GPLUS EDUCATION

Date :
Time : **CHEMISTRY**
Marks :

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Single Correct Answer Type

1. The hybrid state of S in SO_3 is similar to that of
   a) C in C_2H_2 b) C in C_2H_4 c) C in CH_4 d) C in CO_2
2. The hydration energy of Mg^{2+} is larger than that of:
   a) Al^{3+} b) Na^{+} c) Be^{2+} d) None of these
3. Number of lone pair (s) in $XeOF_4$ is/are
   a) 0 b) 1 c) 2 d) 3
4. Van der Waals' forces between molecules depend upon:
   a) Number of electrons b) Charge on nucleus c) Radius of atoms d) All of these
5. XeF_6 is:
   a) Octahedral
   b) Pentagonal pyramidal
   c) Planar
   d) tetrahedral
6. The bond order in NO is 2.5 while that in NO^{+} is 3. Which of the following statements is true for these two species?
   a) Bond length in NO^{+} is greater than in NO
   b) Bond length in NO is greater than in NO^{+}
   c) Bond length in NO^{+} is equal to than in NO
   d) Bond length is unpredictable
7. An atom with atomic number 20 is most likely to combine chemically with the atom whose atomic number is:
   a) 11 b) 16 c) 18 d) 10
8. Which has the largest distance between the carbon hydrogen atom?
   a) Ethane b) Ethene c) Ethyne d) Benzene
9. Length of hydrogen bond ranges from 2.5Å to:
   a) 3.0 Å b) 2.75 Å c) 2.6 Å d) 3.2 Å
10. If $H-X$ bond length is 2.00 Å and $H-X$ bond has dipole moment 5.12×10^{-30} C – m, the percentage of ionic character in the molecule will be
    a) 10% b) 16% c) 18% d) 20%
11. Which molecule is planar?
    a) NH_3 b) CH_4 c) C_2H_4 d) $SiCl_4$
12. From the molecular orbital theory, one can show that the bond order in F_2 molecule as
    a) 2 b) 1 c) 3 d) 4
13. Two ice cubes are pressed over each other until they unite to form one block. Which one of the following forces dominates for holding them together?
    a) Dipole-dipole interaction b) Van der Waals' forces
    c) Hydrogen bond formation d) Covalent attraction
14. Maximum number of covalent bonds between two like atoms can be:
    a) Three b) Two c) Four d) One
15. When sodium and chlorine react, energy is:
    a) Released and ionic bond is formed

b) Released and covalent bond is formed
c) Absorbed and covalent bond is formed
d) Absorbed and ionic bond is formed

16. The maximum possible number of hydrogen bonds is a H_2O molecule can participate is
a) 1 b) 2 c) 3 d) 4

17. The element having lowest ionisation energy among the following is:
a) $1s^2, 2s^2 2p^3$ b) $1s^2, 2s^2 2p^6, 3s^1$ c) $1s^2, 2s^2 2p^6$ d) $1s^2, 2s^2 2p^5$

18. Bond energies in NO, NO^+ and NO^- are such as
a) $NO^- > NO > NO^+$ b) $NO > NO^- > NO^+$ c) $NO^+ > NO > NO^-$ d) $NO^+ > NO^- > NO$

19. Two type F*X*F angles are present in which of the following molecules? (*X*=S, Xe, C)
a) SF_4 b) XeF_4 c) SF_6 d) CF_4

20. The bond angle between two hybrid orbitals is 105°. The percentage of *s*-character of hybrid orbital is between
a) $50 - 55\%$ b) $9 - 12\%$ c) $22 - 23\%$ d) $11 - 12\%$

21. Which is electron deficient compound?
a) C_2H_4 b) B_2H_6 c) C_2H_6 d) $NaBH_4$

22. CCl_4 is insoluble in water because:
a) CCl_4 is non-polar and water is polar
b) Water is non-polar and CCl_4 is polar
c) Water and CCl_4 both are polar
d) None of the above

23. Which of the following is not correct regarding the properties of ionic compounds?
a) Ionic compounds have high metling and boiling points
b) Their reaction velocity in aqueous medium is very high
c) Ionic compounds in their molten and aqueous solutions do not conduct electricity
d) They are highly soluble in polar solvents

24. The number of sigma and pi (π) bonds present in benzene respectively are
a) 12, 6 b) 6, 6 c) 6, 12 d) 12, 3

25. Which of the following is not tetrahedral?
a) BF_4^- b) NH_4^+ c) CO_3^{2-} d) SO_4^{2-}

26. In PCl_5 molecule, P is:
a) sp^3-hybridized b) dsp^2-hybridized c) ds^3p-hybridized d) sp^3d-hybridized

27. The bond angle and % of *d*-character in SF_6 are
a) $120°, 20\%$ b) $90°, 33\%$ c) $109°, 25\%$ d) $90°, 25\%$

28. Linear combination of two hybridized orbitals, belonging to two atoms and each having one electron leads to:
a) Sigma-bond
b) Double bond
c) Coordinate covalent bond
d) Pi-bond

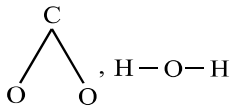
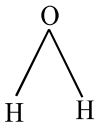
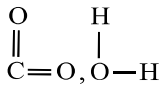
29. In allene structure, three carbon atoms are joined by:
a) Three σ-and three π-bonds
b) Two σ- and one π-bond
c) Two σ-and two π-bonds
d) Three π-bonds only

30. Geometry of SiO_4^{4-} anion is
a) Tetrahedral b) Trigonal c) Trihedral d) Pentagonal

31. The carbon atom in graphite is:
a) sp^2-hybridized b) sp^3-hybridized c) *sp*-hybridized d) None of these

32. Boron cannot form which one of the following anions?

a) BF_6^{3-} b) BH_4^- c) $B(OH)_4^-$ d) BO_2^-

33. If the ionic radii of K^+ and F^- are about 1.34 Å each, then the expected values of atomic radii of K and F should be respectively:
a) 1.34 and 1.34 Å b) 2.31 and 0.64 Å c) 0.64 and 2.31 Å d) 2.31 and 1.34 Å
34. If Z-axis is the molecular axis, then π-molecular orbitals are formed by the overlap of
a) $s + p_z$ b) $p_x + p_y$ c) $p_z + p_z$ d) $p_x + p_x$
35. Which one is the weakest bond?
a) Hydrogen b) Ionic c) Covalent d) Metallic
36. The total number of valency electrons for PO_4^{3-} ion is:
a) 32 b) 16 c) 28 d) 30
37. The ratio of σ and π-bonds in benzene is:
a) 2 b) 6 c) 4 d) 8
38. The geometry of PF_5 molecule is:
a) Planar b) Square planar c) Trigonal bipyramidal d) Tetrahedral
39. Which one of the following linear structure?
(I)I_3^- (II)NO_2^-
(III)I_3^+ (IV)SO_2
(V)N_3^-
a) I, II and III b) I and V c) II, III and IV d) All of these
40. According to MO theory, which of the following lists ranks the nitrogen species in terms of increasing bond order?
a) $N_2^- < N_2^{2-} < N_2$ b) $N_2^- < N_2 < N_2^{2-}$ c) $N_2^{2-} < N_2^- < N_2$ d) $N_2 < N_2^{2-} < N_2^-$
41. The equilateral triangle shape has:
a) sp-hybridization b) sp^2-hybridization c) sp^3-hybridization d) sp^3d-hybridization
42. Which of the following has fractional bond order?
a) O_2^{2+} b) O_2^{2-} c) F_2^{2-} d) H_2^-
43. For which of the following hybridization the bond angle is maximum?
a) sp^2 b) sp c) sp^3 d) dsp^2
44. Experiment shows that H_2O has a dipole moment whereas, CO_2 has not. Point out the structures which best illustrate these facts:
a) O=C=O, H−O−H b)  , H−O−H c) O=C=O,  d) 
45. In $TeCl_4$, the central atom tellurium involves
a) sp^3 hybridisation b) $sp^3\ d$ hybridization c) $sp^3\ d^2$ hybridisation d) dsp^2 hybridisation
46. Stability of hydrides generally increases with:
a) Increase in bond angle
b) Decrease in bond angle
c) Decrease in resonance
d) None of these
47. Which of the following is isoelectronic with CO_2?
a) NO_2 b) NO c) N_2O d) N_2O_4
48. Which can be described as a molecule with residual bonding capacity?
a) N_2 b) CH_4 c) NaCl d) $BeCl_2$
49. Lattice energy of an ionic compound depends upon
a) Charge on the ion and size of the ion b) Packing of ions only
c) Size of the ion only d) Charge on the ion only
50. Identify the correct statement from below, concerning the structure of $CH_2 = C = CH_2$
a) The molecule is planar b) One of the three carbon atoms is in an-

sp^3 hybridised state

The molecule is non - planar with the two $-CH_2$ groups being in planes perpendicular to each other

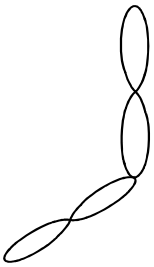
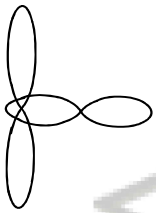
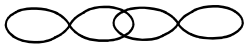
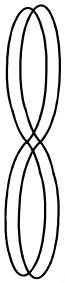
d) All the carbon atoms are *sp*-hybridized

c)

51. (i) $H-C-H$ angle in CH_4
(ii) $Cl-B-Cl$ angle in BCl_3
(iii) $F-I-F$ angle in IF_7 in a plane
(iv) $I-I-I$ angle in I_3^-
Increasing order of above bond angles is
a) (i) < (ii) < (iii) < (*iv*) b) (ii) < (i) < (iii) < (*iv*)
c) (iii) < (i) < (ii) < (*iv*) d) (iv) < (ii) < (i) < (*iii*)

52. Among the following elements, the most electronegative is:
a) Oxygen b) Chlorine c) Nitrogen d) Fluorine

53. Metallic bonds do not play a role in:
a) Brass b) Copper c) Germanium d) Zinc

54. Which *p*-orbitals overlapping would give the strongest bond?
a)  b)  c)  d) 

55. H_2O boils at higher temperature than H_2S because it is capable of forming:
a) Ionic bonds b) Covalent bonds c) Hydrogen bonds d) Metallic bonds

56. When two atomic orbitals combine, they form:
a) One molecular orbitals
b) Two molecular orbitals
c) Two bonding molecular orbitals
d) Two antibonding molecular orbitals

57. The correct increasing covalent nature is:
a) $NaCl < LiCl < BeCl_2$ b) $BeCl_2 < NaCl < LiCl$ c) $BeCl_2 < LiCl < NaCl$ d) $LiCl < NaCl < BeCl_2$

58. IP_1 and IP_2 of Mg are 178 and 348 kcal mol^{-1}. The energy required for the reaction, $Mg \longrightarrow Mg^{2+} + 2e^-$ is:
a) +170 kcal b) +526 kcal c) -170 kcal d) -526 kcal

59. The electronic configuration

$$(\sigma 1s)^2(\overset{*}{\sigma} 1s)^2(\sigma 2s)^2(\overset{*}{\sigma} 2s)^2(\sigma 2p_x)^2$$

$$(\pi 2p_y)^2(\pi 2p_z)^2(\overset{*}{\pi} 2p_y)^2(\overset{*}{\pi} 2p_z)^1$$

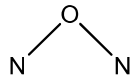
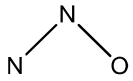
can be assigned to
a) O_2 b) O_2^+ c) O_2^- d) O_2^{2-}

60. Some of the properties of the two species, NO_3^- and H_3O^+ are described below. Which one of them is correct?
a) Dissimilar in hybridization for the central atom with different structure
b) Isostructural with same hybridization for the central atom
c) Isostructural with different hybridization for the central atom
d) Similar is hybridization for the central atom with different structure

61. 6, 6

a) 6, 6 b) 6, 6 c) 6, 6 d) 6, 6

62. Greater the dipole moment:
    a) Greater is the ionic nature
    b) Lesser the polarity
    c) Smaller the ionic nature
    d) None of these
63. H—B—H bond angle in BH_4^- is:
    a) 180° b) 120° c) 109° d) 90°
64. Which of the following molecular orbitals has two nodal planes?
    a) $\sigma 2p_x$ b) $\pi 2p_y$ c) $\pi^* 2p_y$ d) $\sigma^* 2p_x$
65. The common feature among the species CN^-, CO and NO^+ are:
    a) Bond order three and isoelectronic b) Bond order three and weak field ligands c) Bond order two and π-acceptors d) Isoelectronic and weak field ligands
66. Hydrogen bonding is maximum in
    a) C_2H_5OH b) CH_3OCH_3 c) $(CH_3)_2C=O$ d) CH_3CHO
67. The O—H bond distance in water molecule is:
    a) 1.0Å b) 1.33 Å c) 0.96 Å d) 1.45 Å
68. O_2^{2+} has a bond order of
    a) 1 b) 2 c) 3 d) 4
69. Which among the following molecules/ ions is diamagnetic?
    a) Super oxide ion
    b) Oxygen
    c) Carbon molecule
    d) Unipositive ion of N_2molecule
70. The enolic form of acetone contains
    a) 9 sigma bonds, 1 pi bond and two lone pairs
    b) 8 sigma bonds, 2 pi bond and two lone pairs
    c) 10 sigma bonds, 1 pi bond and one lone pairs
    d) 9 sigma bonds, 2 pi bond and one lone pairs
71. Which of the following are isoelectronic and isostructural?
    $NO_3^-, CO_3^{2-}, ClO_3^-, SO_3$
    a) NO_3^-, CO_3^{2-} b) SO_3, NO_3^- c) ClO_3^-, CO_3^{2-} d) CO_3^{2-}, SO_3
72. Which of the following is paramagnetic with bond order 0.5?
    a) F_2 b) H_2^+ c) N_2 d) O_2^-
73. Water has high heat of vaporization due to:
    a) Covalent bonding b) H-bonding c) Ionic bonding d) None of these
74. The C – H bond distance is the longest in
    a) C_2H_6 b) C_2H_2 c) $C_2H_2Br_2$ d) C_2H_4
75. If the electronegativity difference between two atoms *A* and *B* is 2.0, then the percentage of covalent character in the molecule is
    a) 54% b) 46% c) 23% d) 72%
76. Structure of ICl_2^- is:
    a) Trigonal
    b) Octahedral
    c) Square planar
    d) Distorted trigonal pyramidal
77. Polar covalent compounds are soluble in:
    a) Polar solvents b) Non-polar solvents c) Concentrated acids d) All solvents
78. N_2O is isoelectronic to CO_2 and N_3^-. Which of the following is the structure of N_2O?

a)  b) N − O − N c) N − O − N d) 

79. Which does not show hydrogen bonding?
a) C_2H_5OH b) Liquid NH_3 c) H_2O d) Liquid HBr

80. All bond angles are exactly equal to 109° 28` in
a) Methyl chloride b) Iodoform
c) Chloroform d) Carbon tetrachloride

81. Which among the following has highest ionic radius?
a) F^- b) B^{3+} c) O^{2-} d) Li^+

82. Zero dipole moment is possessed by
a) PCl_3 b) BF_3 c) ClF_3 d) NH_3

83. The number of electrons involved in the bond formation of N_2 molecule
a) 2 b) 4 c) 6 d) 10

84. Which one of the following orders is not in according with the property stated against it?
a) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity
b) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
c) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power
d) HI > HBr > HCl > HF : Acidic property in water.

85. What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to a gas?
a) London dispersion force
b) Hydrogen bonding
c) Dipole-dipole interaction
d) Covalent bonds

86. The incorrect statements regarding bonding molecular orbitals because:
a) Bonding molecular orbitals possess less energy than combining atomic orbitals.
b) Bonding molecular orbitals have low electron density between the two nuclei.
c) Every electron in bonding molecular orbitals contributes to attraction between atoms.
d) They are formed when the lobes of the combining atomic orbitals have same sign.

87. A coordinate bond is a dative covalent bond. Which of the below is true?
a) Three atom form bond by sharing their electrons b) Two atoms form bond by sharing their electrons
c) Two atoms form bond and one of them provides both electrons d) Two atoms form bond by sharing electrons obtained from third atom.

88. The bond length between C – C bond in sp^2 hybridised molecule is
a) 1.2 Å b) 1.39 Å c) 1.33 Å d) 1.54 Å

89. The electronegativity values of C, H, O, N and S are 2.5, 2.1, 3.5, 3.0 and 2.5 respectively. Which of the following bonds is most polar?
a) C—H b) N—H c) S—H d) O—H

90. Which of the following has largest size?
a) Al b) Al^+ c) Al^{2+} d) Al^{3+}

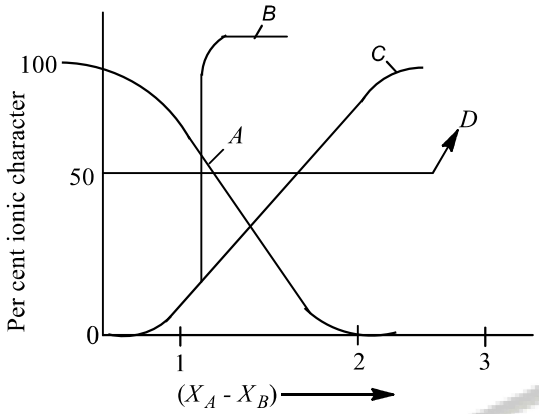
91. In which of the following, the bond length between hybridised carbon atom and other carbon atom is minimum?
a) Propyne b) Propene c) Butane d) Propane

92. Which is expected to conduct electricity?
a) Diamond b) Molten sulphur c) Molten KCl d) Crystalline NaCl

93. Metals are good conductors of electricity because they contain
a) Ionic bonds b) A network structure
c) Very few valence electrons d) Free electrons

94. The species having pyramidal shape is
a) SO_3 b) BrF_3 c) SiO_3^{2-} d) OSF_2

95. The attraction that non-polar molecules have for each other is primarily caused by:
    a) Hydrogen bonding
    b) Difference in electronegativities
    c) High ionisation energy
    d) Van der Waals' forces
96. In HCHO carbon atom has hybridisation:
    a) sp b) sp^2 c) sp^3 d) None of these
97. Which of the following species has four lone pairs of electrons in its outer shell?
    a) I b) O^- c) Cl^- d) He
98. For AB bond if per cent ionic character is plotted against electronegativity difference $(X_A - X_B)$, the shape of the curve would look like



    The correct curve is
    a) A b) B c) C d) D
99. Chlorine atom, in its third excited state, reacts with fluorine to form a compound X. The formula and shape of X are
    a) ClF_5, pentagonal
    b) ClF_4, tetrahedral
    c) ClF_4, pentagonal bipyramidal
    d) ClF_7, pentagonal bipyramidal
100. The formation of the oxide ion $O^{2-}(g)$ requires first an exothermic and then an endothermic step as shown below,
    $O(g) + e \longrightarrow O^-(g)$; $\Delta H = -142$ kJ/mol
    $O^-(g) + e \longrightarrow O^{2-}(g)$; $\Delta H = 844$ kJ/mol
    This is because:
    a) O^- ion has comparatively larger size than oxygen atom
    b) Oxygen has high electron affinity
    c) O^- ion will lead to resist the addition of another electron
    d) Oxygen is more electronegative
101. In which of the following molecules are all the bonds not equal?
    a) AlF_3 b) NF_3 c) ClF_3 d) BF_3
102. Which of the following compound is covalent?
    a) H_2 b) KCl c) Na_2S d) CaO
103. Which of the following molecular species has unpaired electron (s)?
    a) N_2 b) F_2 c) O_2^- d) O_2^{2-}
104. The correct order of bond angles is:
    a) $PF_3 < PCl_3 < PBr_3 < PI_3$
    b) $PF_3 < PBr_3 < PCl_3 < PI_3$
    c) $PI_3 < PBr_3 < PCl_3 < PF_3$
    d) $PF_3 > PCl_3 < PBr_3 < PI_3$

105. If the bond length and dipole moment of a diatomic molecule are 1.25 A and 1.0 D respectively, what is the per cent ionic character of the bond?
a) 10.66 b) 12.33 c) 16.66 d) 19.33

106. The molecule which does not exhibit dipole moment is
a) NH_3 b) $CHCl_3$ c) H_2O d) CCl_4

107. N_2accept electron and convert into N_2^-, where this electron goes?
a) Antibonding π-molecular orbital
b) Bonding π-molecular orbital
c) σ-bonding molecular orbital
d) σ-antibonding molecular orbital

108. The correct order of radii is:
a) $N < Be < B$ b) $F^- < O^{2-} < N^{3-}$ c) $Na < Li < K$ d) $Fe^{3+} < Fe^{2+} < Fe^{4+}$

109. The bond order is maximum in:
a) H_2 b) H_2^+ c) He_2 d) He_2^+

110. Which of the following atoms has minimum covalent radius?
a) Si b) N c) C d) B

111. The screening effect of d-electrons is:
a) Equal to the p -electrons
b) Much more than p-electrons
c) Same as f-electrons
d) Less than p-electrons

112. Which of the following statement is wrong?
a) The stability of hydrides increase from NH_3 to BiH_3 in group 15 of the periodic table.
b) Nitrogen cannot form $d\pi - p\pi$ bond.
c) Single N—N bond is weaker than the single P—P bond.
d) N_2O_4 has two resonance structure

113. The molecule having permanent dipole moment is:
a) SF_4 b) XeF_4 c) SiF_4 d) BF_3

114. Unusually high boiling point of water is result of
a) Intermolecular hydrogen bonding b) Intramolecular hydrogen bonding
c) Both intra and inter molecular hydrogen bonding d) High specific heat

115. Which of the following is least ionic?
a) CaF_2 b) $CaBr_2$ c) CaI_2 d) $CaCl_2$

116. What bond order does O_2^{2-} have?
a) 1 b) 2 c) 3 d) 1/3

117. A compound contains X, Y and Z atoms. The oxidation states of X, Y and Z are +2, +2 and -2 respectively. The possible formula of the compound is
a) XYZ_2 b) $Y_2(XZ_3)_2$ c) $X_3(Y_4Z)_2$ d) $X_3(YZ_4)_3$

118. Which one of the following is a non-polar molecule?
a) CCl_4 b) $CHCl_3$ c) CH_2Cl_2 d) CH_3Cl

119. Which one of the following has the regular tetrahedral structure?
(Atomic numbers B = 5, S = 16, Ni = 28, Xe = 54)
a) XeF_4 b) SF_4 c) BF_4^- d) $[Ni(CN)_3]^{2-}$

120. If the dipole moment of toluene and nitro-benzene are 0.43 D and 3.93 D, then what is the expected dipole moment of p-nitro toluene?
a) 3.50 D b) 2.18 D c) 4.36 D d) 5.30 D

121. Which of the following is most stable?
a) Pb^{2+} b) Ge^{2+} c) Si^{2+} d) Sn^{2+}

122. In which of the following compound sp^2 hybridisation is absent?
a) $CH_2 = CH - CH = CH_2$ b) $CH \equiv C - CH_2 - CH_3$

c) $CH_2 - CH = CH_2$ d) $CH_2 = CH - CH_2 - CH_3$

123. Which one of the following pairs of species has the same bond order:
a) NO^+ and CN^+ b) CN^- and NO^+ c) CN^- and CN^+ d) O_2^- and CN^-

124. Which of the following characteristics regarding halogens is not correct?
a) Ionization energy decreases with increase in atomic number.
b) Electronegativity decreases with increase in atomic number.
c) Electron affinity decreases with increase in atomic number.
d) Enthalpy of fusion increases with increase in atomic number.

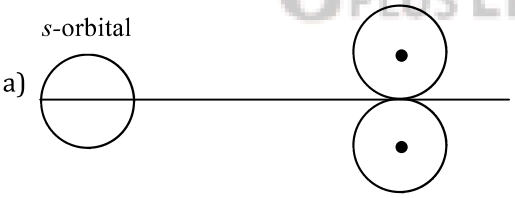
125. The number of S – S bonds in sulphur trioxide is
a) Three b) Two c) One d) Zero

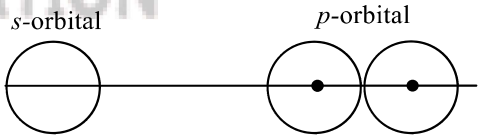
126. The low density of ice compared to water is due to
a) Induced dipole – induced dipole interactions
b) Dipole – induced dipole interaction
c) Hydrogen bonding interactions
d) Dipole –dipole interaction

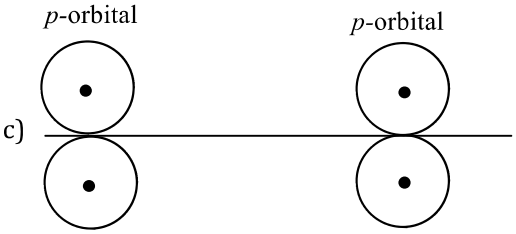
127. Consider the following molecules or ions
(i)H_2O (ii)NH_4^+ (iii)SO_4^{2-}
(iv)ClO_4^- (v)NH_3
sp^3 hybridisation is involved in the formation of
a) (i), (ii) (v) only b) (i), (ii) only
c) (ii) only d) (i), (ii), (iii), (iv) and (v)

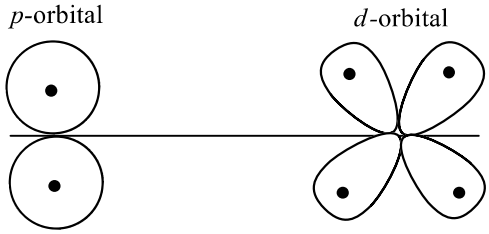
128. Which of the following compounds has dipole moment approximately equal to that of chlorobenzene?
a) *o*-dichlorobenzene
b) *m*-dichlorobenzene
c) *p*-dichlorobenzene
d) *p*-chloronitrobenzene

129. Which of the following overlaps leads to bonding?

a)


b)


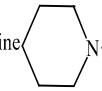
c)


d)


130. Which of the following is correct?
a) The number of electrons present in the valence shell of S in SF_6 is 12.
b) The rates of ionic reactions are very low.
c) According to VSEPR theory, $SnCl_2$ is a linear molecule.
d) The correct order of ability to form ionic compounds among Na^+, $Mg^{2+}$and Al^{3+} is $Al^{3+} > Mg^{2+} > Na^+$.

131. The number of sigma and pi bonds in peroxodisulphuric acid are respectively
a) 9 and 4 b) 11 and 4 c) 4 and 8 d) 4 and 9

132. Which is not a paramagnetic species?
a) O_2 b) O_2^+ c) O_2^- d) O_2^{2-}

133. In piperidine  N—H, N atom has hybridization:

a) sp b) sp^2 c) sp^3 d) dsp^2

134. Electron deficient species are known as:

a) Lewis acids b) Hydrophilic c) Nucleophiles d) Lewis bases

135. The molecule having three folds of axis of symmetry is:

a) NH_3 b) PCl_5 c) SO_2 d) CO_2

136. The structure of ICl_2^- is:

a) Trigonal
b) Octahedral
c) Square planar
d) Distorted trigonal bipyramid

137. Among the following the molecule with the highest dipole moment is

a) CH_3Cl b) CH_2Cl_2 c) $CHCl_3$ d) CCl_4

138. Which of the following is not isostructural with $SiCl_4$?

a) PO_4^{3-} b) NH_4^+ c) SCl_4 d) SO_4^{2-}

139. A molecule which cannot exist theoretically is:

a) SF_4 b) OF_2 c) OF_4 d) O_2F_2

140. An atom X has three valence electrons and atom Y has six valence electrons. The compound formed between them will have the formula

a) X_2Y_6 b) XY_2 c) X_2Y_3 d) X_3Y_2

141. Which one is polar molecule among the following?

a) CH_4 b) CCl_4 c) CO_2 d) H_2O

142. Shape of molecules is decided by:

a) Sigma bond
b) π-bond
c) Both sigma and π-bonds
d) Neither sigma nor π-bonds

143. The shape of carbon dioxide is

a) Pyramidal b) Tetrahedral c) Planar d) linear

144. The correct ionic radii order is:

a) $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$
b) $N^{3-} > Na^+ > O^{2-} > F^- > Mg^{2+} > Al^{3+}$
c) $Na^+ > O^{2-} > N^{3-} > F^- > Mg^{2+} > Al^{3+}$
d) $O^{2-} > F^- > Na^+ > N^{3-} > Mg^{2+} > Al^{3+}$

145. Which is not linear?

a) CO_2 b) HCN c) C_2H_2 d) H_2O

146. Hybridisation of oxygen in diethyl ether is

a) Sp b) sp^2 c) sp^3 d) sp^3d

147. What is the effect of more electronegative atom on the strength of ionic bond?

a) Increases b) Decreases c) Remains the same d) None of these

148. Which of the following two are isostructural?

a) XeF_2, IF_2^- b) NH_3, BF_3 c) CO_3^{2-}, SO_3^{2-} d) PCl_5, ICl_5

149. NF_3 is:

a) Non-polar compound
b) Electrovalent compound
c) Having low value of dipole moment than NH_3
d) Having more dipole moment than NH_3

150. Molecular size of ICl and Br_2 is nearly same, but boiling point of ICl is about 40°C higher than Br_2. This

might be due to:

a) I—Cl bond is stronger than Br—Br bond

b) Ionisation energy of I < ionisation energy of Br

c) ICl is polar where as Br_2 is non-polar

d) The size of I > size of Br

151. Which molecule is linear?

a) H_2S b) NO_2 c) ClO_2 d) CO_2

152. Which of the following shows minimum melting point?

a) Naphthalene b) Diamond c) NaCl d) Mn

153. Which of the following does not have a lone pair on the central atom?

a) NH_3 b) PH_3 c) BF_3 d) PCl_3

154. Molecular orbital theory was given by

a) Kossel b) Mosley c) Mulliken d) Werner

155. NH_3 has a net dipole moment, but boron trifluoride (BF_3) has zero dipole moment, because:

a) B is less electronegative than N

b) F is more electronegative than H

c) BF_3 is pyramidal while NH_3 is planar

d) NH_3 is pyramidal while BF_3 is trigonal planar

156. Proton plays an important role in…bonding.

a) Electrovalent b) Hydrogen c) Covalent d) Coordinate

157. Which represents a collection of isoelectronic species?

a) Be, Al^{3+}, Cl^- b) Ca^{2+}, Cs^+, Br c) Na^+, Ca^{2+}, Mg^{2+} d) N^{3-}, F^-, Na^+

158. An electrovalent compound does not exhibit space isomerism due to:

a) Presence of ions

b) High melting point

c) Strong electrostatic forces between constituent ions

d) Non-directional nature of electrovalent bond

159. In which molecule Sulphur atom is not sp^3-hybridized?

a) SO_4^{2-} b) SF_4 c) SF_2 d) None of these

160. In which one of the following species, the central atom has the type of hybridization which is not the same as that present in other three?

a) SF_4 b) I_3^- c) $SbCl_5^{2-}$ d) PCl_5

161. The radii of F, F^-, O and O^{2-} are in the order of:

a) $O^{2-} > F^- > F > O$ b) $F^- > O^{2-} > F > O$ c) $O^{2-} > O > F^- > F$ d) $O^{2-} > F^- > O > F$

162. The correct order of decreasing second ionisation enthalpy of Ti (22), V (23), Cr (24) and Mn (25) is:

a) V > Mn > Cr > Ti b) Mn > Cr > Ti > V c) Ti > V > Cr > Mn d) Cr > Mn > V > Ti

163. How many σ and π-bonds are present in given compound?

$$Ph - CH = \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} - C_2H_5$$

a) 19 σ and 4 π − bonds b) 22 σ and 4 π − bonds

c) 25 σ and 4 π − bonds d) 26 σ and 4 π − bonds

164. C − Cl bond is stronger than C – I bond, because

a) C − Cl bond is more ionic than C – I b) C − Cl bond is polar covalent bond

c) C − Cl bond is more covalent than C – I d) C − Cl bond length is longer than C – I

165. The ICl molecule is:

a) Purely covalent

b) Purely electrovalent

c) Polar with negative end on chlorine

d) Polar with negative end on iodine

166. Which of the following silver salts is insoluble in water?
a) $AgClO_4$ b) Ag_2SO_4 c) AgF d) $AgNO_3$

167. Silicon has 4 electrons in the outermost orbit. In forming the bond:
a) It gains electrons b) It losses electrons c) It shares electrons d) None of these

168. The shape of gaseous $SnCl_2$ is
a) Tetrahedral b) Linear c) Angular d) T-shape

169. Chlorine atom tends to acquire the structure of:
a) He b) Ne c) Ar d) Kr

170. The d – orbital involved in $sp^3\ d$ – hybridisation is
a) $d_{x^2-y^2}$ b) d_{xy} c) d_{z^2} d) d_{zx}

171. When O_2 is converted into O_2^+;
a) Both paramagnetic character and bond order increase
b) Bond order decreases
c) Paramagnetic character increases
d) Paramagnetic character decreases and the bond order increases

172. Intramolecular hydrogen bond is present in
a) Water b) *o*-nitrophenol c) *p*-nitrophenol d) methylamine

173. A pair of compounds which have odd electrons in the group NO, CO, ClO_2, N_2O_5, SO_2 and O_2 are
a) NO and ClO_2 b) COI and SO_2 c) $ClO_2$and CO d) $SO_2$and O_3

174. According to VSEPR theory the repulsion between different pair (lone or bond) of electrons obey the order
a) *lp bp lp lp bp bp* b) *lp bp bp bp lp lp*
c) *lp lp lp bp bp bp* d) *bp bp lp lp lp bp*

175. The bond between two identical non-metal atoms has a pair of electrons:
a) Unequally shared between the two
b) Equally shared between the two
c) Transferred fully from one atom to another
d) None of the above

176. The bond angle in AsH_3 is greater than that in
a) NH_3 b) H_2O c) BCl_3 d) None of these

177. The correct order of increasing electropositive character among Cu, Fe and Mg is:
a) Cu ≈ Fe < Mg b) Fe < Cu < Mg c) Fe < Mg < Cu d) Cu < Fe < Mg

178. H—O—H bond angle in H_2O is 104.5° and not 109°28′ because of:
a) High electronegativity of oxygen
b) Bond pair-bond pair repulsion
c) Lone pair-lone pair repulsion
d) Lone pair-bond pair repulsion

179. The bond order in O_2^+ is equal to bond order in:
a) N_2^+ b) CN^- c) CO d) NO^+

180. The electron affinity for inert gases is likely to be:
a) High b) Small c) Zero d) Positive

181. The true statements from the following are
1.PH_5 and $BiCl_5$ do not exist
2.$p\pi - d\pi$ bond is present in SO_2
3.Electrons travel at the speed of light
4.SeF_4 and CH_4 have same shape
5.I_3^+has bent geometry
a) 1,3 b) 1,2,5 c) 1,3,5 d) 1,2,4

182. 1,3-butadiene has:
a) 6σ and 2π-bonds b) 2σ and 2π-bonds c) 9σ and 2π-bonds d) 6σ and 2π-bonds

183. The bond between atoms of two elements of atomic number 37 and 53 is:
a) Covalent b) Ionic c) Coordinate d) Metallic

184. In methane the bond angle is
a) 180° b) 90° c) 109° d) 120°

185. One would expect the elemental form of Cs at room temperature to be:
a) A network solid b) A metallic solid c) Non-polar liquid d) An ionic liquid

186. Which of the following is false?
a) Glycerol has strong hydrogen bonding
b) Glycol is a poisonous alcohols
c) Waxes are esters of higher alcohols with higher acids
d) Alkyl halides have higher b.p. than corresponding alcohols

187. Ionic radii are:
a) $\propto \frac{1}{\text{effective nuclear charge}}$
b) $\propto \frac{1}{(\text{effective nuclear charge})^2}$
c) $\propto$ effective nuclear charge
d) $\propto (\text{effective nuclear charge})^2$

188. Which of the following statements is incorrect?
a) He_2 does not exist because its bond order is zero
b) O_2, O_2^- and O_2^+ are all paramagnetic
c) Any two atomic orbitals can combine to form two molecular orbitals
d) $\pi(2p_x)$ and $\pi(2p_y)$are degenerate molecular orbitals

189. Which of the following pairs will from the most stable ionic bond?
a) Na and Cl b) Mg and F c) Li and F d) Na and F

190. Among NaF, NaCl NaBr and NaI, the NaF has highest melting point because:
a) It has maximum ionic character
b) It has minimum ionic character
c) It has associated molecules
d) It has least molecular weight

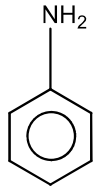
191. The planar structure of BF_3 can be explained by the fact that BF_3 is
a) sp hybridized b) sp^2 hybridised c) sp^3 hybridised d) $sp^3\ d$ hybridized

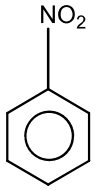
192. The correct order of bond order value among the following is
(i) NO^- (ii) NO^+
(iii)NO (iv) NO^{2+}
(v) NO^{2-}
a) (i) < (iv) < (iii) < (ii) < (v) b) (iv) = (ii) < (i) < (v) < (iii)
c) (v) < (i) < (iv) = (iii) < (ii) d) (ii) < (iii) < (iv) < (i) < (v)

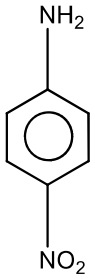
193. The bond between chlorine and bromine in $BrCl_3$ is:
a) Ionic
b) Non-polar
c) Polar with negative end on Br^-
d) Polar with negative end on Cl^-

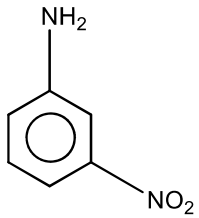
194. Which of the following has regular tetrahedral shape?
a) $[Ni(CN)_4]^{2-}$ b) SF_4 c) $[BF_4]^-$ d) XeF_4

195. Which of the following will have large dipole moment?

a) 

b) 

c) 

d) 

196. PCl_5 exists but NCl_5 does not because:
   a) Nitrogen has no vacant $2d$-orbitals
   b) NCl_5 is unstable
   c) Nitrogen atom is much smaller than phosphorus
   d) Nitrogen is highly mert
197. In which of the following pairs the two species are not isostructural?
   a) PCl_4^+ and $SiCl_4$ b) PF_5 and BrF_5 c) AlF_6^{3-} and SF_6 d) CO_3^{2-} and NO_3^-
198. The molecule having a pyramidal shape out of the following is
   a) CO_2 b) BF_3 c) SF_4 d) NH_3
199. If Na^+ ion is larger than Mg^{2+} ion and $S^{2-}$is larger thanCl^- ion, which of the following will be stable soluble in water?
   a) Sodium chloride b) Sodium sulphide c) Magnesium chloride d) Magnesium sulphide
200. An atom of an element A has three electrons in its outermost orbit and that of B has six electrons in its outermost orbit. The formula of the compound between these two will be
   a) A_3B_6 b) A_2B_3 c) A_3B_2 d) A_2B
201. The energy of σ $2s$-orbital is greater than σ∗ $1s$ orbital because:
   a) σ $2s$ orbital is bigger than σ∗ $1s$ orbital
   b) σ $2s$ orbital is a bonding orbital whereas, σ∗ $1s$ is an antibonding orbital
   c) σ $2s$ orbital has a greater value of n than σ∗ $1s$ orbital
   d) None of the above
202. The bond angle in ammonia molecule is
   a) $90°3'$ b) $91°8'$ c) $106°45'$ d) $109°28'$
203. The compound in which the number of d p bonds are equal to those present in ClO_4^-
   a) XeF_4 b) XeO_3 c) XeO_4 d) XeF_6
204. The correct order of bond angles (smallest first) in $H_2S, NH_3, BF_3$and SiH_4 is
   a) $H_2S < SiH_4 < NH_3 < BF_3$ b) $NH_3 < H_2S < SiH_4 < BF_3$
   c) $H_2S < NH_3 < SiH_4 < BF_3$ d) $H_2S < NH_3 < BF_3 < SiH_4$
205. A covalent molecule AB_3 has pyramidal structure. The number of lone pair and bond pair of electrons in the molecule are respectively.
   a) 2 and 2 b) 0 and 4 c) 3 and 1 d) 1 and 3
206. Be in $BeCl_2$ undergoes
   a) Diagonal hybridisation b) Trigonal hybridisation
   c) Tetrahedral hybridisation d) No hybridisation
207. Which statement is wrong?
   a) Hybridisation is the mixing of atomic orbitals prior to their combining into molecular orbitals
   b) sp^2-hybrid orbitals are formed from two p-atomic orbitals and one s-atomic orbitals
   c) dsp^2-hybrid orbitals are all at 90° to one another
   d) d^2sp^2-hybrid orbitals are directed towards the corners of a regular tetrahedron
208. In the anion $HCOO^-$ the two carbon-oxygen bonds are found to be of equal length. What is the reason for it?
   a) Electronic orbits of carbon atom are hybridised
   b) The C=O bond is weaker than the $C-O$ bond

c) The anion $HCOO^-$ has two resonating structures
d) The anion is obtained by removal of a proton from the acid molecule

209. Which of the following molecules has three fold axis of symmetry?
a) NH_3 b) C_2H_4 c) CO_2 d) SO_2

210. Oxygen and the oxide ion have the
a) Same proton number b) Same electronic configuration
c) Same electron number d) Same size

211. Valence bond theory of metallic bond was given by
a) Dalton b) Drudel c) Fajan d) Pauling

212. The correct order of second ionisation potential of carbon, nitrogen, oxygen and fluorine is:
a) C > N > O > F b) O > N > F > C c) O > F > N > C d) F > O > N > C

213. The molecule which has T – shaped structure is
a) PCl_3 b) ClF_3 c) NH_3 d) BCl_3

214. As a result of resonance:
a) Bond length decreases
b) Energy of the molecules decreases
c) Stability of the molecule increases
d) All are correct

215. The pair of species with the same bond order is:
a) NO, CO b) N_2, O_2 c) O_2^{2-}, B_2 d) O_2^+, NO^+

216. Which of the following molecules has pentagonal bipyramidal shape?
a) PF_5 b) SF_6I c) XeF_6 d) $[Fe(CN)_6]^{3-}$

217. The number of types of bonds between two carbon atoms in calcium carbide is
a) One sigma, two pi b) One sigma, one pi c) Two sigma, one pi d) Two sigma, two pi

218. The bond angle between H—O—H in ice is closest to:
a) 115° b) $109^\circ 28'$ c) 110° d) 90°

219. If a molecule MX_3 has zero dipole moment the sigma bonding orbitals used by M (at. No. < 21) is:
a) Pure p b) sp-hybrid c) sp^2-hybrid d) sp^3-hybrid

220. Which combination of atoms can form a polar covalent bond?
a) H and H b) H and Br c) N and N d) Na and Br

221. The bond strength in O_2^+, O_2, O_2^- and O_2^{2-} follows the order:
a) $O_2^{2-} > O_2^- > O_2 > O_2^+$ b) $O_2^+ > O_2 > O_2^- > O_2^{2-}$ c) $O_2 > O_2^- > O_2^{2-} > O_2^+$ d) $O_2^- > O_2^{2-} > O_2^+ > O_2$

222. The shape of XeF_4 molecule and hybridisation of xenon in it are
a) Tetrahedral and sp^3 b) Square planar and dsp^2
c) Square planar and sp^3d^2 d) Octahedral and sp^3d^2

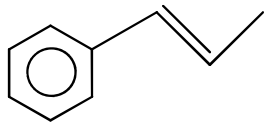
223. In H_2^- ion, the bond order is:
a) Zero b) 1/2 c) -1/2 d) 1

224. H-bonding is not present in:
a) Glycerine b) Water c) H_2S d) HF

225. In which of the following gaseous molecules, the ionic character of the covalent bond is greatest?
a) HCl b) HBr c) HI d) HF

226. The angle between the overlapping of one s-orbital and one p-orbital is:
a) 180° b) 120° c) $109°28'$ d) $120°60'$

227. How many bonds are there in?



a) 14 σ, 8π b) 18 σ, 8π c) 19 σ, 4π d) 14 σ, 2π

228. Which is the correct statement about σ and π molecular orbitals? Statements are

(i) π-bonding orbitals are ungerade
(ii) π-antibonding orbitals are ungerade
(iii) σ-antibonding orbitals are gerade
a) (i) only b) (ii) and (iii) only c) (iii) only d) (ii) only

229. Among the following statement, the correct statement about PH_3 and NH_3 is:
a) NH_3 is a better electron donor because the lone pair of electron occupies spherical *s*-orbital and is less directional
b) PH_3 is a better electron donor because the lone pair of electron occupies sp^3-orbital and is more directional
c) NH_3 is a better electron donor because the lone pair of electron occupies sp^3-orbital and more directional
d) PH_3 is a better electron donor because the lone pair of electron occupies spherical *s*-orbital and is less directional

230. Which is expected to have linear structure?
a) SO_2 b) CO_2 c) CO_3^{2-} d) SO_4^{2-}

231. The bond angle in PH_3 is:
a) Much lesser than NH_3 b) Equal to that in NH_3 c) Much greater than in NH_3 d) Slightly more than in NH_3

232. Carnallite in solution in water shows the properties of
a) K^+, Mg^{2+}, Cl^- b) $K^+, Cl^-, SO_4^{2-}, Br^-$ c) K^+, Mg^{2+}, CO_3^{2-} d) K^+, Mg^{2+}, Cl^-, Br^-

233. A simple of a coordinate covalent bond is exhibited by
a) HCl b) NH_3 c) C_2H_2 d) H_2SO_4

234. In the series ethane, ethylene and acetylene, the C—H bond energy is:
a) The same in all the three compounds
b) Greatest in ethane
c) Greatest in ehtylene
d) Greatest in acetylene

235. In which molecule the van der Waals' force is likely to be the most important in determining the m.p. and b.p.?
a) Br_2 b) CO c) H_2S d) HCl

236. Identify the wrong statement in the following:
a) Atomic radius of the elements increases as one moves down the first group of the periodic table
b) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table
c) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius
d) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius

237. (I)1, 2-dihydroxy benzene
(II) 1, 3-dihydroxy benzene
(III) 1, 4-dihydroxy benzene
(IV) Hydroxy benzene
The increasing order of boiling points of above mentioned alcohols is
a) $I < II < III < IV$ b) $I < II < IV < III$
c) $IV < I < II < III$ d) $IV < II < I < III$

238. Dipole moment is shown by
a) *cis* - 1, 2-dichloro ethane b) *trans*-1, 2-dichloro ethane
c) *trans*-1 2-dichloro-2 peptene d) Both (a) and (c)

239. Compounds formed by sp^3d^2-hybridization will have configuration:
a) Square planar
b) Octahedral
c) Trigonal bipyramidal

d) Pentagonal bipyramidal

240. In which molecular are all atoms coplanar?
a) PF_3 b) NH_3 c) BF_3 d) CH_4

241. The AsF_5 molecule is trigonal bipyramidal.The hybrid orbitals used by the As atoms for bonding are
a) $d_{x^2-y^2}, d_{z^2}, s, P_x, P_y$ b) d_{xy}, s, P_x, P_z c) $s, P_x, P_y, P_z, d_{z^2}$ d) $d_{x^2-y^2}, s, P_x, P_y$

242. The bond order of N_2^+ is
a) 1.5 b) 3.0 c) 2.5 d) 2.0

243. CO_2 is isostructural with
a) C_2H_2 b) $SnCI_2$ c) NO_2 d) $MgCI_2$

244. The compound with the maximum dipole moment among the following is:
a) p-dichlorobenzene b) m-dichlorobenzene c) o-dichlorobenzene d) Carbon tetrachloride

245. Which of the following bonds require the largest amount of energy to dissociate the bond concerned?
a) H—H bond in H_2 b) C—H bond in CH_4 c) $N \equiv N$ bond in N_2 d) $O = O$ bond in O_2

246. The sequence that correctly describes the relative bond strength pertaining to oxygen molecule and its cation or anion is
a) $O_2^{2-} > O_2^- > O_2 > O_2^+$ b) $O_2 > O_2^+ > O_2^- > O_2^{2-}$
c) $O_2^+ > O_2 > O_2^{2-} > O_2^-$ d) $O_2^+ > O_2 > O_2^- > O_2^{2-}$

247. The type of hybridisation in XeF_4 is
a) dsp^2 b) sp^3d c) sp^3d^2 d) sp^3d^3

248. What bond order does Li_2 have?
a) 3 b) 1 c) 2 d) 0

249. Which have zero dipole moment?
a) 1,1-dichloroethene
b) Cis-1, 2-dichloroethene
c) $trans$-1, 2-dichlorothene
d) None of the above

250. Strongest bond is formed by the head on overlapping of:
a) $2s$ -and $2p$ -orbitals b) $2p$- and $2p$-orbitals c) $2s$- and $2s$- orbitals d) All of these

251. Hybridization state of I in ICl_2^+ is :
a) dsp^2 b) sp c) sp^2 d) sp^3

252. Arrange the following compound in order of increasing dipole moment:
Toluene (I) m-dichlorobenzene (II)
o-dichlorobenzene (III) p-dichlorobenzene (IV)
a) I < IV < II < III b) IV < I < II < III c) IV < I < III < II d) IV < II < I < III

253. Which has maximum covalent character?
a) $SiCl_4$ b) $MgCl_2$ c) NaCl d) $AlCl_3$

254. Which species does not exist?
a) $(SnCl_6)^{2-}$ b) $(GeCl_6)^{2-}$ c) $(CCl_6)^{2-}$ d) $(SiCl_6)^{2-}$

255. Among the following which has the highest cation to anion size ratio?
a) CsI b) CsF c) LiF d) NaF

256. The dipole moment of HBr is 1.6×10^{-30} cm and inter – atomic spacing is 1 Å. The % ionic character of HBr is
a) 7 b) 10 c) 15 d) 27

257. When an element of very low ionisation potential is allowed to react with an element of very high electron affinity, we get:
a) A weak ionic bond b) A strong ionic bond c) A polar covalent bond d) No bond

258. Ionization potential is lowest for:
a) Halogens b) Inert gases c) Alkaline earth metals d) Alkali metals

259. The orbitals of same energy level providing the most efficient overlapping are:
a) sp^3-sp^3 b) sp -sp c) sp^2-sp^2 d) All of these

260. The covalent compound HCl has the polar character because:
   a) The electronegativity of hydrogen is greater than that of chlorine
   b) The electronegativity of hydrogen is equal to than that of chlorine
   c) The electronegativity of chlorine is greater than that of hydrogen
   d) Hydrogen and chlorine are gases

261. Identify the non-polar molecule in the set of compounds given
   HCl, HF, H_2, HBr
   a) H_2 b) HCl c) HF, HBr d) HBr

262. Which one of the following compounds has sp^2 hybridisation?
   a) CO_2 b) SO_2 c) N_2O d) CO

263. The increasing order of the ionic radii of the given isoelectronic species is:
   a) $S^{2-}, Cl^-, Ca^{2+}, K^+$ b) $Ca^{2+}, K^+, Cl^-, S^{2-}$ c) $K^+, S^{2-}, Ca^{2+}, Cl^-$ d) $Cl^-, Ca^{2+}, K^+, S^{2-}$

264. Which cannot exist on the basis of M.O. theory?
   a) C_2 b) He_2^+ c) H_2^+ d) He_2

265. Which of the following does not involve covalent bond?
   a) PH_3 b) CsF c) HCl d) H_2S

266. $B_{10}C_2H_{12}$ is isoelectronic with
   a) $B_{12}H_{12}^{2-}$ b) $B_{12}H_{12}$ c) $B_{12}H_{12}^{+}$ d) $B_{12}H_{12}^{2+}$

267. The electronegativity of A and B are 1.20 and 4.0 respectively. Therefore, ionic character in $A-B$ bond will be
   a) 50% b) 43% c) 53.3% d) 72.23%

268. During the formation of a chemical bond
   a) Electron-electron repulsion becomes more than the nucleus-electron repulsion attraction
   b) Energy of the system does not change
   c) Energy increases
   d) Energy decreases

269. The number of ions formed when a molecule of $K_4Fe(CN)_6$ dissociates is:
   a) 4 b) 5 c) 6 d) 2

270. Pair of species having identical shapes for molecules is
   a) CF_4, SF_4 b) BF_3, PCl_3 c) XeF_2, CO_2 d) PF_5, IF_7

271. An example of a polar covalent compound is
   a) KCl b) NaCl c) CCl_4 d) HCl

272. Which is not an exception to octet rule?
   a) BF_3 b) $SnCl_4$ c) BeI_2 d) ClO_2

273. The molecules having dipole moment are:
   a) 2, 2-dimethylpropane
   b) *Trans*-3-hexene
   c) *Trans*-2-pentene
   d) 2, 2, 3, 3-tetramethylbutane

274. Which of the following species has a bond order other than 3?
   a) CO b) CN^- c) NO^+ d) O_2^+

275. Which of the following is planar?
   a) XeF_2 b) XeO_3F c) XeO_2F_2 d) XeF_4

276. Among the following species, identify the pair having same bond order CN^-, O_2^-, NO^+, CN^+
   a) CN^- and O_2^- b) O_2^- and NO^+ c) CN^- and NO^+ d) CN^- and CN^+

277. The bond angle and dipole moment of water respectively, are
   a) 109.5°, 1.84 D b) 107.5°, 1.56 D c) 104.5°, 1.84 D d) 102.5°, 1.56 D

278. The correct order of increasing bond angles in the following species is:
   a) $Cl_2O < ClO_2 < ClO_2^-$ b) $ClO_2 < Cl_2O < ClO_2^-$ c) $Cl_2O < ClO_2^- < ClO_2$ d) $ClO_2^- < Cl_2O < ClO_2$

279. Which compound shows hydrogen bonding?
   a) RCH_2NHCH_3 b) RCH_2CHO c) C_2H_6 d) HCl

280. Chlorine atom differs from chloride ion in the number of:
    a) Protons
    b) Neutrons
    c) Electrons
    d) Protons and electrons
281. What is the reason for unusual high b.p. of water?
    a) Due to the presence of H^+ and OH^- ions in water
    b) Due to dipole – dipole interactions
    c) Due to London forces
    d) Strong London Forces
282. The increasing order of the first ionization enthalpies of the elements B, P, S and F (lower first) is:
    a) F < S < P < B b) P < S < B < F c) B < P < S < F d) B < S < P < F
283. The IP_1, IP_2, IP_3, IP_4, and IP_5 of an element are 7.1, 14.3, 34.5, 46.8, 162.2 eV respectively. The element is likely to be:
    a) Na b) Si c) F d) Ca
284. Which of the following is paramagnetic?
    a) B_2 b) C_2 c) N_2 d) F_2
285. Ionization potential of Na would be numerically the same as:
    a) Electron affinity of Na^+
    b) Electronegativity of Na^+
    c) Electron affinity of He
    d) Ionization potential of Mg
286. Which one of the following conversions involve change in both hybridisation and shape?
    a) $CH_4 \longrightarrow C_2H_6$ b) $NH_3 \longrightarrow NH_4^+$ c) $BF_3 \longrightarrow BF_4^-$ d) $H_2O \longrightarrow H_3O^+$
287. According to MO theory,
    a) O_2^+ is paramagnetic and bond order greater than O_2
    b) O_2^+ is paramagnetic and bond order less than O_2
    c) O_2^+ is diamagnetic and bond order is less than O_2
    d) O_2^+ is diamagnetic and bond order is more than O_2
288. If the molecule of HCl were totally polar, the expected value of dipole moment is 6.12 D (dbye), but the experimental value of dipole moment was 1.03 D. Calculate the percentage ionic character
    a) 17 b) 83 c) 50 d) Zero
289. The order of first electron affinity of O, S and Se is:
    a) O > S > Se b) S > O > Se c) Se > O > S d) Se > S > O
290. The nodal plane in the π-bond of ethane is located in:
    a) The molecular plane
    b) A plane parallel to the molecular plane
    c) A plane perpendicular to the molecular plane which bisects the carbon-carbon σ-bond at right angle
    d) A plane perpendicular to the molecular plane which contains the carbon-carbon σ-bond
291. The correct electronegativity order is:
    a) C, N, Si, P b) N, Si, C, P c) Si, P, C, N d) P, Si, N, C
292. The pair of species having identical shapes for molecules of both species is
    a) CF_4, SF_4 b) XeF_2, CO_2 c) BF_3, PCl_3 d) PF_5, IF_5
293. Amongst the following, the molecule that is linear is
    a) SO_2 b) CO_2 c) ClO_2 d) NO_2
294. Using MO theory predict which of the following species has the shortest bond length?
    a) O_2^{2+} b) O_2^+ c) O_2^- d) O_2^{2-}
295. The hybridisation of carbon atom in benzene is?
    a) sp b) sp^2 c) sp^3 d) dsp^2
296. Bond angle between two hybrid orbitals is 105°. Hybrid character orbital is:
    a) Between 20-21% b) Between 19-20% c) Between 21-22% d) Between 22-23%
297. KF combines with HF to form KHF_2. The compound contains the species:

a) K^+, F^- and H^+ b) K^+, F^- and HF c) K^+ and $[HF_2]^-$ d) $[KHF]^+$ and F^-

298. *o*-hydroxy benzaldehyde, although contains enolic group but does not give test of group with $FeCl_3$ because:
a) It is steam volatile
b) Of intermolecular H-bonding
c) Of intramolecular H-bonding
d) All of the above

299. Iron is tougher than sodium because:
a) Iron atom is smaller
b) Iron atoms are more closely packed
c) Metallic bonds are stronger in iron
d) None of the above

300. Correct order of bond angles in NH_3, PCl_3 and BCl_3 is
a) $PCl_3 > NH_3 > BCl_3$ b) $NH_3 > BCl_3 > PCl_3$
c) $NH_3 > PCl_3 > BCl_3$ d) $BCl_3 > NH_3 > PCl_3$

301. The number of π - bonds present in propyne is
a) 4 b) 1 c) 3 d) 2

302. A bond with maximum covalent character between non-metallic elements is formed:
a) Between identical atoms
b) Between chemically similar atoms
c) Between atoms of widely different electro-negativities
d) Between atoms of the same size

303. The compound in which underlined carbon uses only its sp^3 hybrid orbitals for bond formation is
a) $CH_3\underline{C}OOH$ b) $CH_3\underline{C}ONH_2$ c) $CH_3\underline{C}H_2OH$ d) $CH_2\underline{C}H = CH_2$

304. Consider the following compounds
(i) chloroethene (ii) benzene
(iii) 1, 3-butadiene (iv) 1,3,5 – hexatriene
All the carbon atoms are sp^2 hybridised in
a) (i), (iii), (iv) only b) (i), (ii) only c) (ii), (ii), (iv) only d) (i), (ii), (iii) and (iv)

305. When ionic compounds get dissolved in water:
a) They involve heat changes
b) Inter-ionic attraction is reduced
c) Ions show dipole-ion attraction with water molecules
d) All are correct

306. Pick the odd one out (The one having zero dipole moment):
a) NH_3 b) H_2O c) BCl_3 d) SO_2

307. Which of the following shows minimum bond angle?
a) H_2O b) H_2Se c) H_2S d) H_2Te

308. Among the following isostructural compounds, identify the compound which has the highest lattice energy
a) LiF b) LiCl c) NaCl d) MgO

309. Which species is diamagnetic in nature?
a) He_2^+ b) H_2 c) H_2^+ d) H_2^-

310. Which of the following compounds would have the highest boiling point?
a) $CH_3CH_2CH_2CH_3$ b) CH_3NH_2 c) CH_3OH d) CH_2F_2

311. Hybridisation of central atom in NF_3 is
a) sp^3 b) sp c) sp^2 d) dsp^2

312. Which of the compounds has highest boiling point?
a) Acetone b) Diethyl ether c) Methanol d) Ethanol

313. The number and type of bonds between two carbon atoms in CaC_2 are:
a) One sigma (σ) and one pi (π)-bond

b) One sigma (σ) and two pi (π)-bonds
c) One sigma (σ) and one and a half pi (π)-bond
d) One sigma (σ) bond

314. Which of the following hydrogen bonds are strongest in vapour phase?
a) HF---HF b) HF---HCl c) HCL---HCl d) HF---Hi

315. The bond angle and hybridization in ether (CH_3OCH_3) is:
a) $106^\circ 51', sp^3$ b) $104^\circ 31', sp^3$ c) $110^\circ, sp^3$ d) None of these

316. Which has the highest bond energy?
a) Hydrogen bond b) Triple bond c) Double bond d) Single bond

317. Among the following compounds the one that is polar and has central atom with sp^2-hybridisation is:
a) H_2CO_3 b) SiF_4 c) BF_3 d) $HClO_2$

318. The incorrect statement among the following is:
a) The first ionization potential of Al is less than the first ionization potential of Mg
b) The second ionization potential of Mg is greater than the second ionization potential of Na
c) The first ionization potential of Na is less than the first ionization potential of Mg
d) The third ionization potential of Mg is greater than the third ionization potential of Al

319. The bond angle is smallest in
a) H_2O b) H_2S c) $BeCl_2$ d) N_2O

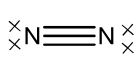
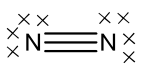
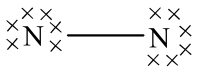
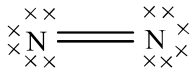
320. The number of electrons in the valence shell of sulphur in SF_6 is
a) 12 b) 10 c) 8 d) 11

321. Acetic acid exists as dimer in benzene due to:
a) Condensation reaction
b) Hydrogen bonding
c) Presence of carboxyl group
d) Presence of hydrogen atom at α-carbon

322. The correct order of hybridization of the central atom in the following species NH_3, $[PtCl_4]^{2-}$, PCl_5 and BCl_3 is:
a) dsp^2, dsp^3, sp^2, sp^3 b) sp^3, dsp^2, dsp^3, sp^2 c) dsp^2, sp^2, sp^3, dsp^3 d) dsp^2, sp^3, sp^2, dsp^3

323. Chemical bond formation takes place when?
a) Energy is absorbed
b) Forces of attraction overcome forces of repulsion
c) Forces of repulsion overcome forces of attraction
d) Forces of attraction are equal to forces of repulsion

324. NH_3 has higher boiling point than expected, because:
a) With water it forms NH_4OH
b) It has strong intermolecular hydrogen bonds
c) It has strong intermolecular covalent bonds
d) Its density decreases in freezing

325. Which of the following represents the Lewis structure of N_2 molecule?
a)  b)  c)  d) 

326. Which of the following has a bond order of 1.75?
a) ClO_3^- b) ClO_4^- c) NO_3^- d) CO_3^{2-}

327. Higher is the bond order, greater is:
a) Bond dissociation energy
b) Covalent character
c) Bond length
d) Paramagnetism

328. Which has the highest ionisation potential?

a) Na b) Mg c) C d) F

329. Strongest bond is in:
a) NaCl b) CsCl c) Both (a) and (b) d) None of these

330. Which of the following is not correct with respect to bond length of the species?
a) $C_2 > C_2^{2-}$ b) $B_2^+ > B_2$ c) $Li_2^+ > Li_2$ d) $O_2 > O_2^-$

331. The bond order in O_2^{2-} ion is
a) 3 b) 2 c) 3/2 d) 1

332. Which is likely to have the highest melting point?
a) He b) CsF c) NH_3 d) $CHCl_3$

333. Which of the following are not correct?
a) Lone pair of electrons present on central atom can give rise to dipole moment
b) Dipole moment is vector quantity
c) CO_2 molecule has dipole moment
d) Difference in electronegativities of combining atoms can lead to dipole moment

334. In the formation of N_2^+ from N_2, the electron is lost from:
a) a σ-orbital b) a π-orbital c) a σ^*-orbital d) a π^*-orbital

335. Bond angle of 109°28′ is found in
a) NH_3 b) H_2O c) $\overset{\oplus}{C}H_5$ d) $\overset{\oplus}{N}H_4$

336. The half of the difference between the number of electrons in bonding molecular orbitals and antibonding molecular orbitals is known as:
a) Bond order b) Proton order c) Molecular order d) Electron order

337. Which of the following set contains species having same angle around the central atom?
a) SF_4, CH_4, NH_3 b) NF_3, BCl_3, NH_3 c) $BF_3, NF_3, AlCl_3$ d) BF_3, BCl_3, BBr_3

338. At ordinary temperature and pressure, among halogens, the chlorine is a gas, bromine is a liquid and iodine is a solid. This is because:
a) The specific heat is in the order $Cl_2 > Br_2 > I_2$
b) Intermolecular forces among molecules of chlorine are the weakest and those in iodine are the strongest
c) The order of density is $I_2 > Br_2 > Cl_2$
d) The order of stability is $Cl_2 > Br_2 > I_2$

339. Which of the following has lowest bond angle?
a) BeF_2 b) H_2O c) NH_3 d) CH_4

340. Which of the following has shortest carbon-carbon bond length?
a) C_6H_6 b) C_2H_6 c) C_2H_4 d) C_2H_2

341. Which one of the following constitutes a group of the isoelectronic species?
a) C_2^{2-}, O_2^-, CO, NO b) $NO^+, C_2^{2-}, CN^-, N_2$ c) $CN^-, N_2, O_2^{2-}, CO_3^{2-}$ d) N_2, O_2^-, NO^+, CO

342. The sp^3d^2 hybridisation of central atom of a molecule would lead to
a) Square planar geometry
b) Tetrahedral geometry
c) Trigonal bipyramidal geometry
d) Octahedral geometry

343. Methanol and ethanol are miscible in water due to:
a) Covalent character
b) Hydrogen bonding character
c) Oxygen bonding character
d) None of the above

344. The shape of ClF_3 is
a) Distorted T- shape b) Pyramidal c) Tetrahedral d) Trigonal planar

345. Which are true statements among the following?

(1) PH_5 and $BiCl_5$ does not exist
(2) $p\pi$—$d\pi$ bonds are present in SO_2
(3) Electrons travel with speed of light
(4) SeF_4 and CH_4 has same shape
(5) I_3^+ has bent geometry

a) 1, 3 b) 1, 2, 5 c) 1, 3, 5 d) 1, 2, 4

346. The actual geometry of NO_2^- is
a) Planar b) Linear c) V-shape d) Tetrahedral

347. Which has the lowest anion to cation size ratio?
a) LiF b) NaF c) CsI d) CsF

348. The energy change accompanying the process given below is,
$Na^+(g) + Cl^-(g) \longrightarrow NaCl(s)$:
a) Hydration energy b) Ionization energy c) Electron affinity d) Lattice energy

349. Which of the following has covalent bond?
a) Na_2S b) $AlCl_3$ c) NaH d) $MgCl_2$

350. The correct order in which the $O-O$ bond length increases in the following is
a) $O_2 < O_3 < H_2O_2$ b) $H_2O_2 < O_3 < O_2$ c) $O_3 < O_2 < H_2O_2$ d) $O_2 < H_2O_2 < O_3$

351. N_2 is less reactive than CN^- due to
a) Difference in spin quantum number b) Presence of more electrons in orbitals
c) Absence of dipole moment d) None of the above

352. According to molecular orbital theory for O_2^+:
a) Bond order is less than O_2 and O_2^+ is paramagnetic
b) Bond order is more than O_2 and $O_2^+$is paramagnetic
c) Bond order is less than O_2 and $O_2^+$is diamagnetic
d) Bond order is more than O_2 and O_2^+ is diamagnetic

353. As compared to covalent compounds, electrovalent compounds generally have:
a) Low melting points and low boiling points
b) High melting points and high boiling points
c) Low melting points and high boiling points
d) High melting points and low boiling points

354. Which is present in peroxides?
a) O_2 b) O^{2-} c) O_2^{2-} d) O_2^-

355. Two hybrid orbitals have a bond angle of 120°. The percentage of*s* character in the hybrid orbital is nearly
a) 25% b) 33% c) 50% d) 66%

356. Which molecule is T-shaped?
a) BeF_2 b) BCl_3 c) NH_3 d) ClF_3

357. Which of the following is paramagnetic?
a) O_2 b) CN^- c) CO d) NO^+

358. Dipole moment is highest for:
a) $CHCl_3$ b) CH_4 c) CHF_3 d) CCl_4

359. Which will not conduct electricity?
a) Aqueous KOH solution b) Fused NaCl c) Graphite d) KCl in solid state

360. The ionization potential order for which set is correct?
a) Li > K > Cs b) B > Li > K c) Cs > Li > B d) Cs < Li < K

361. The bond that determines the secondary structure of a protein is:
a) Coordinate bond b) Covalent bond c) Hydrogen bond d) Ionic bond

362. Molecular orbital theory was developed mainly by
a) Pauling b) Mulliken c) Thomson d) Pauling and Slater

363. Which species has lone pair on central atom?
a) CCl_4 b) CH_4 c) NH_4^+ d) H_2O

364. In which of the following molecules/ions are all the bonds not equal?
a) SF_4 b) SiF_4 c) XeF_4 d) BF_4^-

365. Super octet molecule is:
a) F_3Cl b) PCl_3 c) NH_3 d) None of these

366. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is:
a) 4 b) 1 c) 2 d) 3

367. Which of the following statement is not correct?
a) Hybridisation is the mixing of atomic orbitals prior to their combining into molecular orbitals
b) sp^2hybrid orbitals are formed from two p-atomic orbitals and one s-orbital
c) d^2sp^3 hydride orbitals are directed towards the corners of a regular octahedron
d) dsp^3hybrid orbitals are all at 90° to one another

368. Which statement is correct?
a) Pi-bond always exists with sigma-bond
b) Pi-bond can exist independently
c) Sigma-bond is weaker than pi-bond
d) Pi-bond is less reactive than sigma-bond

369. Which of the following pair has same structure?
a) PCl_5 and SF_6 b) SO_2 and NH_3 c) PH_3 and BCl_3 d) NH_4^+ and SO_4^{2-}

370. Which of the following has dipole moment?
a) CO_2 b) p-dichlorobenzene c) NH_3 d) CH_4

371. Which one of the following is highest melting halide?
a) AgCl b) AgBr c) AgF d) AgI

372. The hybridisation state of central atom in PCl_5 is
a) sp^3d b) sp^3d^2 c) sp^3 d) d^2sp^3

373. The correct order of increasing bond angles in the following triatomic species is:
a) $NO_2^- < NO_2 < NO_2^+$ b) $NO_2^+ < NO_2 < NO_2^-$ c) $NO_2^+ < NO_2^- < NO_2$ d) $NO_2^- < NO_2^+ < NO_2$

374. $K^+, Cl^-, Ca^{2+}, S^{2-}$ ions are isoelectronic. The decreasing order of their size is:
a) $S^{2-} > Cl^- > K^+ > Ca^{2+}$
b) $Ca^{2+} > K^+ > Cl^- > S^{2-}$
c) $K^+ > Cl^- > Ca^{2+} > S^{2-}$
d) $Cl^- > S^{2-} > Ca^{2+} > K^+$

375. As the s-character of hybridization orbitals increases, the bond angle:
a) Increases b) Decreases c) Does not change d) Becomes zero

376. $AlCl_3$ is covalent while AlF_3 is ionic. This fact can be justified on the basis of
a) Valence bond theory b) Crystal structure c) Lattice energy d) Fajan rule

377. Which one of the following is a correct set with respect to molecule, hybridisation and shape?
a) $BeCl_2, sp^2$, linear
b) $BeCl_2, sp^2$, triangular planar
c) BCl_3, sp^2, triangular planar
d) BCl_3, sp^3, tetrahedral

378. In BrF_3 molecule, the lone pairs occupy equatorial positions to minimize
a) Lone pair – bond pair repulsion only
b) Bond pair – bond pair repulsion only
c) Lone pair – lone pair repulsion and lone pair – bond pair repulsion
d) Lone pair – lone pair repulsion only

379. The correct order of decreasing polarity is
a) $HF > SO_2 > H_2O > NH_3$
b) $HF > H_2O > SO_2 > NH_3$
c) $HF > NH_3 > SO_2 > H_2O$
d) $H_2O > NH_3 > SO_2 > HF$

380. The process requiring the absorption of energy is:
a) $F - F^-$ b) $H \rightarrow H^-$ c) $Cl \rightarrow Cl^-$ d) $O \rightarrow O^{2-}$

381. In O_2^-, O_2 and O_2^{2-} molecular species, the total number of antibonding electrons respectively are

a) 7 , 6, 8 b) 1, 0, 2 c) 6, 6, 6 d) 8, 6, 8

382. sp^3 hybridisation is found in

a) CO_3^{2-} b) BF_3 c) NO_3^- d) NH_3

383. Among the following metals interatomic forces are probably weakest in:

a) Cu b) Ag c) Zn d) Hg

384. Which of the following phenomenon will occur when two atoms of an element with same spin of electron in orbitals approach each other?

a) Orbitals will overlap
b) Orbitals will not overlap
c) Bonding will take place
d) A diatomic molecule will be formed

385. If the bond has zero per cent ionic character, the bond is:

a) Pure covalent b) Partial covalent c) Partial ionic d) Coordinate covalent

386. Which bond angle θ would result in the maximum dipole moment for the triatomic molecule yxy?

a) $\theta = 90°$ b) $\theta = 120°$ c) $\theta = 150°$ d) $\theta = 180°$

387. The species having bond order different from that in CO is

a) NO^- b) NO^+ c) CN^- d) N_2

388. The species having octahedral shape is:

a) SF_6 b) BF_4^- c) PCl_5 d) BO_3^{3-}

389. The following compounds have been arranged in order of their increasing thermal stabilities. Identify the correct order:

K_2CO_3 (I) $MgCO_3$ (II)
$CaCO_3$ (III) $BeCO_3$ (IV)

a) I < II < III < IV b) IV < II < III < I c) IV < II < I < III d) II < IV < III < I

390. Which of the following will show least dipole moment?

a) Ethane b) Ether c) Ethanol d) Water

391. Which has the minimum bond energy?

a) H—Br b) H—I c) I—I d) H—H

392. The polarising ability of which one of the following is highest?

a) Small highly positive ion
b) Large positive ion
c) Small highly negative ion
d) Large negative ion

393. Which is expected to show paramagnetism?

a) ClO_2 b) SO_2 c) CO_2 d) SiO_2

394. Highest covalent character is found in which of the following?

a) CaF_2 b) $CaCl_2$ c) CaI_2 d) $CaBr_2$

395. The molecule which has zero moment is

a) CH_3Cl b) NF_3 c) BF_3 d) ClO_2

396. Hydrogen bond is strongest in

a) S——H-----O b) O——H-----S c) F——H-----F d) O——H-----N

397. The only molecule having dipole moment is

a) 2,2-dimethylpropane
b) *trans*-2-pentene
c) *trans*-3-hexene
d) 2,2,3,3-tetramethylbutane

398. Two lone pairs of electrons and two bond pairs are present in:

a) NH_3 b) BF_3 c) CO_3^{2-} d) NH_2^-

399. The lattice enthalpy and hydration enthalpy of four compounds are given below.

Compound	Lattice	Hydration

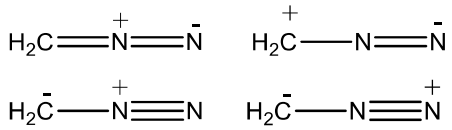
	enthalpy (in kJ mol^{-1})	enthalpy (in kJ mol^{-1})
P	+780	-920
Q	+1012	-812
R	+828	-878
S	+632	-600

The pair of compounds which is soluble in water is

a) $P$and Q b) $Q$and R c) $R$and S d) $P$and R

400. The increase in bond order results in:
   a) Decrease in bond length and increase in bond energy
   b) Decrease in bond length and bond energy
   c) Increase in bond length and bond energy
   d) None of the above

401. The correct stability order of the following resonance structure is



a) (I)> (II) > (IV) > (III) b) (I)> (III) > (II) > (IV)

c) (II)> (I) > (III) > (IV) d) (III)> (I) > (IV) > (II)

402. Which is not characteristic of π-bond?
   a) π-bond is formed when a sigma bond already formed
   b) π-bond is formed from hybrid orbitals
   c) π-bond may be formed by the overlapping of p-orbitals
   d) π-bond results from lateral overlap of atomic orbitals

403. A molecule in which sp^2-hybrid orbitals are used by the central atom in forming covalent bond is:
   a) He_2 b) SO_2 c) PCl_5 d) N_2

404. Which species has the highest bond order?
   a) O_2 b) O_2^{2-} c) N_2 d) Both O_2 and O_2^{2-}

405. Molecular shapes of SF_4, CF_4, XeF_4 are
   a) The same with 2, 0 and 1 lone pair of electron respectively
   b) The same with 1, 1 and 1 lone pair of electrons respectively
   c) Different with 0, 1 and 2 lone pair of electrons respectively
   d) Different with 1, 0 and 2 lone pair of electrons respectively

406. The correct sequence of hybridisation of methane, ethene and acetylene is
   a) sp, sp^2, sp^3 b) sp^2, sp^3, sp c) sp^3, sp^2, sp d) sp^3, sp, sp^2

407. The nature of the bond in diamond is
   a) Ionic b) Covalent c) Metallic d) Coordinate covalent

408. The set representing the correct order of first ionization potential is:
   a) K > Na > Li b) Be > Mg > Ca c) B > C > N d) Ge > Si > C

409. Amongst the following, the molecule that is linear is
   a) SO_2 b) BeH_2 c) ClO_2 d) NO_2

410. Which of the following species does not exist under normal conditions?
   a) Be^{2+} b) Be_2 c) B_2 d) Li_2

411. How many σ and π – bonds are present in toluene?
   a) 3π + 8σ b) 3π + 10σ c) 3π + 15σ d) 6π + 3σ

412. Octet rule is not valid for the molecule:
   a) CO_2 b) H_2O c) O_2 d) CO

413. CO_2 has the same geometry as:
(A) $HgCl_2$, (B) NO_2, (C) $SnCl_4$, (D) C_2H_2
a) A and C b) B and D c) A and D d) C and D

414. Concept of bond order in the molecular orbital theory depends on the number of electrons in the bonding and antibonding orbitals. The bond order:
a) Can have a −ve value
b) Has always an integral value
c) Is a non-zero quantity
d) Can assume any +ve value, including zero

415. The number of σ and π-bonds in pent-4-en-1-yne are respectively:
a) 3, 10 b) 9, 4 c) 4, 9 d) 10, 3

416. The Cl—C—Cl angle in 1, 1, 2, 2-tetrachloroethene and tetrachloromethane respectively will be about:
a) 109.5° and 900° b) 120° and 109.5° c) 90° and 109.5° d) 109.5° and 120°

417. Which set has strongest tendency to form anions?
a) Ga, In, Te b) Na, Mg, Al c) N, O, F d) V, Cr, Mn

418. From elementary molecular orbital theory we can give the electronic configuration of the singly positive nitrogen molecular ion N_2^+ as
a) $l\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \pi 2p^4, \sigma 2p^1$ b) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^2, \pi 2p^3$
c) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^3, \pi 2p^2$ d) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^2, \pi 2p^4$

419. NH_3 has much higher boiling point than PH_3 because
a) NH_3 has larger molecular weight
b) NH_3 undergoes umbrella inversion
c) NH_3 forms hydrogen bond
d) NH_3 contains ionic bonds whereas PH_3 contains covalent bonds

420. In a crystal, the atoms are located at the positions of:
a) Maximum potential energy
b) Minimum potential energy
c) Zero potential energy
d) Infinite potential energy

421. Which substance has the greatest ionic character?
a) Cl_2O b) NCl_3 c) $PbCl_2$ d) $BaCl_2$

422. The conductivity of the metal decreases with increases in temperature because
a) The kinetic energy of the electron increases
b) The movement of electrons becomes haphazard
c) The kernels start vibrating
d) The metal becomes hot and starts emitting radiations

423. Which of the following when dissolved in water forms a solution, *i.e.*, non-conducting?
a) Chile salt petre b) Potash alum
c) Green vitriol d) Ethyl alcohol

424. Which bond is more polar?
a) Cl—Cl b) N—F c) C—F d) O—F

425. The pairs of bases in DNA are held together by:
a) Hydrogen bonds b) Ionic bonds c) Phosphate groups d) Deoxyribose groups

426. Which of the following has highest bond angle?
a) H_2O b) H_2S c) NH_3 d) PH_3

427. The compound in which carbon atom uses only sp^3 - hybrid orbitals for bond formation is
a) HCOOH b) NH_2CONH_2 c) $(CH_3)_3COH$ d) CH_3CHO

428. For the type of interactions; (I) Covalent bond, (II) van der Waals' forces, (III) Hydrogen bonding, (IV) Dipole-dipole interaction, which represents the correct order of increasing stability?
a) (I) < (III) < (II) < (IV)

b) (II) < (III) < (IV) < (I)
c) (II) < (IV) < (III) < (I)
d) (IV) < (II) < (III) < (I)

429. If the ionization potential for hydrogen atom is 13.6 eV, then the ionization potential for He^+ ion should be:
a) 72.2 eV b) 54.4 eV c) 6.8 eV d) 13.6 eV

430. The hydrogen bonding is strongest in:
a) O—H ... S b) S—H ... O c) F—H ... F d) F—H ... O

431. The correct increasing order of polarising power is:
a) $Ca^{2+} < Mg^{2+} < Be^{2+} < K^+$
b) $Mg^{2+} < Be^{2+} < K^+ < Ca^{2+}$
c) $Be^{2+} < K^+ < Ca^{2+} < Mg^{2+}$
d) $K^+ < Ca^{2+} < Mg^{2+} < Be^{2+}$

432. Acetate ion contains:
a) One C, O single bond and one C, O double bond
b) Two C, O single bonds
c) Two C, O double bonds
d) None of the above

433. Which one is paramagnetic and has the bond order half (0.5)?
a) F_2 b) N_2 c) O_2 d) H_2^+

434. Which one is correct?
a) Dinitrogen is paramagnetic
b) Dihydrogen is paramagnetic
c) Dioxygen is paramagnetic
d) Dioxygen is diamagnetic

435. IP is influenced by:
a) Size of atom
b) Charge on nucleus
c) Electrons present in inner shells
d) All of the above

436. The hybridization of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ are:
a) sp, sp^3 and sp^2 respectively
b) sp, sp^2 and sp^3 respectively
c) sp^2, sp and sp^3 respectively
d) sp^2, sp^3 and sp respectively

437. The bond between carbon atoms (1) and (2) in compound $N \equiv C - CH = CH_2$,
(1) (2)
involves the hybrid orbitals;
a) sp^2, sp^3 b) sp, sp^2 c) sp, sp^3 d) sp, sp

438. Which of the following has lowest boiling point?
a) NaCl b) CuCl c) $CuCl_2$ d) CsCl

439. When metals react with non-metals, the metal atoms tend to
a) Share electrons b) Lose electrons c) Gain electrons d) None of the above

440. Which one has more tendency to form covalent compounds?
a) Ba b) Be c) Mg d) Ca

441. The order of melting point of *ortho, para, meta*-nitrophenol is
a) $o > m > p$ b) $p > m > o$ c) $m > p > o$ d) $p > o > m$

442. Number of non-bonding electron pair on Xe in XeF_6, XeF_4 and XeF_2 respectively will be
a) 6, 4, 2 b) 1, 2, 3 c) 3, 2, 1 d) 0, 3, 2

443. The hybridization of carbon in diamond, graphite and acetylene is:

a) sp^3, sp^2, sp b) sp^3, sp, sp^2 c) sp^2, sp^3, sp d) $sp, sp^3 sp^2$

444. The molecule, ion which is pyramidal in shape is

a) NO_3^- b) PCl_3 c) CO_3^{2-} d) SO_3

445. The number of lone pairs of Xe in XeF_2, XeF_4 and XeF_6 respectively are

a) 3, 2, 1 b) 2, 4, 6 c) 1, 2, 3 d) 6, 4, 2

446. The electronic structure of the four elements A, B, C and D are, $(A) = 1s^2$; $(B) = 1s^2, 2s^2 2p^2$; $(C) = 1s^2, 2s^2 2p^5$; $(D) = 1s^2, 2s^2 2p^6$.
The tendency to form electrovalent bond is maximum in:

a) A b) B c) C d) D

447. C − C bond order in benzene is

a) 1 b) 2 c) Between 1 and 2 d) None of these

448. For the formation of covalent bond, the difference in the value of electronegativities should be:

a) Equal to or less than 1.7
b) More than 1.7
c) 1.7 or more
d) None of the above

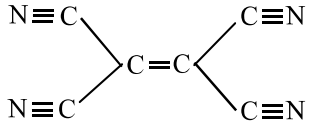
449. Which among the following elements has lowest value of ionisation energy?

a) Pb b) Sn c) Si d) C

450. In coordinate bond, the acceptor atoms must essentially contain in its valency shell an orbitals:

a) With paired electron b) With single electron c) With no electron d) With three electrons

451. How many σ-and π-bonds are there in the molecule of tetracyanoethylene?



a) Nine σ- and nine π b) Five σ- and nine π c) Nine σ- and seven π d) Five σ- and eight π

452. Paramagnetism of oxygen is explained on the basis of its electronic configuration of

a) $\left(\overset{*}{\pi}2p_x\right)^1\left(\pi 2p_y\right)^1$ b) $\left(\overset{*}{\pi}2p_y\right)^1\left(\overset{*}{\pi}2p_z\right)^1$ c) $\left(\overset{*}{\sigma}2s\right)^1\left(\pi 2p_y\right)^1$ d) $\left(\overset{*}{\sigma}2s\right)^1\left(\pi 2p_y\right)^1$

453. The compound possessing most strongly ionic nature is:

a) $SrCl_2$ b) $BaCl_2$ c) $CaCl_2$ d) CsCl

454. The complex ion which has no 'd' electrons in the central metal atom is:

a) $[MnO_4]^-$ b) $[Co(NH_3)_6]^{3+}$ c) $[Fe(CN)_6]^{3-}$ d) $[Cr(H_2O)_6]^{3+}$

455. Which of the following species is least stable?

a) O_2 b) O_2^+ c) O_2^- d) O_2^{2-}

456. The dipole moment of HBr is 1.6×10^{-30}C-m and interatomic spacing is 1Å. The % ionic character of HBr is

a) 7 b) 10 c) 15 d) 27

457. Which group of atoms have nearly same atomic radius?

a) Na, K, Rb, Cs b) Li, Be, B, C c) Fe, Co, Ni, Cu d) F, Cl, Br, I

458. Bond polarity of diatomic molecule is because of

a) Difference in electron affinity of the two atoms
b) Difference in electronegativities of the two atoms
c) Difference in ionisation potential
d) All of the above

459. The hybridization of P in PO_4^{3-} is same as in:

a) I in ICl_4^- b) S in SO_3 c) N in NO_3^- d) S in SO_4^{2-}

460. AB is an ionic solid. The ionic radii of A^+ and B^+ are respectively r_c and r_a. Lattice energy of AB is proportional to

a) $\frac{r_c}{r_a}$ b) $(r_c + r_a)$ c) $\frac{r_a}{r_c}$ d) $\frac{1}{(r_c + r_a)}$

461. Which contains a coordinate and covalent bond?
a) $BaCl_2$ b) NH_4Cl c) HCl d) H_2O

462. Covalent radius of Li is 123 pm. The crystal radius of Li will be:
a) > 123 pm b) < 123 pm c) $+ 123$ pm d) $= \frac{123}{2}$ pm

463. Which of the following does not contain coordinate bond?
a) BH_4^- b) NH_4^+ c) CO_3^{2-} d) H_3O^+

464. The bond order of C_2^+ is:
a) 1 b) 2 c) 3/2 d) 1/2

465. With increasing bond order, stability of a bond
a) Increases b) Decreases c) Remains unaltered d) None of these

466. Molecular orbitals theory was proposed by:
a) Werner b) Kossel c) Moseley d) Mullikan

467. The isoelectronic pair is
a) Cl_2O, ICl_2^- b) Cl_2^-, ClO_2 c) IF_2^+, I_3^- d) ClO_2^-, ClF_2^+

468. The compound 1,2-butadiene has
a) sp, sp^2 and sp^3 hybridised carbon atoms b) Only sp^2 hybridised carbon atoms
c) Only sp hybridised carbon atoms d) Only sp and sp^2 hybridised carbon atoms

469. The correct order of ionic radii is:
a) $Fe > Fe^{2+} > Fe^{3+}$ b) $O^{2-} > O^- > O^+$ c) $I^- > I > I^+$ d) All of these

470. The shape of sulphate ion is
a) Square planar b) Trigonal c) Trigonal planar d) Tetrahedral

471. Molecular shape of SF_4, CF_4 and XeF_4 are:
a) The same with 2, 0 and 1 lone pair of electrons respectively
b) The same with 1, 1 and 1 lone pair of electrons respectively.
c) Different with 0, 1 and 2 lone pairs of electrons respectively.
d) Different with 1, 0 and 2 lone pairs of electrons respectively.

472. Which of the following is sp^3 hybridised?
a) NH_3 b) BH_3 c) PCl_5 d) $AlCl_3$

473. Sodium chloride is soluble in water but not in benzene because
a) $\Delta H_{\text{hdydration}} < \Delta H_{\text{lattice energy in water}}$ and $\Delta H_{\text{hdydration}} > \Delta H_{\text{lattice energy in benzene}}$
b) $\Delta H_{\text{hdydration}} > \Delta H_{\text{lattice energy in water}}$ and $\Delta H_{\text{hdydration}} < \Delta H_{\text{lattice energy in benzene}}$
c) $\Delta H_{\text{hdydration}} = \Delta H_{\text{lattice energy in water}}$ and $\Delta H_{\text{hdydration}} < \Delta H_{\text{lattice energy in benzene}}$
d) $\Delta H_{\text{Hdydration}} < \Delta H_{\text{lattice energy in water}}$ and $\Delta H_{\text{Hdydration}} = \Delta H_{\text{lattice energy in benzene}}$

474. The pair likely to form the strongest hydrogen bonding:
a) H_2O_2 and H_2O b) HCOOH and CH_3COOH c) CH_3COOH and CH_3COO d) SiH_4 and $SiCl_4$

475. The number of sigma and pi bonds in 1- butane 3-yne are:
a) 5σ and 5π b) 6σ and 4π c) 7σ and 3π d) 8σ and 2π

476. Which is soluble in water?
a) AgF b) AgCl c) AgBr d) AgI

477. Which of the following compounds has the lowest melting point?
a) CaF_2 b) $CaCl_2$ c) $CaBr_2$ d) CaI_2

478. sp^3 hybridisation is not found in
a) H_2O b) CH_4 c) BCl_3 d) NH_3

479. Amongst H_2O, H_2S, H_2Se and H_2Te, the one with highest boiling point is:
a) H_2O because of hydrogen bonding

b) H_2Te because of higher molecular weight
c) H_2S because of hydrogen bonding
d) H_2Se because of lower molecular weight

480. Which of the following is false?
a) Methane molecule is tetrahedral in shape
b) Nickel tetrachloride is square planar in shape
c) P_2O_5 is like two pyramids joined at their apices
d) Acetylene is non-linear

481. The pair of elements which on combination are most likely to form an ionic compound is:
a) Na and Ca b) K and O_2 c) O_2 and Cl_2 d) Al and I_2

482. Among the following the maximum covalent character is shown by the compound.
a) $FeCl_2$ b) $SnCl_2$ c) $AlCl_3$ d) $MgCl_2$

483. Dipole-dipole attractive forces are strongest between the molecules of:
a) He b) CH_4 c) CO_2 d) H_2O

484. The type of hybridization of sulphur atom present in SO_2 and SO_3 is respectively:
a) sp, sp^2 b) sp^2, sp^2 c) sp^2, sp^3 d) sp, sp^3

485. The electrons used in bonding atoms:
a) Belong to outermost shell
b) Belong to penultimate shell
c) Belong to outermost shell and sometimes penultimate shell
d) Belong to penultimate shell and sometimes to outermost shell

486. Given are O_2, O_2^+, O_2^{2+} and O_2^{2-} respectively. Find the correct increasing bond order
a) $O_2 < O_2^{2-} < O_2^{2+} < O_2^+$ b) $O_2^{2-} < O_2 < O_2^+ < O_2^{2+}$
c) $O_2^{2-} < O_2 < O_2^+ < O_2^{2-}$ d) $O_2^+ < O_2^{2-} < O_2 < O_2^{2+}$

487. In a homonuclear molecule which of the following set of orbitals is degenerate?
a) $\sigma 2s$ and $\sigma 1s$ b) $\pi\, 2p_x$ and $\overset{*}{\pi}\, 2p_y$ c) $\pi 2p_x$ and $\sigma 2p_z$ d) $\sigma 2p_z$ and $\overset{*}{\pi}\, 2p_x$

488. The electronegativity order of O, F, Cl and Br is:
a) F > O > Cl > Br b) F > Cl < Br > O c) Br > Cl > F > O d) F < Cl < Br < O

489. Solid NaCl is a bad conductor of electricity because:
a) In solid NaCl there are no ions
b) Solid NaCl is covalent
c) In solid NaCl there is no velocity of ions
d) In solid NaCl there are no electrons

490. The number of lone pairs is same in PCl_3 and:
a) BCl_3 b) NCl_3 c) CCl_4 d) PCl_5

491. CaO and NaCl have the same crystal structure and approximately the same ionic radii. If U is the lattice energy of NaCl, the approximate lattice of CaO is
a) $\frac{U}{2}$ b) U c) $2U$ d) $4U$

492. In the molecule $CH \equiv C - CH = CH_2$, the hybridisation of C – C bond is
a) $sp^2 - sp$ b) $sp^3 - sp^3$ c) $sp^2 - sp^2$ d) $sp^3 - sp$

493. Shape and hybridisation of IF_5 respectively are
a) Trigonal bipyramidal, sp^3d
b) Sea-saw, sp^3d
c) Square pyramidal, sp^3d^2
d) Pentagonal pyramidal, sp^3d^3

494. Which of the following set of properties belong toPCl_5?
a) sp^3, tetrahedral, 4 valence shell pairs of electrons

b) $sp^3\ d$, trigonal bipyramidal, 5 valence shell pairs of electrons
c) $sp^3\ d^2$, octahedral, 6 valence shell pairs of electrons
d) $sp^3\ d$, square planar, 4 valence shell pairs of electrons

495. In a polar molecule, the ionic charge is 4.8×10^{-10}esu. If the interionic distance is 1 Å unit, then the dipole moment is
a) 0.48 debye b) 4.18 debye c) 4.8 debye d) 41.8 debye

496. The double bonds between the two carbon atoms in ethylene consists of:
a) Two sigma-bonds at right angles to each other
b) One sigma-bond and one pi-bond
c) Two pi-bonds at right angles to each other
d) Two pi-bonds at an angle of 60° to each other

497. The state of hybridisation of S in SF_4 is
a) sp^3 and has a lone pair of electron
b) sp^2 and has tetrahedral structure
c) sp^3d and has a trigonal bipyramidal structure
d) sp^3d^2 and has an octahedral structure

498. In OF_2, number of bond pair and lone pairs of electrons are respectively:
a) 2, 6 b) 2, 8 c) 2, 10 d) 2, 9

499. In which pair, the first atom or ion is not larger than the second?
a) N, F b) Cl^-, Cl c) O, S d) Fe^{2+}, Fe^{3+}

500. The maximum number of hydrogen bonds that a molecule of water can have is
a) 1 b) 2 c) 3 d) 4

501. The isoelectronic species among the following are:
I—CH_3^+; II—NH_2^+; III—NH_4^+; IV—NH_3
a) I, II, III b) II, III, IV c) I, II, IV d) II, I

502. Dipole moment is exhibited by:
a) 1, 4-dichlorobenzene
b) 1, 2-dichlorobenzene
c) *Trans*- 1, 2-dichloroethene
d) *Trans*-1, 2-dichloro-2-butene

503. In a multi-electron atom, the energy of a 2 p-orbital is:
a) Less than that of 2s-orbital
b) More than that of 2s-orbital
c) Equal to that of 2s-orbital
d) Double that of 2s-orbital

504. In which molecule the central atom does not use sp^3-hybrid orbitals in its bonding?
a) NH_2^- b) BeF_3^- c) SO_2Cl_2 d) SO_4^{2-}

505. RbO_2 is
a) Peroxide and paramagnetic b) Peroxide and diamagnetic
c) Superoxide and paramagnetic d) Superoxide and diamagnetic

506. Ionization energy of nitrogen is more than oxygen because:
a) Nucleus has more attraction for electrons
b) Half-filled p-orbitals are more stable
c) Nitrogen atom is small
d) More penetration effect

507. The high melting point and insolubility in organic solvents of sulphanilic acid are due to its---structure
a) Simple ionic b) Cubic c) Bipolar ionic d) hexagonal

508. Which of the following does not have a coordinate bond?
a) SO_2 b) H_2SO_3 c) HNO_2 d) HNO_3

509. Which of the following sequence regarding ionisation potential of coinage metal is correct:

a) Cu > Ag > Au b) Cu < Ag < Au c) Cu > Ag < Au d) Ag > Cu < Au

510. Which, molecule has zero dipole moment?
a) HBr b) AgI c) $PbSO_4$ d) H_2O

511. BCl_3 is a planar molecule, while NCl_3 is pyramidal, because
a) N – Cl bond is more covalent than B – Cl bond
b) Nitrogen atom is smaller than boron atom
c) B – Cl bond is more polar than N – Cl bond
d) BCl_3 has no lone pair of electrons but NCl_3 has a lone pair of electrons

512. Hybridisation of the underline atom changes in
a) $\underline{Al}H_3$ changes to AlH_4^- b) $H_2\underline{O}$ changes to H_3O^+
c) $\underline{N}H_3$ changes to NH_4^+ d) In all cases

513. Which molecule has hydrogen bonding
a) CH_4 b) CH_3COOH c) GeH_4 d) H_2Te

514. The energy released when a neutral gaseous atom takes up an electron is called:
a) Ionization energy b) Solvation energy c) Electronegativity d) Electron affinity

515. In NO_3^- ion, number of bond pair and lone pair electrons are respectively:
a) 2, 2 b) 3, 1 c) 1, 3 d) 4, 8

516. Which has sp^2-hybridisation?
a) CO_2 b) SO_2 c) N_2O d) CO

517. A sp^3-hybrid orbital contains:
a) 1/4 *s*-character b) 1/2 *s*-character c) 2/3 *s*-character d) 3/4 *s*-character

518. In the formation of NO^+ from NO, the electron is removed from
a) a σorbital b) a π orbital c) aσ^* orbital d) a π^*orbital

519. The decreasing order of the second ionization energy of K, Ca and Ba is:
a) K > Ca > Ba b) Ca > Ba > K c) Ba > K > Ca d) K > Ba > Ca

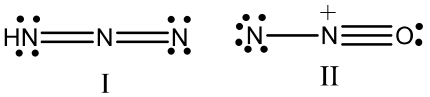
520. The value of *n* in the molecular formula $Be_nAl_2Si_6O_{18}$ is
a) 1 b) 2 c) 3 d) 4

521. Compound *X* is anhydride of sulphuric acid. The number of σ bonds and the number of π - bonds present in *X* are, respectively.
a) 3, 3 b) 4, 2 c) 2, 4 d) 4, 3

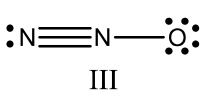
522. OF_2 is:
a) Linear molecule and *sp* -hybridized
b) Tetrahedral molecule and sp^3-hybridized
c) Bent molecule and sp^3-hybridized
d) None of the above

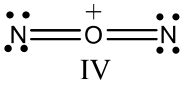
523. Which is not true in case of ionic bond?
a) It is linear bond
b) It is 100% ionic
c) It is formed between two atoms with large electronegativity difference
d) None of the above

524. Which of the following are possible resonating structure of N_2O?


I

II


III


IV

a) I and II b) I and III c) I, II and III d) All of these

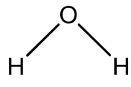
525. The number of σ and π – bonds in a molecule of acetonitrile are respectively
a) 2, 5 b) 3, 4 c) 4, 3 d) 5, 2

526. Strongest hydrogen bond is present in
a) O——H-----F b) S——H-----O c) O——H-----S d) F——H-----F

527. In the cyanide ion, the formal negative charge is on:
a) C
b) N
c) Both C and N
d) Resonate between C and N

528. The trigonal bipyramidal geometry results from the hybridisation
a) dsp^3 or sp^3d b) dsp^2 or sp^2d c) d^2sp^3 or sp^3d^2 d) d^3p^2 or $d^2\,p^3$

529. Which one of the following molecules has the smallest bond angle?
a) NH_3 b) PH_3 c) H_2O d) H_2Se

530. 
The bond angle in H_2O is 104.5. This fact can be best explained with the help of
a) Valence shell electron pair repulsion (VSEPR) theory b) Molecular orbital theory
c) Presence of hydrogen bond d) Electronegativity difference between hydrogen and oxygen atoms

531. Which of the two ions from the list given below that have the geometry that is explained by the same hybridization of orbitals, $NO_2^-, NO_3^-, NH_2^-, NH_4^+, SCN^-$?
a) NO_2^- and NH_2^- b) NO_2^- and NO_3^- c) NH_4^+ and NO_3^- d) SCN^- and NH_2^-

532. Which of the following is non – linear molecule?
a) SO_3 b) CO_2 c) CS_2 d) $BeCl_2$

533. Which contains both covalent and ionic bonds?
a) CCl_4 b) KCN c) $CaCl_2$ d) H_2O

534. In the formation of NaCl by combination of Na and Cl:
a) Sodium and chlorine both lose electrons
b) Sodium and chlorine both gain electrons
c) Sodium loses but chlorine gains electrons
d) Sodium gains but chlorine loses electrons

535. Which of the following has linear structure?
a) CCl_4 b) C_2H_4 c) C_2H_2 d) SO_2

536. A molecule (X) has (i) four sigma bonds formed by the overlap of sp^2 and s - orbitals (ii) one sigma bond formed by sp^2 and sp^2 orbitals and (iii) one π bond formed by p_x and p_z orbitals. Which of the following is X?
a) C_2H_6 b) C_2H_3Cl c) $C_2H_2Cl_2$ d) C_2H_4

537. The lowest ionization energy would be associated with the electronic structure:
a) $1s^2, 2s^2 2p^6, 3s^1$ b) $1s^2, 2s^2 2p^5$ c) $1s^2, 2s^2 2p^6$ d) $1s^2, 2s^2 2p^6, 3s^2$

538. Which is correct in the following?
a) Radius of Cl atom is 0.99Å, while that of Cl^+ ion is 1.54 Å
b) Radius of Cl atom is 0.99 Å, while that of Na atom is 1.54 Å
c) The radius of Cl atom is 0.95 Å, while that of Cl^- ion is 0.81 Å
d) Radius of Na atom is 0.95 Å, while that of Na^+ ion is 1.54 Å

539. How many unpaired electrons are present in N_2^+?
a) 1 b) 2 c) 3 d) 4

540. Which one of the following compounds has the smallest bond angle in its molecule?
a) SO_2 b) OH_2 c) SH_2 d) NH_3

541. Which of the following is isostructural with CO_2?
a) N_2O b) NO_2 c) N_2O_5 d) NO

542. The electronic configuration of four elements L, P, Q and R are given in brackets $L(1s^2, 2s^2, 2p^4), P(1s^2, 2s^2, 2p^6, 3s^1), Q(1s^2, 2s^2, 2p^6, 3s^2, 3p^5), R(1s^2, 2s^2, 2p^6, 3s^2)$ The formula of ionic

compounds that can be formed between these elements are

a) L_2p, RL, PQ andR_2Q b) LP, RL, PQ and RQ c) P_2L, RL, PQ and RQ_2 d) LP, R_2L, P_2Q, and RQ

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

a) $C_2 \longrightarrow C_2^+$ b) $NO \longrightarrow NO^+$ c) $O_2 \longrightarrow O_2^+$ d) $N_2 \longrightarrow N_2^+$

544. The size of ionic species is correctly given in the order:

a) $Cl^{7+} > Si^{4+} > Mg^{2+} > Na^+$

b) $Na^+ > Mg^{2+} > Si^{4+} > Cl^{7+}$

c) $Na^+ > Mg^{2+} > Cl^{7+} > Si^{4+}$

d) $Cl^{7+} > Na^+ > Mg^{2+} > Si^{4+}$

545. Which of the following has the minimum bond length?

a) O_2 b) O_2^+ c) O_2^- d) O_2^{2-}

546. In acetylene molecule, between the carbon atoms there are

a) Three pi bonds b) One sigma and two pi bonds

c) Two sigma and one pi bonds d) Three sigma bonds

547. The ionic radii of N^{3-}, O^{2-} and F^- are respectively given by:

a) 1.36, 1.40, 1.71 b) 1.36, 1.71, 1.40 c) 1.71, 1.40, 1.36 d) 1.71, 1.36, 1.40

548. Bond order of 1.5 is shown by:

a) O_2^{2-} b) O_2 c) O_2^+ d) O_2^-

549. In which of the process, the bond order increases and magnetic behaviour changes?

a) $N_2 \rightarrow N_2^+$ b) $C_2 \rightarrow C_2^+$ c) $NO \rightarrow NO^+$ d) $O_2 \rightarrow O_2^+$

550. Which involves a bond forming process?

a) Stretching rubber

b) Dissolution of sugar in water

c) Rusting of iron

d) Emission of γ-rays by radioactive iron

551. Which is paramagnetic?

a) Cl_2O_6 b) Cl_2O_7 c) Cl_2O d) ClO_2

552. Which one of the following pairs of molecules will have permanent dipole moments for both members?

a) SiF_4 and NO_2 b) NO_2 and CO_2 c) NO_2 and O_3 d) SiF_4 and CO_2

553. The state of hybridization of boron and oxygen atom in boric acid (H_3BO_3) is respectively:

a) sp^3, sp^3 b) sp^2, sp^3 c) sp^3, sp^2 d) sp^2, sp^2

554. The correct order towards bond angle is

a) $sp^3 < sp^2 < sp$ b) $sp < sp^2 < sp^3$ c) $sp < sp^3 < sp^2$ d) $sp^2 < sp^3 < sp$

555. Which orbital is used by oxygen atom to form a sigma bond with other oxyen atom in O_2 molecule?

a) Pure p-orbital b) sp^2-hybrid orbital c) sp^3- hybrid orbital d) sp- hybrid orbital

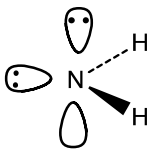
556. Which of the following is a linear molecule?

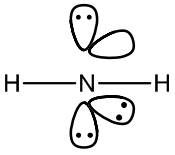
a) $BeCl_2$ b) H_2O c) SO_2 d) CH_4

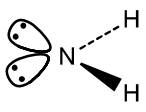
557. Which involves breaking of covalent bond?

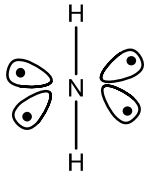
a) Boiling H_2S b) Melting KCN c) Melting SiO_2 d) Boiling CF_4

558. For $\overline{N}H_2$, the best three-dimensional view is

a) 

b) 

c) 

d) 

559. For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order?

a) Cr > Mn > Co > Fe

b) Mn > Fe > Cr > Co

c) $Fe > Mn > Co > Cr$

d) $Co > Mn > Fe > Cr$
$(At.\ no.\ Cr = 24, Mn = 25, Fe = 26, Co = 27)$

560. In PO_4^{3-}, the formal charge on each on each oxygen atom and the $P - O$ bond order respectively are
a) $-0.75, 0.6$ b) $-0.75, 1.0$ c) $-0.75, 1.25$ d) $-3, 1.25$

561. An element X has 3 electrons in p-orbitals and also belongs to III period. Its molecular formula should be:
a) X b) X_2 c) X_4 d) X_5

562. Elements having six electrons in its outermost orbit generally form:
a) Complex ion b) Negative ion c) Positive ion d) Zwitter ion

563. Oxygen is divalent, but sulphur exhibits variable valency of 2, 4 and 6, because:
a) Sulphur is less electronegative than oxygen
b) Sulphur is bigger atom than oxygen
c) Ionisation potential of sulphur is more than oxygen
d) Of the presence of d-orbitals in sulphur

564. Of the following sets which one does not contain isoelectronic species?
a) $BO_3^{3-}, CO_3^{2-}, NO_3^-$ b) $SO_3^{2-}, CO_3^{2-}, NO_3^-$ c) CN^-, N_2, C_2^{2-} d) $PO_4^{3-}, SO_4^{2-}, ClO_4^-$

565. In which of the following, unpaired electrons are present?
$KO_2, AlO_2^-, BaO_2, NO_2^+$
a) NO_2^+, BaO_2 b) KO_2, AlO_2^- c) Only KO_2 d) Only BaO_2

566. Which transition involves maximum amount of energy?
a) $M^-(g) \longrightarrow M(g) + e$
b) $M^-(g) \longrightarrow M^+(g) + 2e$
c) $M^+(g) \longrightarrow M^{2+}(g) + e$
d) $M^{2+}(g) \longrightarrow M^{3+}(g) + e$

567. What is the nature of the bond between B and O in $(C_2H_5)_2OBH_3$?
a) Covalent b) Coordinate covalent
c) Ionic bond d) Banana shaped bond

568. Which does not use sp^3-hybrid orbitals in its bonding?
a) BeF_3^- b) OH_3^+ c) NH_4^+ d) NF_3

569. Hybridisation of C_2 and C_3 of
$H_3C - CH = C = CH - CH_3$ are
a) sp, sp^3 b) sp^2, sp c) sp^2, sp^2 d) sp, sp

570. Maximum covalence of an atom of an element is equal to:
a) Number of unpaired electrons in the s-and p-orbitals of valency shell
b) Number of unpaired electrons in the p-orbitals of valency shell
c) Total number of electrons in the s-and p-orbitals of valency shell
d) Total number of electrons in the p-orbitals of valency shell

571. Which main group elements have a different number of outermost electrons than their group number?
a) Alkali metals b) Noble gases c) Halogens d) None of these

572. The forces present in the crystals of naphthalene are:
a) Van der Waals' forces b) Electrostatic forces c) Hydrogen bonding d) None of these

573. Which does not show inert pair effect?
a) Al b) Sn c) Pb d) Thallium

574. The electronic theory of bonding was proposed by
a) Pauling b) Lewis c) Bronsted d) Mullikan

575. The correct order of decreasing first ionization potential is:
a) $C > B > Be > Li$ b) $C > Be > B > Li$ c) $B > C > Be > Li$ d) $Be > Li > B > C$

576. The hybridisation of orbitals of N atom in NO_3^-, NO_2^+, and NH_4^+ are respectively
a) sp, sp^2, sp^3 b) sp^2, sp, sp^3 c) sp, sp^3, sp^2 d) sp^2, sp^3, sp

577. Which of the following is more ionic?

a) NaCl b) KCl c) $MgCl_2$ d) $CaCl_2$

578. The species showing $p\pi$-$d\pi$ overlapping is:
a) NO_3^- b) PO_4^{3-} c) CO_3^{2-} d) NO_2^-

579. H_2O has a net dipole moment, while BeF_2 has zero dipole moment, because:
a) H_2O molecule as linear while BeF_2 is bent
b) BeF_2 molecule is linear, while H_2O is bent
c) Fluorine is more electronegative than oxygen
d) Be is more electronegative than oxygen

580. Among the following which is the strongest oxidising agent?
a) Cl_2 b) F_2 c) Br_2 d) I_2

581. Which of the following molecule in its valence shell has three bond pairs of electrons and one lone pair of electrons?
a) NH_3 b) H_2O c) BF_3 d) CO_2

582. Which of the following statements is correct?
a) All carbon to carbon bonds contain a σ - bond and one or more π - bonds
b) All carbon to hydrogen bonds are π - bonds
c) All oxygen to hydrogen bonds are hydrogen bonds
d) All carbon to hydrogen bonds are σ - bonds

583. Which of the following has sp^2 hybridisation?
a) C_2H_6 b) C_2H_4 c) $BeCl_2$ d) C_2H_2

584. The formation of energy bonds in solids are in accordance with
a) Heisenberg's uncertainty principle b) Bohr's theory
c) Ohm's law d) Rutherford's atomic model

585. Which of the following configuration is associated with biggest jump between 2nd and 3rd IE?
a) $1s^2, 2s^2 2p^2$ b) $1s^2, 2s^2 2p^6, 3s^1$ c) $1s^2, 2s^2 2p^6, 3s^2$ d) $1s^2, 2s^2 2p^1$

586. The predominent intermolecular forces in hydrogen fluoride is due to:
a) Dipole-induced dipole interaction
b) Dipole-dipole interaction
c) Hydrogen bond interaction
d) Dispersion interaction

587. Correct order of bond length is
a) $CO_3^{2-} > CO_2 > CO$ b) $CO_2 > CO > CO_3^{2-}$
c) $CO > CO_2 > CO_3^{2-}$ d) None of these

588. Which of the following molecules has pyramidal shape?
a) PCl_3 b) SO_3 c) CO_3^{2-} d) NO_3^-

589. The molecular electronic configuration of Be_2 is
a) $\sigma 1s^2 \overset{*}{\sigma} 1s^2 \sigma 02s^2 \overset{*}{\sigma} 2p^2$ b) $KK\sigma 2S^2$ c) $\sigma 1s^2 \overset{*}{\sigma} 1s^2 \sigma 02s^2 \overset{*}{\sigma} 2s^2$ d) None of the above

590. The maximum number of 90° angles between bond pair-bond pair of electrons is observed in
a) dsp^3 hybridisation b) $sp^3\ d$ hybridization
c) dsp^2 hybridisation d) $sp^3\ d^2$ hybridisation

591. In which of the following arrangement the order is not correct according to property indicated against it?
a) Increasing size : $Al^{3+} < Mg^{2+} < Na^+ < F^-$
b) Increasing IE_1 : B < C < N < O
c) Increasing EA_1 : I < Br < F < Cl
d) Increasing metallic radius : Li < Na < K < Rb

592. Most covalent halide of aluminium is:
a) $AlCl_3$ b) AlI_3 c) $AlBr_3$ d) AlF_3

593. The bond order of individual carbon-carbon bonds in benzene is:
a) One

b) Two
c) Between 1 and 2
d) One and two alternately

594. In pyrophosphoric acid, $H_4P_2O_7$, number of σ and $d\pi - p\pi$ bonds are respectively
a) 8 and 2 b) 6 and 2 c) 12 and zero d) 12 and 2

595. The percentage s – character of the hybrid orbitals in methane, ethene and ethyne are respectively
a) 25, 33, 50 b) 25, 50, 75 c) 50, 75, 100 d) 10, 20, 40

596. The types of bonds present in $CuSO_4 \cdot 5H_2O$ are only
a) Electrovalent and covalent
b) Electrovalent and co-ordinate
c) Electrovalent, covalent and co- ordinate covalent
d) Covalent and co-ordinate covalent

597. Which pair represents isostructural species?
a) CH_3^- amd CH_3^+ b) NH_4^+ and NH_3 c) SO_4^{2-} and BF_4^- d) NH_2^- and BeF_2

598. In which of the following species, all the three types of hybrid carbons are present?
a) $CH_2 = C = CH_2$ b) $CH_3 - CH = CH - CH_2^+$
c) $CH_3 - C \equiv C - CH_2^+$ d) $CH_3 - CH = CH - CH_2^-$

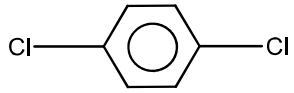
599. Which statement is not correct?
a) Double bond is shorter than a single bond.
b) Sigma bond is weaker than π-bond.
c) Double bond is stronger than a sigma bond.
d) Covalent bond is stronger than hydrogen bond.

600. The pair having similar geometry is:
a) BF_3, NH_3 b) BF_3, AlF_3 c) BeF_2, H_2O d) BCl_3, PCl_3

601. Which of the following is largest?
a) Cl^- b) S^{2-} c) Na^+ d) F^-

602. The AsF_5 molecule is trigonal bipyramidal. The hybrid orbitals used by the As atoms for bonding are
a) $d_{x^2-y^2}, d_{z^2}, s, p_x, p_y$ b) d_{xy}, s, p_x, p_y, p_z c) $s, p_x, p_y, p_z, d_{z^2}$ d) $d_{x^2-y^2}, s, p_x, p_y$

603. Consider the following halogen containing compounds
(A) $CHCl_3$ (B) CCl_4
(C) CH_2Cl_2 (D) CH_3Cl
(E)



The compounds with a net zero dipole moment are
a) B and E only b) C only c) C and D only d) A and D only

604. Alkali metals in each period have:
a) Largest size
b) Lowest IE
c) Highest IE
d) Highest electronegativity

605. In a regular octahedral molecule, MX_6 the number of $X - M - X$ bonds at 180° is
a) Three b) Two c) Six d) Four

606. Valency means:
a) Combining capacity of an element
b) Atomicity of an element
c) Oxidation number of an element
d) None of the above

607. Which does not form two or more chlorides?

a) Na b) Hg c) Cu d) Fe

608. Which has the largest first ionisation energy?
a) Li b) Na c) K d) Rb

609. Polarization of electrons in acrolein may be written as:
a) $\overset{\delta-}{CH_2}=CH-\overset{\delta+}{CH}=O$ b) $\overset{\delta-}{CH_2}=CH-CH=\overset{\delta+}{O}$ c) $\overset{\delta-}{CH_2}=\overset{\delta+}{CH}-CH=O$ d) $\overset{\delta+}{CH_2}=CH-CH=\overset{\delta-}{O}$

610. Which bond has the highest bond energy?
a) Coordinate bond b) Sigma bond c) Multiple bond d) Polar covalent bond

611. In which of the following molecules the van der Waals' forces is likely to be the most important in determining the melting and boiling point?
a) CO b) H_2S
c) Br_2 d) HCl

612. The higher values of specific heat of water in comparison to other liquids is due to:
a) High dielectric constant
b) Polarity
c) H-bonding
d) None of the above

613. Which contains both polar and non-polar covalent bonds?
a) NH_4Cl
b) HCN
c) H_2O_2
d) CH_4

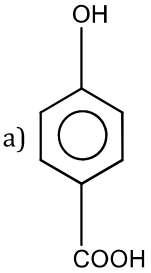
614. How many – bonds are present in naphthalene?
a) 4 b) 5 c) 6 d) 7

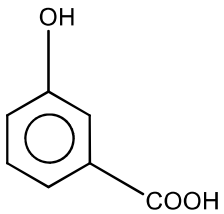
615. If the electron pair forming a bond between two atoms *A* and *B* is not in the centre, then the bond is
a) Polar bond b) Single bond c) π-bond d) Non-polar bond

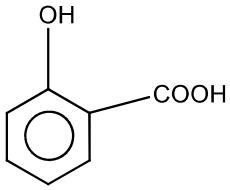
616. Which of the following species in non-linear?
a) ICl_2^- b) I_3^- c) N_3^- d) ClO_2^-

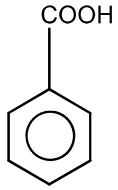
617. The bond order of CO molecule on the basis of molecular orbital theory is:
a) Zero b) 2 c) 3 d) 1

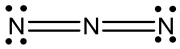
618. Which one is the strongest bond?
a) Cl—F b) F—F c) Br—F d) Br—Cl

619. Which of the following compound has maximum volatility?
a) 

b) 

c) 

d) 

620. In the following electron-dot structure, calculate the formal charge from left to right nitrogen atom;

a) -1, -1, +1 b) -1, +1,-1 c) +1, -1, -1 d) +1, -1, +1

621. Hybridisation shown by carbon and oxygen of – OH group in phenol are respectively
a) sp^2, sp^2 b) sp^3, sp^3 c) sp, sp^2 d) sp^2, sp^3

622. The molecule which has pyramidal shape is:
a) PCl_3 b) SO_3 c) CO_3^{2-} d) NO_3^-

623. The correct increasing bond angles order is:
a) $BF_3 < NF_3 < PF_3 < ClF_3$

b) $ClF_3 < PF_3 < NF_3 < BF_3$
c) $BF_3 \approx NF_3 < PF_3 < ClF_3$
d) $BF_3 < NF_3 < PF_3 > ClF_3$

624. Van der Waals' forces are applied to:
a) Inert gases only
b) Rare gases only
c) Mixture of gases
d) Elementary gases only

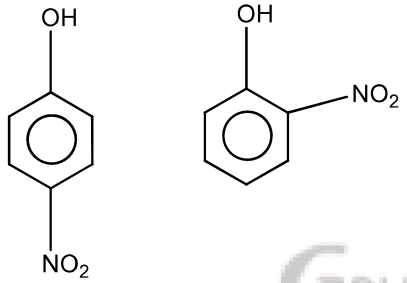
625. Which bond angle results in the minimum dipole moment for the triatomic molecule XY_2 shown below?
a) 90° b) 120° c) 150° d) 180°

626. Which shows the least dipole moment?
a) $CHCl_3$ b) CH_3CH_2OH c) CH_3COCH_3 d) CCl_4

627. Which force is strongest?
a) Dipole-dipole forces
b) Ion-ion forces
c) Ion-dipole forces
d) Ion-induced dipole forces

628. Which molecule has linear structure?
a) CO_2 b) H_2O c) SO_2 d) H_2O_2

629. Out of the compounds below the vapour pressure of (B) at a particular temperature is



(A) (B)

a) Higher than that of (A) b) lower than that of (A)
c) Higher or lower than (A), depending on the size of the vessel d) Same as that of (A)

630. Which ion has a higher polarizing power?
a) Mg^{2+} b) Al^{3+} c) Ca^{2+} d) Na^{+}

631. Which of the following represent the given mode of hybridisation $sp^2 - sp^2 - sp - sp$ from left to right?
a) $H_2C = CH - C \equiv CN$ b) $HC \equiv C - CH_2 - C \equiv CH$
c) $H_2C = C = C = CH_2$ d) $HC = C - CH_2 - C = CH$

632. The solubility of KCl is relatively more in (where D is dielectric constant):
a) $C_6H_6(D = 0)$ b) $(CH_3)_2CO(D = 2)$ c) $CH_3OH(D = 32)$ d) $CCl_4(D = 0)$

633. Elements have electronegativities 1.2 and 3.0, bond formed between them would be
a) Ionic b) Covalent c) Co-ordinate d) metallic

634. Among the following, the pair in which the two species are not isostructural, is
a) SiF_4 and SF_4 b) IO_3^- and XeO_3 c) BH_4^- and NH_4^+ d) PF_6^- and SF_6

635. Which has zero dipole moment?
a) ClF b) PCl_3 c) SiF_4 d) $CFCl_3$

636. Which of the following molecules is covalent and shows expanded octet in its formation?
a) HF b) NF_3 c) BF_3 d) ClF_3

637. Which one of the following is a correct set?
a) H_2O, sp^3, angular b) BCl_3 sp^3, angular

c) NH_4, dsp^2, square planar d) CH_4, dsp^2, tetrahedral

638. Which property of halogens increases from F to I?
a) Electronegativity
b) First ionization energy
c) Bond length in the molecule
d) None of the above

639. The total number of bonds in acetylene molecule is:
a) One b) Two c) Three d) Five

640. The number of antibonding electron pairs in O_2^{2-} molecular ion on the basis of molecular orbital theory is (Atomic number of O is 18.)
a) 5 b) 4 c) 3 d) 2

641. Variable valency is characteristic of:
a) Noble gases
b) Alkali metals
c) Transition metals
d) Non-metallic elements

642. In which molecule all atoms are coplanar?
a) CH_4 b) BF_3 c) PF_3 d) NH_3

643. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals?
a) $\pi*$ orbital b) π orbital c) $\sigma*$ orbital d) σ orbital

644. Bond energy of covalent O—H bond in water is:
a) Greater than bond energy of hydrogen bond
b) Equal to bond energy of hydrogen bond
c) Less than bond energy of hydrogen bond
d) None of the above

645. Which one of the following has a coordinate bond?
a) NH_4Cl b) $AlCl_3$ c) NaCl d) Cl_2

646. Which carbon is more electronegative?
a) sp^3 hybridised carbon
b) sp – hybridised carbon
c) sp^2 hybridised carbon
d) Always same irrespective of its hybrid state

647. Among $NH_3, BeCl_2, CO_2$ and H_2O, the non-linear molecules are:
a) $BeCl_2$ and H_2O b) $BeCl_2$ and CO_2 c) NH_3 and H_2O d) NH_3 and CO_2

648. Paramagnetism is exhibited by molecules:
a) Not attracted into a magnetic field
b) Containing only paired electrons
c) Carrying a positive charge
d) Containing unpaired electrons

649. Which molecule has the largest dipole moment?
a) HF b) HCl c) HBr d) HI

650. The intermolecular attractive forces vary in the order:
a) Water < alcohol < ether
b) Water > alcohol > ether
c) Alcohol > water < ether
d) Ether > water > alcohol

651. Which of the following species has a linear shape?
a) NO_2^+ b) O_3 c) NO_2^- d) SO_2

652. The electronic configuration of 4 elements K, L, M and N are,
$K = 1s^2,\ 2s^2 2p^1$ $L = 1s^2,\ 2s^2 2p^6$

$M = 1s^2,\ 2s^2 2p^4$ $N = 1s^2,\ 2s^2 2p^3$

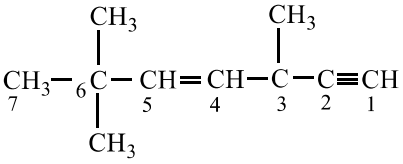
The element that would form a diatomic molecule with double bond is:

a) K b) L c) M d) N

653. Which of the following will provide the most efficient overlap?

a) $s - s$ b) $s - p$ c) $sp^2 - sp^2$ d) $sp - sp$

654. The state of hybridization of C_2, C_3, C_5 and C_6 of the hydrocarbon,



is in the following sequence:

a) sp, sp^2, sp^3 and sp^2 b) sp, sp^3, sp^2 and sp^3 c) sp^3, sp^2, sp^2 and sp d) sp, sp^2, sp^2 and sp^3

655. Four diatomic species are listed below in different sequences. Which of these represents the correct order of their increasing bond order?

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

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

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

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

656. Which one species has the longest bond length?

a) NO^+ b) O_2^- c) O_2^+ d) N_2^+

657. The pair of molecules forming strongest hydrogen bonds are

a) SiH_4 and SiF_6

b) $CH_3 - \underset{\underset{O}{\|}}{C} - CH_3$ and $CHCl_3$

c) $H - \underset{\underset{O}{\|}}{C} - OH$ and $CH_3 - \underset{\underset{O}{\|}}{C} - OH$

d) H_2O and H_2

658. Which one of the following has not triangular pyramidal shape?

a) NH_3 b) NCl_3 c) PF_3 d) BCl_3

659. A covalent bond is formed between the atoms by the overlapping of orbitals containing:

a) Single electron

b) Paired electron

c) Single electron with parallel spin

d) Single electron with opposite spin

660. Which of the following bonds required the largest amount of bond energy to dissociate the atom concerned?

a) $H - H$ bond in H_2 b) $O = O$ bond in O_2 c) $N \equiv N$ bond in N_2 d) $C - C$ bond in C_2H_6

661. The covalency of nitrogen in HNO_3 is:

a) Zero

b) 3

c) 4

d) 5

662. Which is distilled first?

a) Liquid H_2 b) Liquid CO_2 c) Liquid O_2 d) Liquid N_2

663. Which one of the following is a correct set?

a) H_2O, sp^3, angular b) H_2O, sp^2, linear

c) NH_4^+, dsp^2, square planar d) CH_4, dsp^2, tetrahedral

664. Which is correct order for electron gain enthalpy?

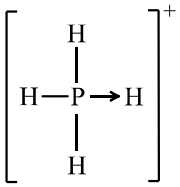
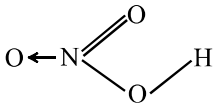
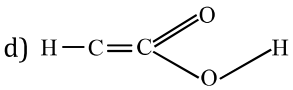
a) $S < O < Cl < F$ b) $O < S < F < Cl$ c) $Cl < F < S < O$ d) $F < Cl < O < S$

665. Which is a pyramidal structure?
a) Trimethylamine b) Methanol c) Acetylene d) Water

666. Among the following mixtures, dipole – dipole as the major interaction, is present in
a) Benzene and ethanol
b) Acetonitrile and acetone
c) KCl and water
d) Benzene and carbon tetrachloride

667. In dry ice there are ... in between molecules.
a) Ionic bond b) Covalent bond c) Hydrogen bond d) None of these

668. The dipole moment of o, p and m-dichlorobenzene will be in the order
a) $o > p > m$ b) $p > o > m$ c) $m > o > p$ d) $o > m > p$

669. Which formulae does not correctly represents the bonding capacity of the atom involved?
a) 
b) 
c) 
d) 

670. Which has minimum ionic radius?
a) N^{3-} b) K^+ c) Na^+ d) F^-

671. The bond order is maximum in
a) O_2 b) O_2^+ c) O_2^- d) O_2^{2-}

672. PF_3 molecule is:
a) Square planar b) Trigonal bipyramidal c) Tetrahedral d) Trigonal pyramidal

673. Resonance is due to:
a) Delocalization of σ-electrons
b) Delocalization of π-electrons
c) Migration of H atoms
d) Migration of protons

674. Which property is commonly exhibited by a covalent compound?
a) High solubility in water
b) Low m.p.
c) High electrical conductivity
d) High b.p.

675. Which of the following is an electrovalent linkage?
a) CH_4 b) $SiCl_4$ c) $MgCl_2$ d) BF_3

676. The decreasing values of bond angles from NH_3 (106°) to SbH_3 (101°) down group-15 of the periodic table is due to:
a) Increasing bp - bp repulsion
b) Increasing p-orbital character in sp^3
c) Decreasing lp - bp repulsion
d) Decreasing electronegativity

677. The shape of ClO_3^- according to VSEPR model is:
a) Planar triangle b) Pyramidal c) Tetrahedral d) Square planar

678. Which metal has a greater tendency to form metal oxide?
a) Cr b) Fe c) Al d) Ca

679. The charge/size ratio of a cation determines its polarising power. Which one of the following sequences represents the increasing order of the polarising power of the cationic species, $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$?
a) $Mg^{2+} < Be^{2+} < K^+ < Ca^{2+}$
b) $Be^{2+} < K^+ < Ca^{2+} < Mg^{2+}$
c) $K^+ < Ca^{2+} < Mg^{2+} < Be^{2+}$
d) $Ca^{2+} < Mg^{2+} < Be^{2+} < K^+$

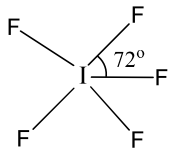
680. A p-block element in which last electron enters into s-orbitals of valence shell instead of p-orbital is:
a) As b) Ga c) No such element exist d) He

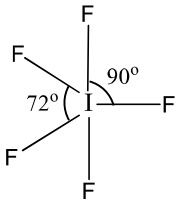
681. How many electron pairs are present in valence shell of oxygen in water molecule?

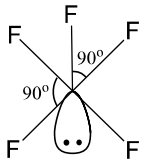
a) 4 b) 1 c) 2 d) 3

682. Number of electrons in a the valence orbit of nitrogen in an ammonia molecule is
a) 8 b) 5 c) 6 d) 7

683. The number of valency electrons in carbon atom is:
a) Zero b) 2 c) 6 d) 4

684. The structure of IF_5 can be best described as
a) 

b) 

c) 

d) None of these

685. The relationship between the dissociation energy and N_2 and N_2^+ is
a) dissociation energy of N_2 = dissociation energy of N_2^+
b) dissociation energy of N_2 can either be lower or higher than the dissociation energy of N_2^+
c) dissociation energy of N_2 > dissociation energy of N_2^+
d) dissociation energy of N_2^+ > dissociation energy of N_2

686. The bond angle in H_2S (for H—S—H)is:
a) Same as that of Cl—Be—Cl in $BeCl_2$
b) Greater than H—N—H bond angle in NH_3
c) Greater than H—Se—H and less than H—O—H
d) Same as Cl—Sn— Cl in $SnCl_2$

687. Which one among the following does not have the hydrogen bond?
a) Phenol b) Water c) Liquid NH_3 d) Liquid HCl

688. Which of the following molecules/ions does not contain unpaired electrons.
a) O_2^{2-} b) B_2 c) N_2^+ d) O_2

689. The $C-O-H$ bond angle in ethanol is nearly
a) 90 b) 104 c) 120 d) 180

690. Which one of the following does not have sp^2 hybridised carbon?
a) Acetone b) Acetic acid c) Acetonitrile d) Acetamide

691. Among the following elements Ca, Mg, P and Cl the order of increasing atomic radius is:
a) Mg < Ca < Cl < P b) Cl < P < Mg < Ca c) P < Cl < Ca < Mg d) Ca < Mg < P < Cl

692. Which has a giant covalent structure?
a) PbO_2 b) SiO_2 c) NaCl d) $AlCl_3$

693. Bond angles of NH_3, PH_3, AsH_3 and SbH_3 is in the order
a) $PH_3 > AsH_3 > SbH_3 > NH_3$ b) $SbH_3 > AsH_3 > PH_3 > NH_3$
c) $SbH_3 > AsH_3 > NH_3 > PH_3$ d) $NH_3 > PH_3 > AsH_3 > SbH_3$

694. Amongst the elements with following electronic configurations, which one of them may have the highest ionization energy?
a) Ne$[3s^2 3p^1]$ b) Ne$[3s^2 3p^3]$ c) Ne$[3s^2 3p^2]$ d) Ar$[3d^{10} 4s^2 4p^3]$

695. Based on VSEPR theory, the number of 90 degree $F-Br-F$ angles in BrF_5 is
a) 0 b) 1 c) 2 d) 3

696. Which one of the following elements has lower value of ionisation energy?
a) Mg b) Rb c) Li d) Ca

697. The lattice energy order for lithium halide is:
a) LiF > LiCl > LiBr > LiI
b) LiCl > LiF > LiBr > LiI
c) LiBr > LiCl > LiF > LiI
d) LiI > LiBr > LiCl > LiF

698. Among the species:CO_2, CH_3COO^-, CO, CO_3^{2-},HCHO which has the weakest $C-O$ bond?

a) CO b) CO_2 c) CO_3^{2-} d) CH_3COO^-

699. Peroxide ion
(i) has five completely filled antibonding molecular orbitals
(ii) is diamagnetic
(iii) has bond order one
(iv) is isoelectronic with neon
Which one of these is correct?
a) (ii) and (iii) b) (i),(ii) and (iv) c) (i),(ii) and (iii) d) (i) and (iv)

700. Which is the weakest among the following type of bond?
a) Ionic bond b) Covalent bond c) Metallic bond d) Hydrogen bond

701. In which of the following pairs of molecules/ions, the central atom has sp^2-hybridization?
a) NO_2 and NH_3 b) BF_3 and NO_2^- c) NH_2^- and H_2O d) BF_3 and NH_2^-

702. Bond length decreases with:
a) Decrease in size of the atom
b) Increase in the number of bonds between the atoms
c) Decrease in bond order
d) Decrease in the number of bonds between the atoms

703. Which of the following molecules/ ions does not contain unpaired electrons?
a) O_2^{2-} b) B_2 c) N_2^+ d) O_2

704. The structure of IF_7 is
a) Square pyramid b) Trigonal bipyramid
c) Octahedral d) Pentagonal bipyramid

705. The species C_2
a) Has one σ bond and one π bond b) Has both π bonds
c) Has both σ bonds d) Does not exist

706. In which of the following bond angle is maximum?
a) NH_3 b) NH_4^+ c) PCl_5 d) SCl_2

707. Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below

$$\frac{1}{2}Cl_2(g) \xrightarrow{\frac{1}{2}\Delta_{diss}H^\circ} Cl(g) \xrightarrow{\Delta_{EA}H^\circ} Cl^-(g) \xrightarrow{\Delta_{hyd}H^\circ} Cl^-(aq)$$

The energy involved in the conversion of $\frac{1}{2}Cl_2(g)$ to $Cl^-(aq)$(Using the data)

$\Delta_{diss^\circ Cl_2} = 240$ kJ mol^{-1}

$\Delta_{EA^\circ Cl} = -349$ kJ mol^{-1}

$\Delta_{hyd\ H^\circ}Cl = -381$ kJ mol^{-1} will be

a) $+152$ kJ mol^{-1} b) -610 kJ mol^{-1} c) -850 kJ mol^{-1} d) $+120$ kJ mol^{-1}

708. The hybridisation of the *ipso* – carbon dichlorobenzene is
a) *sp* hybridized b) sp^2 hybridised c) $sp^2\ d$ hybridized d) sp^3 hybridised

709. Which of the following has maximum dipole moment?
a) NCl_3 b) NBr_3 c) NH_3 d) NI_3

710. The molecule having largest dipole moment among the following is
a) CHl_3 b) CH_4 c) $CHCl_3$ d) CCl_4

711. Which of the following diatomic molecules would be stabilized by the removal of an electron?
a) C_2 b) CN c) N_2 d) O_2

712. Which of the following possess maximum hydration energy?
a) $MgSO_4$ b) $RaSO_4$ c) $SrSO_4$ d) $BaSO_4$

713. In which of the following hydrogen bond is present?
a) H_2 b) Ice c) Sulphur d) Hydrocarbon

714. The correct order of decreasing polarisability of ion is:
a) Cl^-, Br^-, I^-, F^- b) F^-, I^-, Br^-, Cl^- c) I^-, Br^-, Cl^-, F^- d) F^-, Cl^-, Br^-, I^-

715. Which is highest melting point halide?
a) NaCl b) NaBr c) NaF d) NaI

716. Number of σ and π bonds in acetylene are
a) 3 and 2 b) 2 and 2 c) 2 and 3 d) 4 and 3

717. Which of the following halides is least stable and has doubtful existence?
a) CI_4 b) GeI_4 c) SnI_4 d) PbI_4

718. C − C bond length is maximum in
a) Diamond b) Graphite c) Naphthalene d) Fullerene

719. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3 (1.5 D) is larger than that of NF_3 (0.2D). This is because:
a) In NH_3 as well as NF_3 the atomic dipole and bond dipole are in opposite directions.
b) In NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction.
c) In NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction.
d) In NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions.

720. Resonance is not shown by:
a) C_6H_6 b) CO_2 c) CO_3^{2-} d) SiO_2

721. The molecular shapes of SF_4, CF_4 and XeF_4 are
a) Different with 1, 0 and 2 lone pairs of electrons on the central atom, respectively
b) Different with 0, 1 and 2 lone pairs of electrons on the central atom, respectively
c) The same with 1, 1 and 1 lone pairs of electrons on the central atoms, respectively
d) The same with 2, 0 and 1 lone pairs of electrons on the central atom, respectively

722. The shape of IF_7 molecule is
a) Pentagonal bipyramidal b) Trigonal bipyramidal
c) Tetrahedral d) Octahedral

723. Decreasing order of C – C bond length is
(I)C_2H_4 (II)C_2H_2
(III)C_6H_6 (IV)C_2H_6
a) IV > *III* > *I* > *II* b) I > *II* > *IV* > *III* c) II > *I* > *IV* > *III* d) IV > *I* > *III* > *II*

724. In which of the following compounds, the bonds have the largest percentage of ionic character:
a) H_2O b) HF c) IBr d) N_2O_4

725. Oxygen and sulphur both are the member of same group in Periodic Table but H_2O is liquid while H_2S is gas because
a) Molecular weight of water is more
b) Electronegativity of sulphur is more
c) H_2S is weak acid
d) Water molecules are having strong hydrogen bonds between them

726. The linear structure is possessed by:
a) $SnCl_2$ b) NCO^- c) NO_2^+ d) CS_2

727. When the hybridization state of carbon atom changes from sp^3 to sp^2 and finally to *sp*, the angle between the hybridized orbitals:
a) Decreases gradually
b) Decreases considerably
c) Is not affected
d) Increases progressively

728. Which species has the maximum number of lone pair of electrons on the central atom?
a) $[ClO_3^-]$ b) XeF_4 c) SF_4 d) $[I_3^-]$

729. Which concept best explains that *o*-nitrophenol is more volatile than *p*-nitrophenol?
a) Resonance

b) Steric hinderance
c) Hydrogen bond
d) Hyperconjugation

730. How many bonded electron pairs are present in IF_7 molecule?
a) 6 b) 7 c) 5 d) 8

731. The comparatively high b.p. of HF is due to
a) High reactivity of fluorine
b) Small size of hydrogen atom
c) Formation of hydrogen bonds and consequent association
d) High IE of fluroine

732. Which one of the following species is diamagnetic in nature?
a) H_2^- b) H_2^+ c) H_2 d) He_2^+

733. The unequal sharing of bonded pair of electrons between two atoms in a molecule gives rise to:
a) Ionic bond
b) Polar covalent bond
c) Non-polar covalent bond
d) None of the above

734. In which of the following process energy is liberated?
a) $Cl \longrightarrow Cl^+ + e$ b) $HCl \longrightarrow H^+ + Cl^-$ c) $Cl + e \longrightarrow Cl^-$ d) $O^- + e \longrightarrow O^{2-}$

735. Identify the least stable ion amongst the following:
a) Li^- b) Be^- c) B^- d) C^-

736. The lowest bond energy exist in the following bonds for:
a) C—C b) N—N c) H—H d) O—O

737. Number of lone pair (s) in $XeOF_4$ is/are
a) 0 b) 1 c) 2 d) 3

738. Which one is electron deficient compound?
a) NH_3 b) ICl c) BCl_3 d) PCl_3

739. Which type of bond is present in H_2S molecule?
a) Ionic bond b) Covalent bond
c) Coordinate d) All of three

740. In compound *X*, all the bond angles are exactly $109°28'$, *X* is:
a) Chloromethane b) Iodoform c) Carbon tetrachloride d) Chloroform

741. The hybridisation of P in PCl_5 is
a) sp^2 b) sp^3d c) sp^3 d) dsp^2

742. Pauling's electronegativity values for elements are useful in predicting:
a) Polarity of bonds in molecules
b) Position of elements in electromotive series
c) Coordination number
d) Dipole moment of various molecules

743. The hybridization of carbon atoms in C—C single bond of $HC{\equiv}C{-}CH{=}CH_2$ is:
a) $sp^3{-}sp^3$ b) $sp^2{-}sp^3$ c) $sp{-}sp^2$ d) $sp^3{-}sp$

744. It is thought that atoms combine with each other such that the outermost orbit acquires a stable configuration of 8 electrons. If stability were attained with 6 electrons rather than with 8, what would be the formula of the stable fluoride ions?
a) F^{3+} b) F^+ c) F^- d) F^{2-}

745. The number of antibonding electrons pairs in O_2^{2-} on the basis of MO theory are:
a) 4 b) 3 c) 2 d) 5

746. Which has triangular planar shape?
a) CH_3^+ b) ClO_2^- c) H_3O^+ d) ClO_3^-

747. Specify the coordination geometry around and hybridization of N and B atoms in a 1:1 complex of BF_3 and

NH_3:

a) N : tetrahedral, sp^3 ; B : tetrahedral, sp^3

b) N : pyramidal, sp^3 ; B : pyramidal, sp^3

c) N : pyramidal, sp^3 ; B : planar, sp^2

d) N : pyramidal, sp^3 ; B : tetrahedral, sp^3

748. Which of the following molecule has highest bond energy?

a) $C-C$ b) $N-N$ c) $O-O$ d) $F-F$

749. The number of oxygen atoms bonded to one phosphorus atom in P_4O_6 is

a) 4 b) 3 c) 6 d) 5

750. Bond energies in NO,NO^+ and NO^- are such as

a) $NO^- > NO > NO^+$ b) $NO^+ > NO^- > NO$ c) $NO > NO^- > NO^+$ d) $NO^+ > NO > NO^-$

751. In XeF_6, oxidation state and state of hybridisation of Xe and shape of the molecule are, respectively

a) $+6, sp^3\ d^3$, distorted octahedral b) $+4, sp^3\ d^2$, square planar

c) $+6, sp^3$, pyramidal d) $+6, sp^3d^2$, square pyramidal

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

a) CN^- and NO^+ b) CN^- and CN^+ c) O_2^- and CN^- d) NO^+ and CO

753. The bond length of species O_2, O_2^+ and O_2^- are in the order of

a) $O_2^+ > O_2 > O_2^-$ b) $O_2^- > O_2 > O_2^+$ c) $O_2 > O_2^+ > O_2^-$ d) $O_2 > O_2^- > O_2^+$

754. Which hybridization results non-polar orbitals?

a) sp b) sp^2 c) sp^3 d) dsp^2

755. The d-orbital involed in sp^3d hybridization is

a) $d_{x^2-y^2}$ b) d_{xy} c) d_{z^2} d) d_{zx}

756. The element with strong electropositive nature is:

a) Cu b) Cs c) Cr d) Ba

757. Which statement is correct?

a) X^+ ion is larger than X^- ion

b) X^- ion is larger in size than X atom

c) X^+ and X^- have the same size

d) X^+ ion is larger in size than X atom

758. SF_2, SF_4 and SF_6 have the hybridisations at sulphur atom respectively, as

a) sp^2, sp^3, sp^2d^2 b) sp^3, sp^3, sp^3d^2 c) sp^3, sp^3d, sp^3d^2 d) sp^3, spd^2, d^2sp^3

759. Solid CH_4 is:

a) Molecular solid b) Ionic solid c) Covalent solid d) Not exist

760. The bond angles of NH_3, NH_4^+ and NH_2^- are in the order

a) $NH_2^- > NH_3 > NH_4^+$ b) $NH_4^+ > NH_3 > NH_2^-$ c) $NH_3 > NH_2^- > NH_4^+$ d) $NH > NH_4^+ > NH_2^-$

761. sp^2-hybridization is shown by:

a) $BeCl_2$ b) BF_3 c) NH_3 d) XeF_2

762. $Cl-P-Cl$ bond angles in PCl_5 molecule are

a) 120 and 90 b) 60 and 90 c) 60 and 120 d) 120 and 30

763. Which one of the following pairs is isostructural (*i. e.*, having the same shape and hybridization)?

a) [NF_3 and BF_3] b) [BF_4^- and NH_4^+] c) [BCl_3 and $BrCl_3$] d) [NH_3 and NO_3^-]

764. Which one of the following sets of ions represents a collection of isoelectronic species?

a) $K^+, Cl^-, Ca^{2+}, Sc^{3+}$ b) $Ba^{2+}, Sr^{2+}, K^+, Ca^{2+}$ c) $N^{3-}, O^{2-}, F^-, S^{2-}$ d) $Li^+, Na^+, Mg^{2+}, Ca^{2+}$

765. Which molecule has zero dipole-moment?

a) HF b) HBr c) H_2O d) CO_2

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

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

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

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

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

767. Which one of the following compounds has bond angle as nearly 90°?
a) NH_3 b) H_2S c) H_2O d) CH_4

768. The hybrid state of sulphur in SO_3 molecule is
a) sp^3d b) sp^3 c) sp^3d^2 d) sp^2

769. In which of the following pair both molecules do not possess same type of hybridisation?
a) $CH_4$and H_2O b) PCl_5 and SF_4 c) SF_6 and XeF_4 d) BCl_3 and NCl_3

770. Which is the most covalent?
a) C − F b) C − O c) C − S d) C − Br

771. The shape of NO_3^- is planar. It is formed by the overlapping of oxygen orbitals with ... orbitals of nitrogen.
a) sp^3-hybridized b) sp^2-hybridized c) Three p-orbitals d) None of these

772. Which of the ions has the largest ionic radius?
a) Be^{2+} b) Mg^{2+} c) Ca^{2+} d) Sr^{2+}

773. A σ-bonded molecule MX_3 is T-shaped. The number non-bonding pairs of electron is
a) 0
b) 2
c) 1
d) Can be predicted only if atomic number of M is known

774. Which of the following is not isoelectronic?
a) NO^- b) CN^- c) N_2 d) O_2^{2+}

775. In which set of molecules are all the species paramagnetic?
a) B_2, O_2, N_2 b) B_2, O_2, NO c) B_2, F_2, O_2 d) B_2, O_2, Li_2

776. Which of the following has strongest hydrogen bonding?
a) Ethylamine b) Ammonia c) Ethyl Alcohol d) Diethyl ether

777. The bonds present in N_2O_5 are:
a) Ionic
b) Covalent and coordinate
c) Covalent
d) Ionic and covalent

778. The angle between two covalent bonds is maximum in:
a) CH_4 b) H_2O c) CO_2 d) SO_3

779. The pair having similar geometry is
a) PCl_3, NH_4 b) $BeCl_2, H_2O$ c) CH_4, CCl_4 d) IF_5, PF_5

780. In the electronic structure of acetic acid there are:
a) 16 shared and 8 unshared valency electrons
b) 8 shared and 16 unshared valency electrons
c) 12 shared and 12 unshared valency electrons
d) 18 shared and 6 unshared valency electrons

781. Increasing order (lower first) of size of the various hybridised orbitals is:
a) sp, sp^2, sp^3 b) sp^3, sp^2, sp c) sp^2, sp^3, sp d) sp^2, sp, sp^3

782. Among the following, the compound that contains ionic, covalent and coordinate linkage is
a) NH_3 b) NH_4Cl c) NaCl d) CaO

783. How many bridging oxygen atoms are present in P_4O_{10}?
a) 6 b) 4 c) 2 d) 5

784. Consider the Born-Haber cycle for the formation of an ionic compound given below and identify the compound (Z) formed.

$$\begin{bmatrix} M(s) \xrightarrow{\Delta H_1} M(g) \xrightarrow{\Delta H_2} M^+(g) \\ \frac{1}{2}X_2(g) \xrightarrow{\Delta H_3} X(g) \xrightarrow{\Delta H_4} X^-(g) \end{bmatrix} \xrightarrow{\Delta H_5} Z$$

a) M^+X^- b) $M^+X^-(s)$ c) MX d) $M^+X^-(g)$

785. The bond length is maximum in:
a) H_2S b) HF c) H_2O d) Ice

786. N_2 and O_2 are converted into monocations, N_2^+ and O_2^+ respectively. Which of the following is wrong?
a) In N_2^+, $N-N$ bond weakens
b) In O_2^+, the $O-O$ bond order increases
c) In O_2^+, paramagnetism decreases
d) N_2^+ become diamagnetic

787. The number of nodal planes present in σ^* s-antibonding orbitals is
a) 1 b) 2 c) 0 d) 3

788. Which of the following has maximum number of lone pairs associated with Xe?
a) XeO_3 b) XeF_4 c) XeF_6 d) XeF_2

789. Which is most volatile compound?
a) HI b) HCl c) HBr d) HF

790. The calculated bond order in O_2^- ion is
a) 1 b) 1.5 c) 2 d) 2.5

791. A C ≡ C bond is:
a) Weaker than C=C bond
b) Weaker than C—C bond
c) Longer than C—C bond
d) Shorter than C=C bond

792. In which of the following pairs bond angle is $109^\circ 28'$?
a) $[NH_4^+], [BF_4^-]$ b) $[NH_4^+], [BF_3]$ c) $[NH_3], [BF_4^-]$ d) $[NH_3], [BF_3]$

793. Which of the following molecules has three-fold axis of symmetry?
a) NH_3 b) C_2H_4 c) CO_2 d) SO_2

794. In which of the following arrangements the sequence is not strictly according to the property written against it?
a) $HF < HCl < HBr < HI$: increasing acid strength
b) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing basic strength
c) $B < C < O < N$: increasing first ionization enthalpy
d) $CO_2 < SiO_2 < SnO_2 < PbO_2$:increasing oxidising power

795. Which one of the following is paramagnetic?
a) N_2 b) NO c) CO d) O_3

796. Which of the following has largest ionic radius?
a) Na^+ b) K^+ c) Li^+ d) Cs^+

797. Lattice energy of a solid increases if
a) Size of ions is small
b) Charges of ions are small
c) Ions are neutral
d) None of the above

798. Which one is most polar?
a) CCl_4 b) $CHCl_3$ c) CH_3Cl d) CH_3OH

799. The high boiling point of water is due to:
a) Weak dissociation of water molecules
b) Hydrogen bonding among water molecules
c) Its high specific heat
d) Its high dielectric constant

800. The states of hybridisation of boron and oxygen atoms in boric acid (H_3BO_3) are respectively
a) sp^2 and sp^2 b) sp^2 and sp^3 c) sp^3 and sp^2 d) sp^3 and sp^3

801. In which pair of species, both species do have the similar geometry?
a) CO_2, SO_2 b) NH_3, BH_3 c) CO_3^{2-}, SO_3^{2-} d) SO_4^{2-}, ClO_4^-

802. Which of the following is largest ion?
a) Na^+ b) Mg^{2+} c) O^{2-} d) F^-

803. The electronic configuration of sodium and chlorine justifies:
a) Their physical state

b) Their reactivity
c) The formation of electrovalent compound NaCl
d) None of the above

804. sp^3 hybridisation is found in

a) $\overset{+}{C}H_3$ b) $:\bar{C}H_3$ c) ClO_3^- d) SO_3

805. Glycerol is more viscous than ethanol due to
a) High molecular weight b) High boiling point
c) Many hydrogen bonds per molecule d) Fajan's rule

806. In the case of alkali metals, the covalent character decreases in the order:
a) MI > MBr > MCl > MF
b) MCl > MI > MBr > MF
c) MF > MCl > MBr > MI
d) MF > MCl > MI > MBr

807. Two nodal planes are present in

a) $\overset{*}{\pi}2p_x$ b) $\sigma 2p_z$ c) $\pi 2p_x$ d) $\pi 2p_y$

808. H – bond is not present in
a) Water b) Glycerol
c) Hydrogen fluoride d) Hydrogen sulphide

809. In which of the following pairs molecules have bond order three and are isoelectronic?
a) CN^-, CO b) CO, O_2^+ c) NO^+, CO^+ d) CN^-, O_2^+

810. Which of the following halides has maximum melting point?
a) NaF b) NaCl c) NaBr d) NaI

811. Which atomic orbital is always involved in sigma bonding only?
a) s b) p c) d d) f

812. Which of the following acts sometimes as a metal and sometimes as a non-metal?
a) Hg b) Cl c) K d) At

813. Amongst the following elements the configuration having the highest ionization energy is:
a) $[Ne]3s^23p^1$ b) $[Ne]3s^23p^3$ c) $[Ne]3s^23p^2$ d) $[Ar]3d^{10}4s^24p^3$

814. Which of the following species exhibits the diamagnetic behaviour ?
a) O_2^{2-} b) O_2^+ c) O_2 d) NO

815. Which is a good solvent for ionic and polar covalent compounds?
a) H_2O b) CH_3COOH c) CCl_4 d) Liquid NH_3

816. The following salt shows maximum covalent character
a) $AlCl_3$ b) $MgCl_2$ c) CsCl d) $LaCl_3$

817. Each of the followings has non-zero dipole moment, except:
a) C_6H_6 b) CO c) SO_2 d) NH_3

818. Bonded electron pairs present in octahedral SF_6 molecule:
a) 3 b) 4 c) 6 d) 5

819. Resonance structures can be written for
a) O_3 b) NH_3 c) CH_4 d) H_2O

820. Born-Haber cycle may be used to calculate
a) Electronegativity b) Mass number c) Oxidation number d) Electron affinity

821. The electronic structure of four elements A, B, C, D are
$(A)1s^2$ $(B)1s^2, 2s^2, 2p^2$
$(C)1s^2, 2s^2, 2p^5$ $(D)1s^2, 2s^2, 2p^6$
The tendency to form electrovalent bond is largest in
a) A b) B c) C d) D

822. In which element shielding effect is not possible?

a) H b) Be c) B d) N

823. The hybridisation of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively:
a) sp, sp^2, sp^3 b) sp^2, sp, sp^3 c) sp, sp^3, sp^2 d) sp^2, sp^3, sp

824. Which of the following is isoelectronic with carbon atom?
a) Na^+ b) Al^{3+} c) O^{2-} d) N^+

825. Which of the following statement is correct?
a) Polarization of an anion is maximum by high charged cation
b) Small sized cation minimises the polarization
c) A small anion brings about a large degree of polarisation
d) A small anion undergoes a high degree of polarization

826. Among LiCl, $BeCl_2$, BCl_3 and CCl_4, the covalent bond character follows the order:
a) $LiCl > BeCl_2 > BCl_3 > CCl_4$
b) $LiCl < BeCl_2 < BCl_3 < CCl_4$
c) $LiCl > BeCl_2 > CCl_4 > BCl_3$
d) $LiCl < BeCl_2 < BCl_3 > CCl_4$

827. The value of bond order in nitrogen and oxygen molecule is:
a) 3, 2 b) 4, 2 c) 2, 3 d) 1, 2

828. Pauling received Nobel Prize for his work on:
a) Photosynthesis b) Atomic structure c) Chemical bonding d) Thermodynamics

829. With which of the given pairs CO_2 resembles?
a) $HgCl_2, C_2H_2$ b) C_2H_2, NO_2 c) $HgCl_2, SnCl_4$ d) N_2O, NO_2

830. The enhanced force of cohesion in metals is due to:
a) The covalent linkages between atoms
b) The electrovalent linkages between atoms
c) The lack of exchange of valency electrons
d) The exchange energy of mobile electrons

831. Among H*X*, the maximum dipole moment is of:
a) HF b) HCl c) HBr d) HI

832. Dative bond is present in:
a) SO_3 b) NH_3 c) $BaCl_2$ d) BF_3

833. In which of the following molecule, the central atom does not have sp^3-hybridization?
a) CH_4 b) SF_4 c) BF_4^- d) NH_4^+

834. Which has an odd electron and shows paramagnetic character?
a) NO b) SO_2 c) CO_2 d) H_2O

835. Which ion is not isoelectronic with O^{2-}?
a) N^{3-} b) Na^+ c) F^- d) Ti^+

836. Which species is paramagnetic?
a) O_2^- b) CH_3^- c) CO d) NO^+

837. Structure of ammonia is
a) Pyramidal b) Tetrahedral c) Trigonal d) Trigonal pyramidal

838. The example of the *p*-*p*-orbital overlapping is the formation of:
a) H_2 molecule
b) Cl_2 molecule
c) Hydrogen chloride
d) Hydrogen bromide molecule

839. In which of the following $p\pi$ - $d\pi$ bonding is observed?
a) NO_3^- b) SO_3^{2-} c) BO_3^{3-} d) CO_3^{2-}

840. The shape of ClO_4^- ion is:
a) Square planar b) Square pyramidal c) Tetrahedral d) Trigonal bipyramidal

841. The critical temperature of water is higher than that of O_2 because H_2O molecule has:

a) Fewer electrons than O_2
b) Two covalent bonds
c) V-shape
d) Dipole moment

842. Compound formed by sp^3d-hybridization will have structure:
a) Trigonal bipyramidal
b) T-shaped
c) Linear
d) Either of these depending on number of lone pair of electrons of central atom

843. Which has the lowest bond angle?
a) NH_3 b) BeF_2 c) H_3O^+ d) CH_4

844. Assuming that Hund's rule is violated, the bond order and magnetic nature of the diatomic molecule B_2 is
a) 1 and diamagnetic
b) 0 and diamagnetic
c) 1 and paramagnetic
d) 0 and paramagnetic

845. The energy of antibonding molecular orbitals is:
a) Greater than the bonding M.O.
b) Smaller than the bonding M.O.
c) Equal to that of bonding M.O.
d) None of the above

846. The set representing the correct order of ionic radius is:
a) $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$
b) $Li^+ > Na^+ > Mg^{2+} > Be^{2+}$
c) $Mg^{2+} > Be^{2+} > Li^+ > Na^+$
d) $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

847. Which of the following hydrogen bonds is the strongest?
a) O——H-----N b) F——H-----F c) O——H-----O d) O——H-----F

848. H_2O is dipolar, whereas BeF_2 is not. It is because
a) The electronegativity of F is greater than that of O
b) H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule
c) H_2O is linear and BeF_2 is angular
d) H_2O is angular and BeF_2 is linear

849. Which of the following statements is most correct? Effective nuclear charge of an atom depends on:
a) The atomic number of the atom
b) The charge on the ion
c) The shielding effect
d) Both the actual nuclear charge and the shielding effect

850. The total number of valency electrons in PH_4^+ ion is:
a) 8 b) 9 c) 6 d) 14

851. Phosphoric acid is syrupy in nature due to
a) Strong covalent bonding
b) Hydrogen bonding
c) van der Waals' forces
d) None of the above

852. The correct order of bond angles is:
a) $H_2S < NH_3 < BF_3 < SiH_4$
b) $NH_3 < H_2S < SiH_4 < BF_3$
c) $H_2S < NH_3 < SiH_4 < BF_3$
d) $H_2S < SiH_4 < NH_3 < BF_3$

853. Metallic lusture is explained by
a) Diffusion of metal ions
b) Oscillation of loose electrons

c) Excitation of free protons
d) Existence of bcc lattice

854. Which of the following phenomenon will occur when two atoms of same spin will react?
a) Bonding will not occur
b) Orbital overlap will not occur
c) Both (a) and (b)
d) None of the above

855. The hybrid state of S in SO_3 is similar to that of
a) C in C_2H_2 b) C in C_2H_4 c) C in CH_4 d) C in CO_2

856. Among the following the pair in which the two species are not isostructural is
a) IO_3^- and XeO_3 b) PF_6^- and SF_6 c) BH_4^- and NH_4^+ d) SiF_4 and SF_4

857. Which of the following species contains three bond pairs and one lone pair around the central atom?
a) NH_2^- b) PCl_3 c) H_2O d) BF_3

858. Intramolecular hydrogen bonding is found in:
a) Salicyldehyde b) Water c) Acetaldehyde d) Phenol

859. The type of bond formed between H^+ and NH_3 in NH_4^+ ion is:
a) Ionic b) Covalent c) Dative d) Hydrogen

860. Which of the following statements is correct about N_2 molecule?
a) It has a bond order of 3
b) The number of unpaired electrons present in it is zero and hence, it is diamagnetic
c) The order of filling of MOs is $\pi(2p_x) = \pi(2p_y), \sigma(2p_z)$
d) All the above three statements are correct

861. Ice has an open structure compared to water due to which it floats on water and occupies a greater volume of space. The open structure of ice is due to:
a) Solid state of ice b) Its low density c) Crystalline nature d) Hydrogen bonding

862. Which of the following has minimum melting point?
a) CsF b) HCl c) HF d) LiF

863. Geometry of ammonia molecule and the hybridisation of nitrogen involved in it are
a) sp^3 hyridisation and tetrahedral geometry
b) sp^3 hyridisation and distorted tetrahedral geometry
c) sp^2 hyridisation and triangular geometry
d) None of the above

864. The molecule having smallest bond angle is
a) H_2O b) H_2S c) NH_3 d) H_2Te

865. For a covalent solid, the units which occupy lattice points are:
a) Atoms b) Ions c) Molecules d) Electrons

866. Carbon suboxide (C_3O_2) has recently been shown as a component of the atmosphere of Venus. Which of the following formulation raepresents the correct ground state Lewis structure for carbon suboxide?
a) :O:C::C:C:O: b) :O::C::C:C::O: c) : Ö::C::C::C:: Ö: d) :O: C: C: C: O:

867. The ionization energy will be maximum for the process:
a) $Ba \longrightarrow Ba^{2+}$ b) $Be \longrightarrow Be^{2+}$ c) $Cs \longrightarrow Cs^+$ d) $Li \longrightarrow Li^+$

868. Born Haber cycle is used to determine:
a) Lattice energy b) Electron affinity c) Ionization energy d) Either of them

869. In which of the following molecules/ions BF_3, NO_2^-, NH_2^-, and H_2O the central atom is sp^2 hybridized?
a) BF_3 and NO_2^- b) NO_2^- and NH_2^- c) NH_2^- and H_2O d) NO_2^- and H_2O

870. $sp^3\ d$ hybridisation results in
a) A square planar molecule
b) An octahedron molecule
c) A trigonal bipyramidal molecule
d) A tetrahedron molecule

871. In the electronic structure of H_2SO_4, the total number of unshared electrons is
a) 20 b) 16 c) 12 d) 8

872. Which of the following element has higher ionisation energy?

a) Boron b) Carbon c) Oxygen d) Nitrogen

873. The bond length of HCl molecule is 1.275 Å and its dipole moment is 1.03 D. The ionic character of the molecule (in per cent) (charge of the electron= 4.8×10^{-10} esu) is
a) 100 b) 67.3 c) 33.66 d) 16.83

874. In a double bond connecting two atoms there is a sharing of:
a) 2 electrons b) 4 electrons c) 1 electron d) All electrons

875. Number of P – O bonds in $P_4O_{10}$is
a) 17 b) 16 c) 15 d) 6

876. Elements whose electronegativities are 1.2 and 3.0 form:
a) Ionic bond b) Covalent bond c) Coordinate bond d) Metallic bond

877. Which of the following is correct?
a) Decreases in bond length means increase in bond strength
b) Covalent radius of carbon is less than that of nitrogen
c) Single bonds are stronger than double bonds
d) Fe (III) chloride cannot exist in the dimeric form Fe_2Cl_6

878. Which of the following is a favourable factor for cation formation?
a) Low ionisation potential b) High electron affinity
c) High electronegativity d) Small atomic size

879. A number of ionic compounds, e.g., AgCl, CaF_2, $BaSO_4$ are insoluble in water. This is because:
a) Ionic compounds do not dissolve in water
b) Water has a high dielectric constant
c) Water is not a good ionizing solvent
d) These molecules have exceptionally high attractive forces in their lattice

880. Ionisation potential values of '*d*' block elements as compared to ionisation potential values of '*f*' block elements are:
a) Higher b) Lower c) Equal d) Either of these

881. When a metal atom combines with a non-metal atom, the non-metal atom will
a) Lose electrons and decrease in size
b) Lose electrons and increase in size
c) Gain electrons and decrease in size
d) Gain electrons and increase in size

882. The hydration of ionic compounds involves:
a) Evolution of heat
b) Weakening of attractive forces
c) Dissociation into ions
d) All of the above

883. Which of the following is diamagnetic?
a) H_2^+ b) O_2 c) Li_2 d) Fe_2^+

884. Molecular orbital electronic configuration for '*X*' anion is

$$KK\left(\sigma 2s\right)^2\left(\overset{*}{\sigma} 2s\right)^2\left(\pi 2p_x\right)^2\left(\pi 2p_y\right)^2\left(\sigma 2p_z\right)^2\left(\overset{*}{\pi} 2p_x\right)^1.$$

The anion '*X*' is
a) N_2^- b) O_2^- c) N_2^{2-} d) O_2^{2-}

885. According to Fajan's rule polarization is more when:
a) Small cation and large anion
b) Small cation and small anion
c) Large cation and large anion
d) Large cation and small anion

886. Organic compounds soluble in water contain:
a) C, H. Cl b) C, H c) C, H, O d) C, S

887. Atomic radii of fluorine and neon in angstrom unit are respectively given by:
a) 0.72, 1.60 b) 1.60, 1.60 c) 0.72, 0.72 d) 1.60, 0.72

888. The decreasing order of bond angle is
a) $NO_2 > NO_2^+ > NO_2^-$ b) $NO_2^- > NO_2 > NO_2^+$
c) $NO_2^+ > NO_2 > NO_2^-$ d) $NO_2^+ > NO_2^- > NO_2$

889. The correct order of dipole moment is:
a) $CH_4 < NF_3 < NH_3 < H_2O$
b) $NF_3 < CH_4 < NH_3 < H_2O$
c) $NH_3 < NF_3 < CH_4 < H_2O$
d) $H_2O < NH_3 < NF_3 < CH_4$

890. Which oxide of nitrogen is isoelectronic with CO_2?
a) NO_2 b) N_2O c) NO d) N_2O_2

891. Which of the following molecules does not possess a permanent electric dipole moment?
a) H_2S
b) SO_2
c) SO_3
d) CS_2

892. Among O, C, F, Cl, Br the correct order of increasing atomic radii is:
a) $F < O < C < Cl < Br$ b) $F < C < O < Br < Cl$ c) $F < Cl < Br < O < C$ d) $C < O < F < Cl < Br$

893. In which of the following diatomic molecules /ions is the bond order of each molecule/ion $= 2.5$?
a) O_2^+, NO, CN^- b) CN^-, N_2^+, N_2 c) N_2^+, NO, O_2^+ d) O_2^+, CN^-, N_2^+

894. What type of hybridisation takes place in the N atom of NH_3 ?
a) sp^2 b) sp^3 c) dsp^2 d) sp

895. Identify the correct order of solubility of Na_2S, CuS and ZnS in aqueous medium:
a) $CuS > ZnS > Na_2S$ b) $ZnS > Na_2S > CuS$ c) $Na_2S > CuS > ZnS$ d) $Na_2S > ZnS > CuS$

896. In the following molecule, the two carbon atoms marked by asterisk (*) possess the following type of hybridized orbitals:

$$H_3C-\overset{*}{C}\equiv\overset{*}{C}-CH_3$$

a) sp^3-orbital b) sp^2-orbital c) sp-orbital d) s-orbital

897. Debye an unit of dipole moment is of the order of:
a) 10^{-10} esu cm b) 10^{-18} esu cm c) 10^{-6} esu cm d) 10^{-12} esu cm

898. Which of the following is a favourable factor for cation formation?
a) High electronegativity b) High electron affinity
c) Low ionisation potential d) Smaller atomic size

899. The paramagnetic molecule at ground state among the following is
a) H_2 b) O_2 c) N_2 d) CO

900. The bond in the formation of fluorine molecule will be
a) Due to $s-s$ overlapping b) Due to $s-p$overlapping
c) Due to $p-p$ overlapping d) Due to hybridisation

901. The diamagnetic molecules are:
a) B_2, C_2, N_2 b) O_2, N_2, F_2 c) C_2, N_2, F_2 d) B_2, O_2, N_2

902. The IP_1 is maximum for:
a) K b) Na c) Be d) He

903. In the transition of Cu to Cu^{2+}, there is a decrease in:
a) Atomic number
b) Atomic mass
c) Equivalent weight
d) Number of valency electrons

904. In the following, which bond will be responsible for maximum value of hydrogen bond?

a) $N-H$ b) $O-H$ c) $F-H$ d) $S-H$

905. The bond order of O_2^+ is the same as in
a) N_2^+ b) CN^- c) CO d) NO^+

906. Structure of XeF_5^+ ion is
a) Trigonal bipyramidal b) Square pyramidal c) Octahedral d) Pentagonal

907. The fHOMO in CO is
a) π- bonding b) π-antibonding c) σ-antibonding d) σ- bonding

908. Which of the following has sp^3-hybridization on central atom?
a) BF_2 b) BCl_3 c) SO_3 d) CCl_4

909. Which one has sp^3 hybridisation?
a) N_2O b) CO_2 c) SO_2 d) CO

910. Coordinate compounds are formed by:
a) Transfer of electrons
b) Sharing of electrons
c) Donation of electron pair
d) None of the above

911. In P_4O_{10} the
a) Second bond in $P=O$ is formed by $p\pi - d\pi$ back bonding
b) $P=O$ bond is formed by $p\pi - p\pi$ bonding
c) $P=O$ bond is formed by $d\pi - d\pi$ bonding
d) $P=O$ bond is formed by $d\pi - d\pi - 3\sigma$ back bonding

912. Allene (C_3H_4) contains
a) One double bond, one triple bond and one single bond
b) One triple and two double bonds
c) Two triple and one double bond
d) Two double and four single bond

913. Which shows non-directional bonding?
a) BCl_3 b) CsCl c) NCl_3 d) $BeCl_3$

914. Which one of the following contains both ionic and covalent bonds?
a) C_6H_5Cl b) H_2O c) NaOH d) CO_2

915. $Na^+, Mg^{2+}, Al^{3+}, Si^{4+}$ are isoelectronics. Their ionic size follows the order:
a) $Na^+ < Mg^{2+} < Al^{3+} < Si^{4+}$
b) $Na^+ > Mg^{2+} < Al^{3+} < Si^{4+}$
c) $Na^+ < Mg^{2+} > Al^{3+} > Si^{4+}$
d) $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+}$

916. Which of the following does not apply to metallic bond?
a) Overlapping valence orbitals
b) Mobile valence electrons
c) Delocalized electrons
d) Highly directed bonds

917. Van der Waals' forces are maximum in:
a) HBr b) LiBr c) LiCl d) AgBr

918. The internuclear distance in H_2 and Cl_2 molecules are 74 and 198 pm respectively. The bond length of H—Cl may be:
a) 272 pm b) 70 pm c) 136 pm d) 248 pm

919. The molecule having zero dipole moment is
a) CH_2Cl_2 b) BF_3 c) NF_3 d) ClF_3

920. For a stable molecule, the value of bond order must be
a) There is no relationship between stability and bond order
b) Zero

c) Positive
d) negative

921. Which compound among the following has more covalent character?
a) $AlCl_3$ b) AlI_3 c) MgI_2 d) NaI

922. Which among the following has the largest dipole moment?
a) NH_3 b) H_2O c) HI d) SO_3

923. The hybridization of phosphorus in $POCl_3$ is same as in:
a) P in PCl_3 b) S in SF_6 c) Cl in ClF_3 d) B in BCl_3

924. A square planar complex is formed by hybridisation of the following atomic orbitals
a) s, p_x, p_y, p_z b) s, p_x, p_y, p_z, d c) d, s, p_x, p_y d) s, p_x, p_y, p_z, d, d

925. Which of the following pairs are isostructural?
a) SO_3^{2-}, NO_3^- b) BF_3, NF_3 c) BrO_3^-, XeO_3 d) SF_4, XeF_4

926. Among HF, CH_4, CH_3OH and N_2O_4 intermolecular hydrogen bond is expected
a) In two b) In all c) In all leaving one d) None of these

927. Hydration of different ions in aqueous solution is an example of
a) Ion – induced dipole interaction
b) Dipole - dipole interaction
c) Dipole – induced dipole interaction
d) Ion – dipole interaction

928. Amongst LiCl, RbCl, $BeCl_2$ and $MgCl_2$, the compounds with the greatest and the least ionic character, respectively
a) LiCl and RbCl b) RbCl and $MgCl_2$ c) RbCl and $BeCl_2$ d) $MgCl_2$ and $BeCl_2$

929. The percentage of p – character in the orbitals forming P – P bonds in P_4 is
a) 25 b) 33 c) 50 d) 75

930. Atoms or group of atoms which are electrically charged are known as:
a) Anions b) Cations c) Ions d) Atoms

931. Which among the following elements has lowest value of ionisation energy?
a) Mg b) Ca c) Ba d) Sr

932. IP_2 for an element is invariably higher than IP_1 because:
a) The size of cation is smaller than its atom
b) It is difficult to remove 'e' from cation
c) Effective nuclear charge is more for cation
d) All of the above

933. In forming (i) $N_2 \longrightarrow N_2^+$ and (ii) $O_2 \longrightarrow O_2^+$; the electrons respectively are removed from
a) $\left(\overset{*}{\pi} 2p_y \text{ or } \overset{*}{\pi} 2p_x\right)$ and $\left(\overset{*}{\pi} 2p_y \text{ or } \overset{*}{\pi} 2p_x\right)$
b) $\left(\pi 2p_y \text{ or } \pi 2p_x\right)$ and $\left(\pi 2p_y \text{ or } \pi 2p_x\right)$
c) $\left(\pi 2p_y \text{ or } \pi 2p_x\right)$ and $\left(\overset{*}{\pi} 2p_y \text{ or } \overset{*}{\pi} 2p_x\right)$
d) $\left(\overset{*}{\pi} 2p_y \text{ or } \overset{*}{\pi} 2p_x\right)$ and $\left(\pi 2p_y \text{ or } \pi 2p_x\right)$

934. Which one pair of atoms or ions will have same configuration?
a) Li^+ and He^- b) Cl^- and Ar c) Na and K d) F^+ and Ne

935. Which combination is best explained by the coordinate covalent bond?
a) $H^+ + H_2O$ b) $Cl + Cl$ c) $Mg + \frac{1}{2}O_2$ d) $H_2 + I_2$

936. The dipole moment of $CHCl_3$ is 1.05 debye while that of CCl_4 is zero, because CCl_4 is:
a) Linear b) Symmetrical c) Planar d) Regular tetrahedral

937. Which shows the highest lattice energy?

a) RbF b) CsF c) NaF d) KF

938. In a polar molecule, the ionic charge is 4.8×10^{-10} e.s.u. If the inter ionic distance is 1 Å unit, then the dipole moment is
a) 41.8 debye b) 4.18 debye c) 4.8 debye d) 0.48 debye

939. The correct order regarding the electronegativity of hybrid orbitals of carbon is:
a) $sp < sp^2 > sp^3$ b) $sp < sp^2 < sp^3$ c) $sp > sp^2 < sp^3$ d) $sp > sp^2 > sp^3$

940. Which of the following groups all do not have $sp^3\ d$ hybridisation?
a) ClF_3, IF_3, XeF_3^+ b) ICl_2^-, ClF_2^-, I_3^- c) ClF_3, BrF_3, IF_3 d) $PCl_3, AsCl_3, PF_5$

941. Which of the following compounds does not follow the octet rule for electron distribution?
a) H_2O b) PH_3 c) PCl_3 d) PCl_5

942. Which of the following sets represents the collection of isoelectronic species?
a) $Na^+, Mg^{2+}, Al^{3+}, Cl^-$ b) $Na^+, Ca^{2+}, Sc^{3+}, F^-$ c) $K^+, Cl^-, Mg^{2+}, Sc^{3+}$ d) $K^+, Ca^{2+}, Sc^{3+}, Cl^-$

943. Which of the following has unchanged valency?
a) H b) Na c) Fe d) O

944. The structure of XeF_4 is:
a) Planar b) Tetrahedral c) Square planar d) Pyramidal

945. N_2 and O_2 are converted into N_2^+ and O_2^+ respectively.
Which of the following is not correct?
a) In N_2^+, the N – N bond weakens
b) In O_2^+, O – O bond order increases
c) In O_2^+, paramagnetism decreases
d) N_2^+ becomes diamagnetic

946. Which molecule has trigonal planar geometry?
a) IF_3 b) PCl_3 c) NH_3 d) BF_3

947. Malleability and ductility of metals can be accounted due to
a) The presence of electrostatic force
b) The crystalline structure in metal
c) The capacity of layers of metal ions to slide over the other
d) The interaction of electrons with metal ions in the lattice

948. Underlined carbon is sp^3 hybridised in
a) $CH_3\underline{C}H = CH_2$ b) $CH_3\underline{C}H_2NH_2$ c) $CH_3\underline{C}ONH_2$ d) $CH_3CH_2\underline{C}N$

949. Hydrogen fluoride is a liquid unlike other hydrogen halides because:
a) HF molecules associate due to hydrogen bonding
b) F_2 is highly reactive
c) HF is the weakest acid of all hydrogen halides
d) Fluorine atom is the smallest of all halogens

950. The number of sigma (σ)and pi (π) covalent bonds respectively in banzene nitrile are
a) 5, 13 b) 15, 3 c) 13, 5 d) 16, 2

951. In which one of the following cases, breaking of covalent bond takes place?
a) Boiling of H_2O b) Melting of KCN c) Boiling of CF_4 d) Melting of SiO_2

952. Which compound is soluble in water
a) CS_2 b) C_2H_5OH c) CCl_4 d) $CHCl_3$

953. A π-bond is formed by sideways overlapping of:
a) *s*-*s* orbitals b) *p*-*p* orbitals c) *s*-*p* orbitals d) *s*-*p*-*s* orbitals

954. Which statement is true?
a) Absolutely pure water does not contain any ion.
b) Some covalent compounds may also give ions in aqueous solution.
c) In aqueous solution only electrovalent compound give ions.
d) Very sparingly soluble substances do not dissociate in aqueous solution

955. Formation of π-bond:

a) Increases bond length
b) Decreases bond length
c) Distorts the geometry of molecule
d) Makes homoatomic molecules more reactive

956. In which reaction, the hybridisation on the central atom changes from sp^2 to sp^3?
a) $NH_3 + H^+ \longrightarrow NH_4^+$ b) $BF_3 + F^- \longrightarrow BF_4^-$ c) $H_20 + H^+ \longrightarrow H_3O^+$ d) $C_2H_2 + 2H_2 \longrightarrow C_2H_6$

957. The low solubility of $BaSO_4$ in water is due to:
a) Low dissociation energy
b) Ionic bonds
c) High value of lattice energy
d) None of the above

958. The number of lone pairs of electron on Xe in $XeOF_4$ is:
a) 1 b) 2 c) 3 d) 4

959. Which compound does not contain double bond or triple bond?
a) C_2H_4 b) H_2O c) N_2 d) HCN

960. The compound showing maximum covalent character is:
a) BI_3 b) BCl_3 c) BF_3 d) BBr_3

961. Carbon atoms in $C_2(CN)_4$ are:
a) sp-hybridised
b) sp^2-hybridised
c) sp- and sp^2-hybridised
d) sp, sp^2 and sp^3-hybridised

962. Which statement is wrong?
a) 2nd ionisation energy shows jump in alkali metals
b) 2nd electron affinity for halogens is zero
c) Maximum electron affinity exists for F
d) Maximum ionization energy exists for He

963. Value of x in potash alum,
$K_2SO_4.AI_x(SO_4)_3.24H_2O$ is
a) 4 b) 1 c) 2 d) None of these

964. Among the following, the paramagnetic compound is
a) Na_2O_2 b) O_3 c) N_2O d) KO_2

965. HCl molecule in the vapour state is an example of:
a) Non-polar bond b) Ionic bond c) Polar covalent bond d) Pure covalent bond

966. The electrons in an incomplete outershell are known as:
a) Kernel electrons b) Valency electrons c) Shell electrons d) None of the above

967. According to bond order concept the correct order of stability of O_2, O_2^+, and O_2^- is
a) $O_2 > O_2^+ > O_2^-$ b) $O_2^- > O_2 > O_2^+$ c) $O_2 > O_2^- > O_2^+$ d) $O_2^+ > O_2 > O_2^-$

968. The element which exists in both hard and soft form is:
a) Fe b) Si c) C d) Al

969. Which of the following is not a correct statement?
a) Every AB_5 molecule does in fact have square pyramid structure.
b) Multiple bonds are always shorter than corresponding single bonds.
c) The electron-deficient molecules can act as Lewis acids.
d) The canonical structures have no real existence.

970. The bond strength increases:
a) With increasing bond order
b) With increasing extent of overlapping of orbitals
c) With decreasing difference between energies of overlapping orbitals
d) All of the above

971. The number of unpaired electrons in O_2 molecule is:
a) Zero b) 1 c) 2 d) 3

972. Which has higher bond energy and stronger bond?
a) F_2 b) Cl_2 c) Br_2 d) I_2

973. Which of the following statements regarding carbon monoxide is correct?
a) It involves *sp*-orbitals of carbon
b) It contains a lone pair only on carbon
c) It contains a lone pair only on oxygen
d) In carbonyl, oxygen end is attached to the metal atoms

974. Which of the following is having highest bond length?
a) NO^- b) NO^+ c) CN^- d) CN^+

975. Which of the following statement is correct for $CsBr_3$?
a) It is a covalent compound
b) It contains Cs^{3+} and Br^- ions
c) It contains $Cs^+$and Br_3^- ions
d) It contains Cs^+, Br^- and lattice Br_2 molecule

976. In 1 – butene number of σ - bonds is
a) 8 b) 10 c) 11 d) 12

977. Which does not have pyramidal geometry?
a) SO_3^{2-} b) NO_3^- c) NH_3 d) $C(C_6H_5)_3^-$

978. The nature of bonding in CCl_4 and CaH_2 :
a) Electrovalent in both CCl_4 and CaH_2
b) Covalent in CCl_4 and electrovalent in CaH_2
c) Electrovalent in CCl_4 and covalent in CaH_2
d) None of the above

979. Which of the following oxides is not expected to react with sodium hydroxide?
a) BeO b) B_2O_3 c) CaO d) SiO_2