $CH_3F > CH_3Cl > CH_3Br > CH_3I$
(4) $CH_3F < CH_3Cl < CH_3Br < CH_3I$

584. In which of the following pairs of compounds, the first one is more polar than the second one?
(1) SO_3, SO_2 (2) NF_3, NH_3 (3) CH_3Cl, CH_3F (4) PF_2Cl_3, PF_3Cl_2

585. Increasing order of dipole moment in H_2O, NH_3, NF_3 and CCl_4 is
(1) $CCl_4 < NF_3 < NH_3 < H_2O$ (2) $CCl_4 > NF_3 > NH_3 > H_2O$
(3) $NF_3 > H_2O > CCl_4 > H_2O$
(4) all the four have equal dipole moments

586. The dipole moment of given molecules is such that -
(1) $BF_3 > NF_3 > NH_3$ (2) $NF_3 > BF_3 > NH_3$
(3) $NH_3 > NF_3 > BF_3$ (4) $NH_3 > BF_3 > NF_3$

587. 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) $H_2O < NH_3 < NF_3 < CH_4$

588. 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

589. Which of the following order of polarity of molecules is correct -
(1) $HF > NH_3 > PH_3$ (2) $CH_4 > NH_3 > H_2O$
(3) $CH_3Cl < CH_2Cl_2 < CHCl_3$ (4) $BF_3 > BeF_2 > F_2$

590. Dipole moment is highest in -
(1) $CHCl_3$ (2) CH_4 (3) CHF_3 (4) CCl_4

591. The compound which has maximum dipole moment is:
(1) CH_4 (2) $CHCl_3$ (3) CCl_4 (4) CO_2

592. In the compounds CH_3OH, CH_4, CF_4, CO_2, which has maximum dipole moment: -
(1) CH_3OH (2) CF_4 (3) CH_4 (4) CF_4 and CO_2 have equally more

593. Which of the following order of polar molecules is correct: -
(1) $HF > NH_3 > PH_3$ (2) $CH_4 > NH_3 > H_2O$
(3) $CH_3Cl < CH_2Cl_2 < CHCl_3$ (4) $BF_3 > BeF2 > F_2$

594. The order of increasing polarity in HCl, CO_2, H_2O and HF molecules is:
(1) CO_2, HCl, H_2O, HF (2) HF, H_2O, HCl, CO_2
(3) CO_2, HCl, HF, H_2O (4) CO_2, HF, H_2O, HCl

595. In terms of polar character, which of the following order is correct?
(1) $NH_3 < H_2O < HF < H_2S$ (2) $H_2S < NH_3 < H_2O < HF$

(3) $H < NH_3 < H_2S < HF$ (4) $HF < H_2O < NH_3 < H_2S$

596. Which molecule has the largest dipole moment

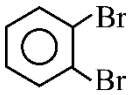
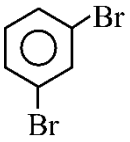
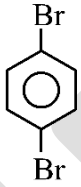
(1) HCl (2) Hl (3) HBr (4) HF

597. Find out the incorrect order of the dipole moment among the following pair of compounds

(1) $NH_3 > NF_3$ (2) p-dichloro benzene > o-dichloro benzene

(3) $CH_3Cl > CH_2Cl_2$ (4) $SiF_4 < SF_4$

598. Which of the following molecules shows maximum dipole moment -

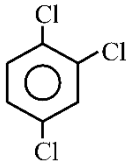
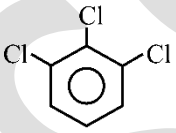
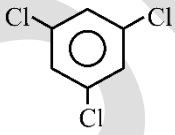
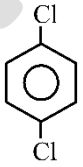
(1)  (2)  (3)  (4) All have the same

599. Which one has minimum (nearly zero) dipole moment

(1) Butene-1 (2) *cis* butene-2

(3) *trans* butene-2 (4) 2-methyl-1-propene

600. Which has maximum dipole moment?

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

601. Which of the following molecule will be most polar: -

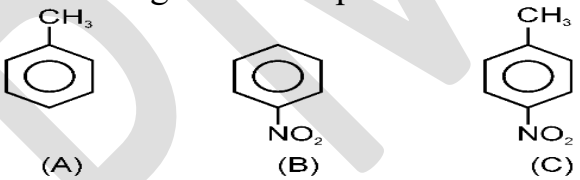
(1) 1, 3, 5 trichloro benzene (2) Trans 1, 2 - dichloro ethene

(3) Cis - 1 - fluoro propene (4) Trans 1- fluoro propene

603. Species having dipole moment: -

(1) XeF_4 (2) 1,2,4 trichloro benzene (3) SF_4 (4) CH_2Cl_2

604. Decreasing order of dipole moment of the following compounds is -



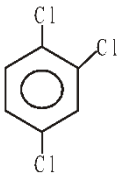
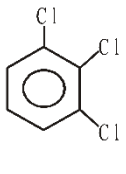
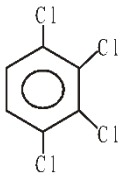
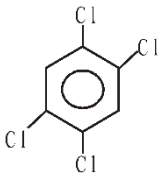
(A) (B) (C)

(1) A > B > C (2) C > A > B (3) C > B > A (4) A > C > B

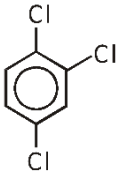
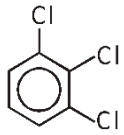
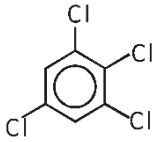
605. Arrange the following compounds in order of increasing dipole moment m-dichlorobenzene (I), o-dichlorobenzene (II), p-dichlorobenzene (III)

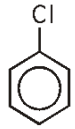
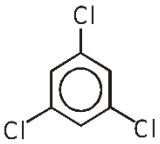
(1) I < II < III (2) II < III < I (3) I < III < II (4) III < I < II

606. Which of the given compound has highest dipole moment?

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

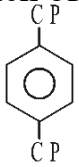
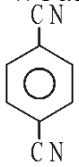
607. Write order of dipole moment of following compounds: -

(i)  (ii)  (iii) 

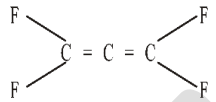
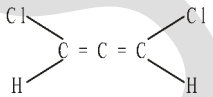
(iv)  (v)  (vi) 

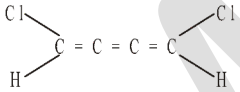
(1) (iii) > (ii) > (i) > (iv) > (v) > (vi) (2) (iii) > (i) > (ii) = (vi) > (iv) > (v)
(3) (ii) > (i) = (iii) = (iv) > (v) = (vi) (4) (iii) > (i) > (iv) > (v) > (ii) > (vi)

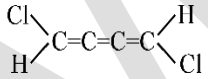
608. Which of the following would be non-polar?

(1)  (2)  (3)  (4) All of these

609. Which of the following molecule is polar as well as planar.

(1)  (2) 

(3)  (4) None of these

610. Choose the correct option for the following molecule in view of chemical bonding 

(1) non-planar (2) $\mu \neq 0$ (3) A & B both (4) $\mu = 0$

611. The dipole moment of the ammonia molecule is 1.48D. The length of the dipole is:
(1) 3.08×10^{-11} m (2) 5×10^{2} m (3) 308 m (4) None

612. The dipole moment of LiH is 1.964×10^{-29}C × m and the interatomic distance between Li and H in this molecule is 1.596Å. Calculate the percent ionic character in LiH:
(1) 76.8 (2) 70 (3) 65.5 (4) 72

613. The dipole moment of chlorobenzene is 1.73 D. The dipole moment of P-dichlorobenzene is expected to be
(1) 3.46 D (2) 0.00 D (3) 1.73 D (4) 1.00 D

614. The dipole moment of *HBr* is 1.6 x 10^{-30}*cm* and interatomic spacing is 1*Å*. The % ionic character of *HBr* is
(1) 7 (2) 10 (3) 15 (4) 27

615. Which of the following statements is incorrect for the dipole moment

measurement of the compound.
(1) It helps to predict the percentage ionic character in a bond.
(2) It helps to predict the shape of the molecule.
(3) It helps to predict the particular cis trans isomer.
(4) It helps to predict the bond energies of all bonds within the molecule.

616. Statement-1: Dipole moment of H_2O is more than that of OF_2.
Statement-2: In H_2O, the resultant bond dipole of O – H bond and the resultant lone pair moment are in opposite direction.
(1) Statement-1 is true, statement-2 is true, and statement-2 is correct explanation for statement-1.
(2) Statement-1 is true, statement-2 is true, and statement-2 is NOT the correct explanation for statement-1.
(3) Statement-1 is true, statement-2 is false.
(4) Statement-1 is false, statement-2 is true.

617. Statement-1: Allene is a non-polar molecule.
Statement-2: Allene is nonplanar molecule.
(1) Statement-1 is true, statement-2 is true, and statement-2 is correct explanation for statement 1.
(2) Statement-1 is true, statement-2 is true, and statement-2 is NOT the correct explanation for statement 1.
(3) Statement-1 is true, statement-2 is false.
(4) Statement-1 is false, statement-2 is true.

Solid State Hybridization

618. What is the hybridisation of Xe in cationic part of solid XeF_6.
(1) sp^3d^3 (2) sp^3d (3) sp^3d^2 (4) sp^3

619. What will be the hybridisation of anionic part of solid PCl_5?
(1) sp^3 (2) sp^3d^2 (3) sp^3d (4) sp^2

620. Which of the following compounds does not have polyatomic anion in the solid state?
(1) I Cl (2) I (CN) (3) PCl_5 (4) PBr_5

621. Which of the following compounds in solid state has both cation and anion with same hybridisation of central atom?
(1) PCl_5 (2) N_2O_5 (3) $(NH_4)_2SO_4$ (4) NH_4NO_3

622. Polyatomic anion in solid state is present in:
(1) PBr_5 (2) PCl_5 (3) PI_5 (4) XeF_6

623. What is the state of hybridisation of anionic part of solid N_2O_5
(1) sp (2) sp^2 (3) sp^3 (4) Not applicable

624. What is the state of hybridisation for the anionic part of solid Cl_2O_6.
(1) sp^2 (2) sp^3 (3) sp^3d (4)sp^3d

625. The hybridisation of the central atom of anionic part and cationic part of solid N_2O_5 are _____ and ____ respectively.
(1) sp and sp^2 (2) sp^2 and sp^3 (3) sp^2 and sp^2 (4) sp^2 and sp

626. In which of the following molecule, the number of possible ∠XAX angles

is maximum in the anionic part of their solid state. [A: Central atom; X: Surrounding atom]

(1) PBr_5 (2) N_2O_5 (3) PCl_5 (4) Cl_2O_6

627. All possible bond angles in anionic part of PCl_5 are.

(1) 109° 28′ only (2) 90°, 180° (3) 90°, 120° , 180° (4) 72°, 90°, 180°

628. What is the difference between bond angles in cationic species of PCl_5 and PBr_5 in solid state.

(1) 60° (2) 109°28′ (3) 0° (4) 90°

629. What is hybridisation of central atom of anionic part of PBr_5 in crystalline state.

(1) sp^2 (2) sp^3 (3) sp (4) not applicable

630. Which of the following compounds in the solid state has linear shape of anion?

(1) PCl_5 (2) PBr_5 (3) ICN (4) N_2O_5

[Sol. ICN(s) exists as $[I_2(CN)]^+ [I(CN)_2]^-$

631. Which of the following has tetrahedral in shape?

(1) PCl_5(solid) (2) SF_6 (3) IF_7 (4) IF_3

632. Identify the correct match.

(i)	XeF_2	(1)	Central atom has sp^3 hybridisation and bent geometry.
(ii)	N_3^-	(2)	Central atom has sp^3d^2 hybridisation and octahedral.
(iii)	PCl_6^-(PCl_5(s) anion)	(3)	Central atom has sp hybridisation and linear geometry.
(iv)	ICl_2^+ (I_2Cl_6 (ℓ) cation)	(4)	Central atom has sp^3d hybridisation and linear geometry.

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

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

Dragos's Rule

633. Which one of the following compounds has bond angle as nearly 90^o

(1) NH_3 (2) H_2S (3) H_2O (4) CH_4

634. The percentage *s*-character of the hybrid orbitals in methane, ethene and ethyne are respectively

(1) 25, 33, 50 (2) 25, 50, 75

(3) 50, 75, 100 (4) 10, 20, 40

635. Which of the following molecule has higher p-character in X–H bond.

(1) NH_3 (2) PH_3 (3) SbH_3 (4) AsH_3

636. For which of the following molecule s-character is found to be maximum in lone pair present at central atom.

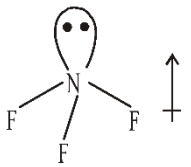
(1) NH_3 (2) H_2O (3) SF_2 (4) AsH_3

637. Two hybrid orbitals have a bond angle of 120º. The percentage of s-

character in the hybrid orbital is nearly:
(1) 25% (2) 33% (3) 50% (4) 66%

638. % s-character of bonding orbital of sulphur in H_2S is -
(Bond angle H–S–H = 92°; cos 92° = –0.035)
(1) 25% (2) 20% (3) 3.38% (4) 33.33%

639 Choose the correct statement:
(1) NH_3 is having bond angle of 109°28'.
(2) The direction of the dipole moment of NF_3 is as shown in the diagram



(3) In the Lewis structure of SO_3^{2-}, there is no π-bond.
(4) sp^2 hybrid orbital is consisting of 33.33 % 'p' character.

640. In AsH_3, H – As – H bond angle is 91.8º, % s and % p charactger in as–H bond approximately will be:
(1) 33% s & 66% p (2) 25% s & 75% p
(3) 33.3% s & 66.6% p (4) 3% s & 97% p

641. Calculate the % p character in the orbital occupied by the lone pairs in water molecule.
[Given: bond angle HOH is 104.5° and Cos (104.5°) = – 0.25]
(1) 80% (2) 20% (3) 70 % (4) 75%

642. It has been observed that % 's' character in Sb–H bond in SbH_3 is 0.5%. Predict the % 's' character in the orbital occupied by the lone pair is
(1) 99.5 % (2) 99.0 % (3) 98.5 % (4) 98.0 %

643. Average bond order of C–C bond in C_6H_6 is
(1) 1 (2) 2 (3) 1.5 (4) 1.33

Bond Order

644. Which set of formal charge on oxygen and bond order is correct for SO_4^{-2}
(1) 0.5 and 1.5 (2) 1.5 and 3 (3) 2 and 3 (4) 1.5 and 1.5

645. In PO_4^{3-}, the formal charge on each oxygen atom and the P–O bond order respectively are:
(1) - 0.75, 0.6 (2) - 0.75, 1.0 (3) - 0.75, 1.25 (4) - 3, 1.253

646. Choose the correct option for following statements:
(I) sp^3 hybrid orbitals are at 90° to one another
(II) sp^3d^2 adjacent hybrid orbitals are at 90° to one another
(III) sp^2 hybrid orbitals are at 120° to one another
(IV) Bond order of N–O bond in NO_3^{-} is $1\frac{1}{3}$
(1) T F T F (2) T T F F (3) F T T T (4) F T F T

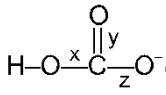
647. The average charge on each O atom and average bond order of I–O bond

in IO_6^{5-} is:

(1) –1 and 1.67 (2) – 5/6 and 1.67

(3) –5/6 and 1.33 (4) –5/6 and 1.167

Bond length

648.  The relation between x, y and z in bicarbonate ion with respect to bond length is -

(1) x > y > z (2) x > z > y (3) z = y > x (4) x > y = z

649. Choose the correct code for incorrect statements.

I: All S – O distance in SO_4^{2-} are not equal

II: All S – O distance in H_2SO_4 is equal

III: All B – O distance in H_3BO_3 is not equal

IV: All B – O distance in BO_3^{3-} are equal

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

650 Which of the following molecule is having shortest bond length of C–O bond.

(1) CH_3OH (2) H_2CO (3) CO (4) Na_2CO_3

651. In benzene molecule all C – C bond lengths are equal because

(1) All carbon atoms are equivalent

(2) All carbon atoms are sp^2 hybridised

(3) All C – C bonds in benzene, have same order

(4) All C – C bonds are single covalent bond

652. The correct order of bond length is

(1) C — C < C ≡ C < C ═ C

(2) C═ C < C ≡ C < C — C

(3) C≡ C < C═ C < C — C

(4) C≡ C < C — C < C═ C

653. Which has the shortest C-C bond length

(1) C_2H_5OH (2) C_2H_6 (3) C_2H_2 (4) C_2H_4

654. The single, double, and triple bond lengths of carbon in carbon dioxide are respectively

(1) 1.15, 1.22 and 1.10 Å (2) 1.22, 1.15 and 1.10 Å

(3) 1.10, 1.15 and 1.22 Å (4) 1.15, 1.10 and 1.22 Å

655. The correct order of bond length (C – O) is

(1) $CO_2 < CO < CO_3^{2-}$ (2) $CO_3^{2-} < CO < CO_2$

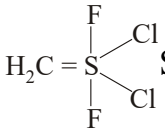
(3) $CO < CO_2 < CO_3^{2-}$ (4) $CO < CO_3^{2-} < CO_2$

656. Bond length of C – O is minimum in –

(1) CO (2) CO_2 (3) CO_3^{-2} (4) $HCOO^-$

657. Which of the following statements is not correct?

(1) In PF_5, all the five P–F bonds have equal bond length.

(2) In,  S–F bond is longer than S–Cl bond length.

(3) XeF_6 has perfect octahedron shape and hybridisation of Xe is p^3d^3.

(4) All of these

658. The correct order in which the O – O bond length increases in the following is

(1) $H_2O_2 < O_2 < O_3$ (2) $O_2 < H_2O_2 < O_3$

(3) $O_2 < O_3 < H_2O_2$ (4) $O_3 < H_2O_2 < O_2$

659. Which of the following is correct order of bond length?

(1) $BF_4^- < BF_3$ (2) $NO_2^+ < NO_2^-$

(3) $CCl_4 < CF_4$ (4) $^+CH_3 > CH_4$

660. O–O bond length in H–O–O–H and F–O–O–F respectively are -

(1) 1.22 Å, 1.48 Å (2) 1.48 Å, 1.22 Å

(3) 1.22 Å, 1.22 Å (4) 1.48 Å, 1.48 Å

661. Which of the following statement is correct for $F_3C – CF_2 – CF_3$?

(1) All C–F bond lengths are identical.

(2) Two C–F bond attached to middle carbon atom are longer as compared to the other C–F bond at the terminal carbon.

(3) Two C–F bonds attached to the middle carbon atom are shorter as compared to the other C–F bond at the terminal carbon.

(4) None of these

662. The correct order of $d_{C–H}$ in the following option is

(1) $CHF_3 = CH_2F_2 = CH_3F$ (2) $CHF_3 > CH_2F_2 > CH_3F$

(3) $CH_2F_2 > CH_3F > CHF_3$ (4) $CH_3F > CH_2F_2 > CHF_3$

663. The strongest P–O bond is found in the molecule

(1) F_3PO (2) Cl_3PO (3) Br_3PO (4) $(CH_3)_3PO$

664. Out of C_2H_6, C_2H_4 and C_2H_2. Compound which has highest C-C bond length is: -

(1) C_2H_4 (2) C_2H_2 (3) C_2H_6 (4) All have equal C-C bond length

665. Correct order of bond length is

(1) $SO_3^{2-} > SO_4^{2-} > SO_3$ (2) $SO_4^{2-} > SO_3^{2-} > SO_3$

(3) $SO_3 > SO_3^{2-} > SO_4^{2-}$ (4) None of these.

666. N_2H_4 reacts with conc. H_2SO_4 to produce a salt $[NH_3 –NH_3]^{+2}SO_4^{-2}$ in which.

(1) $d_{N–N}$ (salt) > $d_{N–N}$ (N_2H_4) (2) $d_{N–N}$ (salt) < $d_{N–N}$ (N_2H_4)

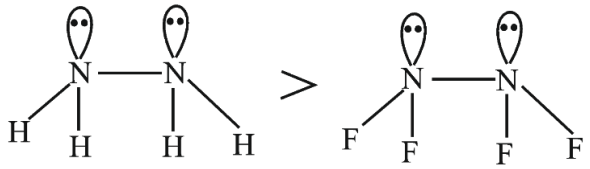
(3) $d_{N–N}$ (salt) = $d_{N–N}$ (N_2H_4) (4) Cannot be predicted

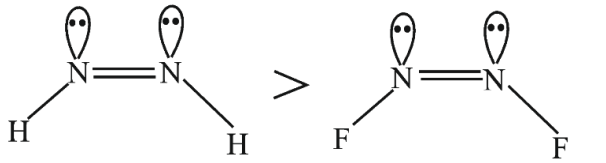
667. What is correct order of bond order of Cl–O bond.

(1) $ClO_4^- > ClO_3^- > ClO_2^- > ClO^-$ (2) $ClO^- < ClO_2^- > ClO_3^- < ClO_4^-$

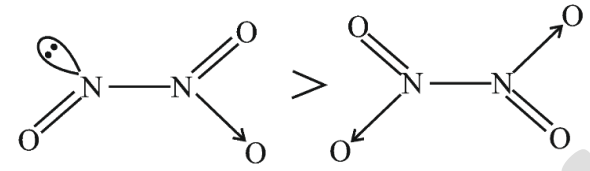
(3) $ClO_3^- < ClO_2^- < ClO_4^- < ClO^-$ (4) $ClO_2^- < ClP_3^- < ClO_4^- < ClO^-$

668 Incorrect order of N–N bond length is:

(1) 

(2) 

(3) 

(4) 

669 In which of the following option, all bond lengths are not equal.
(1) BF_3 (2) NF_3 (3) XeF_4 (4) ClF_3

670. Which of the following statements are correct for the SO_4^{2-} ion?
(1) it is tetrahedral
(2) all the S–O bond length are equal, and shorter than expected
(3) it contains four σ-bonds between the S and the O atoms, two π-bonds delocalized over the S and the four O atoms, and all the S–O bonds have a bond order of 1.5
(4) Oxidation state of sulphur is +6 and all oxygen in –2

671. Which of the following has the shortest N–H bond length?
(1) $H_2N – NH_2$ (2) H–N = N–H (3) NH_3 (4) $CH_3—NH_2$

672. In which of following cases C–C bond length will be highest.
(1) $CH_3–CF_3$ (2) $FCH_2–CH_2F$ (3) $F_2CH–CHF_2$ (4) $CF_3–CF_3$

673. The bond length of the S–O bond is maximum in which of the following compound.
$SOBr_2$, $SOCl_2$, SOF_2
(1) $SOCl_2$ (2) $SOBr_2$
(3) SOF_2 (4) All have same length

674. Which of the following molecules or ions has different bond lengths?
(1) XeF_4 (2) BF_4^- (3) SF_4 (4) SiF_4

675. Which of the following statement is not correct regarding SF_2Cl_2 molecule?
(1) Two axial bond lengths are longer compared to two equilateral bond lengths.
(2) Two S–F bond lengths are identical.
(3) Two S–Cl bond lengths are identical.
(4) Lone pair is not changing its position.

676. Select the correct statement(s) regarding ICl_4 (-) () ion.

(1) It is isostructural with (2) All bond lengths are equal
(3) All adjacent angles are equal (4) All of these

677. Maximum bond length is shown in
(1) CO_2 (2) CH_4 (3) NH_3 (4) H_2O

678. The compound is having shortest S–O bond length is
(1) SO_3F^- (2) SO_4^{2-} (3) SOF_4 (4) $SOCl_2$

BOND ANGLE

679. The correct order towards bond angle is:
(1) $sp^3 < sp^2 < sp$ (2) $sp < sp^2 < sp^3$
(3) $sp^2 < sp < sp^3$ (4) $sp^2 < sp^3 < sp$

680. The bond angle in water molecule is nearly **or** Directed bonds in water forms an angle of
(1) 120^0 (2) 180^0 (3) $109^028'$ (4) $104^030'$

681. In methane the bond angle is
(1) 180^0 (2) 90^0 (3) 120^0 (4) 109^0

682. The bond angle in carbon tetrachloride is approximately
(1) 90^0 (2) 109^0 (3) 120^0 (4) 180^0

683. The angle between sp^2 orbitals in ethylene are
(1) 90^0 (2) 120^0 (3) 180^0 (4) 109^0

684. CO_3^{2-} anion has which of the following characteristics
(1) Bonds of unequal length (2) sp^2 hybridization of *C* atom
(3) Resonance stabilization (4) Same bond angles

685. The bond angle in sp^2 hybridisation is
(1) 180^0 (2) 120^0 (3) 90^0 (4) $109^02'$

686. The correct order towards bond angle is
(1) $sp < sp^2 < sp^3$ (2) $sp^2 < sp < sp^3$ (3) $sp^3 < sp^2 < sp$
(4) Bond angle does not depend on hybridisation

687. When the hybridisation state of carbon atom changes from sp^3 to sp^2 to sp the angle between the hybridised orbitals
(1) Decreases gradually (2) Increases gradually
(3) Decreases considerably (4) All of these

688. The bond angle in PH_3 is
(1) Much less than NH_3 (2) Equal to that of NH_3
(3) Much greater than NH_3 (4) Slightly greater than NH_3

689. The bond angle is minimum in
(1) H_2Te (2) H_2Se (3) H_2O (4) H_2S

690. The smallest bond angle is found in
(1) IF_7 (2) CH_4 (3) BeF_2 (4) BF_3

691. As the *s*-character of hybridisation orbital increases, the bond angle

(1) Increases (2) Decreases
(3) Becomes zero (4) Does not change

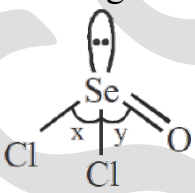
692 In which of the following species is the interatomic bond angle is $109^{\circ}28'$
(1) NH_3, $(BF_4)^{-1}$ (2) $(NH_4)^{+}$, BF_3
(3) NH_3, BF_4 (4) $(NH_2)^{-1}$, BF_3

693. The molecule of CO_2 has 180° bond angle. It can be explained on the basis of
(1) sp^3 hybridisation (2) sp^2 hybridisation
(3) sp hybridisation (4) $d^2\ sp^3$ hybridisation

694. Among the following orbital/bonds, the angle is minimum between:
(1) sp^3 bonds (2) p_x and p_y orbitals
(3) H—O—H in water (4) sp bonds

695. The compound MX_4 is tetrahedral. The number of < XMX angles in the compound is
(1) Three (2) Four (3) Five (4) Six

696. Select the correct order of bond angle in $SeOCl_2$



(1) x > y (2) x < y (3) x = y (4) Can't predict

697. Which compound has the smallest bond angle is each series.
(i) (P) OSF_2 (Q) $OSCl_2$ (R) $OSBr_2$
(ii) (P) $SbCl_3$ (Q) $SbBr_3$ (R) SbI_3
(iii) (P) PI_3 (Q) AsI_3 (R) SbI_3
(1) P, P, R (2) P, R, R (3) P, P, P (4) P, R, P

698. Which of the following statement is correct about PCl_3?
(1) $P–Cl_{ax}$ is longer than $P–Cl_{eq.}$
(2) All the hybrid orbitals of P–atom having bond pairs are identical to each other
(3) $P–Cl_{ax}$ is shorter than $P–Cl_{eq.}$
(4) Maximum 4 atoms in a plane and 4 such planes are present

699 The element A has 3 electrons in valence shell and its principal quantum number for last electron is 2 and element B has 7 electrons in valence shell and its principal quantum number for last electron is 3. Which option is true for compound of element A and B.
(1) Compound is AB_3 type (2) Compound is nonplanar
(3) Compound has 107° bond angle. (4) All are correct

700 Select the **correct** statement regarding XeO_4 and IO_4^-.

(1) both are isoelectronic.
(2) both have equal number of pp-dp bonds.
(3) both have different shapes.
(4) ∠OXeO and ∠OIO are different bond angles.

701. The correct statement for the reaction –
$NH_3 + H^+ \rightarrow NH_4^+$: -
(1) Hybridisation state is changed (2) Bond angle increases
(3) NH_3 act as a Lewis acid (4) Regular geometry is changed

702. In compounds X, all the bond angles are exactly 109°28'. X is:
(1) Chloromethane (2) Carbon tetrachloride
(3) Iodoform (4) Chloroform

703. 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

704. Which of the following molecules has two lone pairs and bond angle (need not be all bond angles) < 109.5°?
(1) SF_2 (2) KrF_4 (3) ICl_4^- (4) All of these

705. The correct order of bond angle is:
(1) $H_2S < NH_3 < BF_3 < CH_4$ (2) $NH_3 < H_2S < CH_4 < BF_3$
(3) $H_2S < NH_3 < CH_4 < BF_3$ (4) $H_2S < CH_4 < NH_3 < BF_3$

706. In which of the following molecules are all the bonds not equal?
(1) NF_3 (2) ClF_3 (3) BF_3 (4) AlF_3

707. Which of the following order of bond angle is **CORRECT.**
(1) $NH_3 < PH_3 < AsH_3 < SbH_3$ (2) $H_2O < H_2S < H_2Se < H_2Te$
(3) $OF_2 < H_2O < Cl_2O$ (4) $SiF_4 < SiCl_4 < SiBr_4 < SiI_4$

708. Consider the following compounds:
(I) ClF_3 (II) BrF_3
The order of the angles between axial and equatorial bond pairs is
(1) I > II (2) I < II (3) I = II (4) none

709. In which of the following is the angle between the two covalent bonds greatest:
(1) CO_2 (2) CH_4 (3) NH_3 (4) H_2O

710. The bond angle in PH_3 would be expected to be close to
(1) 90º (2) 105º (3) 109º (4) 120º

711. Which of the following is the correct reducing order of bond-angle
(1) $NH_3 < CH_4 < C_2H_2 < H_2O$ (2) $H_2O < NH_3 < CH_4 < C_2H_2$
(3) $C_2H_2 < CH_4 < H_2O < NH_3$ (4) $NH_3 < H_2O < CH_4 < C_2H_2$

712. Maximum bond angle is present in
(1) BCl_3 (2) BBr_3 (3) BF_3 (4) Same for all

713. Select the correct order for bond angle.

(1) $PH_3 < AsH_3 < NH_3 < SbH_3$ (2) $F_2O < H_2O < Cl_2O$
(3) $SbI_3 < SbBr_3 < SbCl_3$ (4) $BF_3 > BCl_3 > BBr_3$

714. CO_3^{2-} anion does not have which of the following characteristics
(1) Bonds of unequal length (2) sp^2 hybridisation of C atom
(3) Resonance stabilization (4) Same bond angles.

715. Which order of decreasing bond angle is correct: -
(1) CCl4 > BF3 > (2) NH3 > NCl3 > NBr3
(3) Br2O > Cl2O > OF2 (4) PCl3 > PBr3 > PI3

716. The correct order of bond angles (smallest first) in H_2S, NH_3, BF_3 and SiH_4 is
(1) $H_2S < NH_3 < SiH_4 < BF_3$ (2) $NH_3 < H_2S < SiH_4 < BF_3$
(3) $H_2S < SIH_4 < NH_3 < BF_3$ (4) $H_2S < NH_3 < BF_3 < SiH_4$

717. The bond angles of NH_3, NH_4^+ and 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) $NH_3 > NH_4^+ > NH_2^-$

718. Bond angle in H_2O is 104.5°; then bond in Cl_2O should be -
(1) 104.5° (2) 101° (3) 109°28' (4) 110.8°

719. Correct order of bond angles is -
(1) $PF_3 < PCl_3 < PBr_3 < PI_3$ (2) $PF_3 < PBr_3 < PI_3 < PCl_3$
(3) $PCl_3 < PF_3 < PBr_3 < PI_3$ (4) $PCl_3 < PBr_3 < PF_3 < PI_3$

720. Correct order of bond angle is -
(1) $PF_3 < PH_3$ (2) $PH_3 < PF_3$
(3) $PF_3 = PH_3$ (4) Cannot be predicted

721. Which statement is correct for N_3^- ion.
(1) It is bent molecule (2) Bond angle is < 120°
(3) Central atom is sp^2 hybridized (4) None of these

722. Consider the following molecules.
H_2O H_2S H_2Se H_2Te
I II III IV
Arrange these molecules in increasing order of bond angles.
(1) I < II < III < IV (2) IV < III < II < I
(3) I < II < IV < III (4) II < IV < III < I

723. In which of the following bond angle is maximum
(1) NH_3 (2) NH_4^+ (3) PCl_3 (4) SCl_2

724. In which of the following central atom is unhybridized ?
(1) $S(CH_3)_2$ (2) SO_2 (3) SiH_4 (4) PCl_3

725. The order of bond angle in NH_3, PH_3 and AsH_3 is:
(1) $NH_3 > PH_3 > AsH_3$ (2) $PH_3 > NH_3 > AsH_3$
(3) $AsH_3 > PH_3 > NH_3$ (4) $PH_3 = NH_3 < AsH_3$

726. The bond angle in water molecule is nearly:
(1) 120º (2) 180º (3) 109º28’ (4) 104º30’

727. A molecule is formed by sp^3d^2 hybridisation. Bond angle in it is:

(1) 90º (2) 109º28’ (3) 90º and 120º (4) 120º

728. In which of the following species the angle around the central atom is exactly equal to 109°28’:

(1) SF_4 (2) NH_3 (3) NH_4^+ (4) None

729. The bond angles of NH_3, and NH_4^+ are in the order:

(1) $NH_3 > NH_4^+ > NH_2^-$ (2) $NH_3 > NH_2^- > NH_4^+$

(3) $NH_4^+ > NH_3 > NH_2^-$ (4) $NH_2^- > NH_3 > NH_4^+$

730. Which of the following set contains species having same angle around the central atom:

(1) SF_4, CH_4, NH_3 (2) NF_3, BCl_3, NH_3

(3) BF_3, NF_3, $AlCl_3$ (4) BF_3 BCl_3, BBr_3

731. The order of increasing bond angle in the molecules $BeCl_2$, BCl_3, CCl_4 and SF_6 is:

(1) $SF_6 < CCl_4 < BCl_3 < BeCl_2$ (2) $BeCl_2 < BCl_3 < CCl_4 < SF_6$

(3) $SF_6 < CCl_4 < BeCl_2 < BCl_3$ (4) $BCl_3 < BeCl_2 < SF_6 < CCl_4$

732. In compounds X, all the bond angles are exactly 109°28’. X is -

(1) Chloromethane (2) Carbon tetrachloride

(3) Iodoform (4) Chloroform

733. Among the following orbital/bonds, the angle is minimum between -

(1) sp^3 bonds (2) p_x and p_y orbitals (3) H—O—H in water (4) sp bonds

734. 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

735. Which is not correct:

(1) Bond angle H–S–H < H–OH (2) Bond angle F–O–F < Cl–O–Cl

(3) Bond angle H–P–H < H–N–H

(4) Bond angle Cl–Sn–Cl > Cl–Hg–Cl

736. When NH_3 is treated with HCl, H–N–H bond angle

(1) Increases (2) Decreases

(3) Remains same (4) Depends upon temperature

737. The correct order of the bond angles is: -

(1) $NH_3 > H_2O > PH_3 > H_2S$ (2) $NH_3 > PH_3 > H_2O > H_2S$

(3) $NH_3 > H_2S > PH_3 > H_2O$ (4) $PH_3 > H_2S > NH_3 > H_2O$

738. The correct increasing bond angle among BF_3, PF_3 and ClF_3 follows the order: -

(1) $BF_3 < PF_3 < ClF_3$ (2) $PF_3 < BF_3 < ClF_3$

(3) $ClF_3 < PF_3 < BF_3$ (4) $BF_3 = PF_3 = ClF_3$

739. Among the following orbital bonds, the angle is minimum between: -

(1) sp^3 bonds (2) p_x and p_y orbitals
(3) H–O–H in water (4) sp bonds

740. The correct order of increasing X – O – X bond angle is (X = H, F or Cl)
(1) $H_2O > Cl_2O > F_2O$ (2) $Cl_2O > H_2O > F_2O$
(3) $F_2O > Cl_2O > H_2O$ (4) $F_2O > H_2O > Cl_2O$

741. Which of the following has maximum bond energy?
(1) H – O – H (2) H – S – H (3) H – Te – H (4) H – Se – H

742. Which of the following hypothesis justifies that the bond angle of H_2S is 92°?
(1) Lewis's structure (2) Valence bond theory
(3) Valance bond concept of hybrid orbitals (4) Octet rule

743. If s character decreases in hybrid orbital, then bond angle
(1) decreases (2) increases
(3) remains uncertain (4) all are wrong

744. Incorrect information about Cl_2O is
(1) angular structure (2) 110° bond angle
(3) four lone pairs (4) two σ bonds

745. Select the correct order of bond angle of the following species.
ClO_3^-, BrO_3^-, IO_3^-
(1) $BrO_3^- > IO_3^- > ClO_3^-$ (2) $ClO_3^- > BrO_3^- > IO_3^-$
(3) $IO_3^- > BrO_3^- > ClO_3^-$ (4) $IO_3^- < BrO_3^- > ClO_3^-$

746. The total right angled ∠ClPCl are present in PCl_5, PCl_4^+, PCl_6^- ____ respectively.
(1) 0, 1, 4 (2) 6, 0, 4 (3) 2, 4, 0 (4) 6, 0, 12

747. If hybridisation is absent in NH_3 and pure orbitals involved in bonding then select the incorrect statement.
(1) All bonds have equal strength
(2) Shape of NH_3 will be pyramidal
(3) All ∠HNH angles are 90° (4) All ∠HNH angles are 107°

748. Which of the following has 90° bond angle in its structure?
(1) IF_7 (2) SF_6 (3) PCl_5 (4) All

749. The correct order of OPX bond angle is (X = F, Cl, Br):
(1) $POF_3 > POCl_3 > POBr_3$ (2) $POF_3 < POCl_3 < POBr_3$
(3) $POF_3 = POCl_3 = POBr_3$ (4) $POCl_3 > POF_3 > POBr_3$

750. Which of the following has maximum bond angle?
(1) NF_3 (2) NCl_3 (3) PCl_3 (4) OF_2

751. Which of the following has minimum bond angle about oxygen?
(1) OF_2 (2) OCl_2 (3) $(CH_3)_2O$ (4) H_2O

752. The correct order of bond angle is
(1) $PF_3 < PCl_3 < PI_3 < PBr_3$ (2) $PF_3 < PCl_3 < PBr_3 < PI_3$
(3) $PF_3 > PCl_3 > PBr_3 > PI_3$ (4) $PCl_3 > PF_3 > PBr_3 > PI_3$

753. Which of the following has all equal bond angles?

(1) CH_3Cl (2) CH_2F_2 (3) NH_3 (4) NH_2–OH

754. In which of the following O–N–O bond angle is highest?
(1) NO_2^+ (2) NO_3^- (3) NO_2^- (4) None

755. Which of the following tri-atomic planar species have bond angle greater than 104° and less than bond angle in perfectly tetrahedral species?
(1) OCl_2 (2) NH_3 (3) OF_2 (4) OH_2

756. ∠ HBH is BH_4^- is almost
(1) 180° (2) 120° (3) 109° (4) 90°

757. In which of the following the O – N – O bond angle is highest.
(1) N_2O_4 (2) NO_2^+ (3) NO_2^- (4) NO_3^-

758. Arrange the following species according to their bond angle order.
(I) O_3 (II) NO_2^- (III) FNO
(1) I > II > III (2) II > I > III
(3) III > II > I (4) II > III > I

759. Arrange the following species according to their bond angle order.
(I) O_3 (II) NO_2^- (III) FNO
(1) I > II > III (2) II > I > III
(3) III > II > I (4) II > III > I

760. Which of following statements is/are correct regarding IF_5 molecule.
(I) There is only one lone pair present in equatorial position.
(II) All ∠ FIF angles are identical.
(III) There are eight faces in this molecule.
(IV) The number ∠ FIF angles less than 90° is 8.
(1) I, II and III (2) II, III and IV (3) III and IV (4) III only

761. If hybridisation is absent in NH_3 and pure orbitals involved in bonding then select the incorrect statement.
(1) All bonds have equal strength
(2) Shape of NH_3 will be pyramidal
(3) All ∠HNH angles are 90°
(4) All ∠HNH angles are 107°

762. Which of the following has 90° bond angle in its structure?
(1) IF_7 (2) SF_6 (3) PCl_5 (4) All

763. The number of 90° angle in SF_6 are:
(1) 4 (2) 8 (3) 12 (4) 16

764. Which of the following has maximum bond angle?
(1) NF_3 (2) NCl_3 (3) PCl_3 (4) OF_2

765. Which of the following has minimum bond angle about oxygen?
(1) OF_2 (2) OCl_2 (3) $(CH_3)_2O$ (4) H_2O

766. In compound X, all the bond angles are exactly 109^0,28'X is
(1) Chloromethane (2) Iodoform
(3) Carbon tetrachloride (4) Chloroform

767. Select the property which do(es) not follow the following order for NX_3 (X = halogen). $NF_3 < NCl_3 < NBr_3 < NI_3$
(1) XNX bond angle (2) NX bond length
(3) N–X bond polarity (4) All of these

768. The bond angle in PH_3would be expected to be close to
(1) 90^0 (2) 105^0 (3) 109^0 (4) 120^0

769. Which has the least bond angle
(1) NH_3 (2) BeF_2 (3) H_2O (4) CH_4

770. Which has maximum bond angle
(1) CHF_3 (2) $CHCl_3$
(3) $CHBr_3$ (4) All have maximum bond angle

771. In which of the following is the angle between the two covalent bonds greatest
(1) CO_2 (2) CH_4 (3) NH_3 (4) H_2O

772. As the *s*-character of hybridized orbital decreases, the bond angle
(1) Decreases (2) Increases
(3) Does not change (4) Becomes zero

773. The bond angle between H-O-H in ice is closest to
(1) $120^028'$ (2) 60^0 (3) 90^0 (4) 105^0

774. Which of the following is the correct reducing order of bond-angle
(1) $NH_3<CH_4<C_2H_2<H_2O$ (2) $C_2H_2>NH_3>H_2O<CH_4$
(3) $NH_3>H_2O>CH_4<C_2H_2$ (4) $H_2O<NH_3>CH_4<C_2H_2$

775. Which compound has bond angle nearly to 90^0
(1) H_2O (2) H_2S (3) NH_3 (4) CH_4

776. The bond angle of water is 1045^0due to
(1) Repulsion between lone pair and bond pair
(2) SP^3 hybridization of *O*
(3) Bonding of H_2O (4) Higher electronegativity of *O*

777. The correct sequence of decrease in the bond angle of the following hybrids is
(1) $NH_3>PH_3>AsH_3>SbH_3$ (2) $NH_3>AsH_3>PH_3>SbH_3$
(3) $SbH_3>AsH_3>PH_3>NH_3$ (4) $PH_3>NH_3>AsH_3>SbH_3$

778. True order of bond angle is
(1) $H_2O>H_2S>H_2Se>H_2Te$ (2) $H_2Te>H_2Se>H_2S>H_2O$
(3) $H_2S>H_2O>H_2Se>H_2Te$ (4) $H_2O>H_2S>H_2Te>H_2Se$

779. Maximum bond angle is present in
(1) $BeCl_3$ (2) BBr_3 (3) BF_3 (4) Same for all

780. The largest bond angle is in
(1) AsH_3 (2) NH_3 (3) H_2O (4) PH_3

781. The bond angle in ammonia molecule is
(1) $91^08'$ (2) $93^03'$ (3) $106^045'$ (4) $109^028'$

782. The maximum number of 90° angles between bond pair-bond pair of electrons are observed in
(1) dsp^2 hybridization (2) sp^3d hybridization
(3) dsp^3 hybridization (4) sp^3d^2 hybridization

783. Among the following molecules which one have smallest bond angle
(1) NH_3 (2) PH_3 (3) H_2O (4) H_2S

784. As the P-character increases, the bond angle in hybrid orbitals formed by s and atomic orbitals
(1) Decreases (2) Increases
(3) Doubles (4) Remains unchanged