Chemistry

1. From which of the following, the concept of zero point energy originates?
   a) Heisenberg's uncertainty principle.*
   b) de Broglie hypothesis
   c) Schrodinger wave equation.
   d) None of these.

2. The nineteenth electron in chromium atom has the following set of quantum numbers (n,l,m,s respectively)
   a) 3,0,0,1/2 b) 4,-2,0,1/2 c) 4,0,0,1/2 * d) 3,0,2,1/2.

3. The species which has nonlinear structure among the following is
   a) I^{3-} b) N^{3-} c) I^{3+*} d) CO_2.

4. If the ionization energy of hydrogen atom is 13.2eV, an electron in the fifth orbit of Ne^{9+} will be (in eV)
   a) 13.2, b) 52.8* c) 39.6 d) 26.4

5. Total number of sigma bonds present in a molecule of P_2O_5 is
   a) 18, b) 12, c) 20 d) 16*.

6. The ion among the following which is colored is
   a)La^{3+}, b) Eu^{3+},* c) Gd^{3+}, d) Lu^{3+}.

7. According to Bohr's theory the angular momentum of an electron in the 5^{th} orbit is a) $5h/\pi$, b) $2.5h/\pi$,* c) $10h/\pi$, d) $25h/\pi$.

8. The number of atoms present in a cube-based unit cell having one atom on each corner and two atoms on each body diagonal of the cube is

a) 4, b) 6, c) 8, d) 9*.

9. The crystal structure of Na_2O is

a) antifluorite,* b) fluorite, c) rutile, d) antirutile.

10. The quantum mechanical system for which the energy increases quadratically with the quantum number n is

a) one dimensional harmonic oscillator, b) hydrogen atom,

c) particle in a box,* d) rigid rotator.

11. The uncertainty in position of an electron having mass $9.1X10^{-28}$ g moving with a velocity of $3X10^4$ cm/sec accurate up to 0.011/ will be (in cm)

a) 7.68, b) 3.84, c) 1.94, d) 0.175.*

12. Naturally occurring boron is 80/ $_5B^{11}$ and 20/ $_5B^{10}$. The atomic weight of boron is

a)10.20, b)10.50, c)10.80,* d)11.20.

13. An electron moving with a velocity v is found to have a certain value of de Broglie wavelength. The velocity to be possessed by the neutron to have the same de Broglie wave length is

a) ν, b)1840ν, c) 1840/ν, d) ν/1840.*

14. The periodic group consists entirely of metals is

a) IIA,* c) IIIA, c) VIA, d) VIIA.

15. The element among the following having the highest ionization potential is

a) Na, b) Se, c) Br, d) Kr.*

16. The electronic transition between Bohr's orbits in hydrogen responsible to the third line in Balmer series is

a) 5 to1, b) 5 to 2,* c) 4 to 2 , d) 6 to 3.

17. The species among the following which is paramagnetic is

a) BN, b) N_2, c) O_2,* d) O^{2-}.

18. The species among the following which has neither oxidizing nor reducin property is a)F^- * b)HNO_3 c)Fe^{2+} d)$MnO4^-$.

19.Manganese(II) forms a complex with bromide ion. Its paramagnetism indicates five unpaired electrons. The geometry of the complex will be

a) tetrahedral,* b) octahedral, c) trigonal bipyramid, d) square planar.

20. The total number of geometrical isomers possible for the coplanar complex $[Pt(NH_3)(NH_2OH)Py(NO_2)]+$ will be

a) 6, b) 4, c) 3,* d) 2.

21. The frequency of the light having wavelength 5000 A^o will be (in THz)

a) 1666.7, b) 2500.0, c) 1199.2, d) 599.6.*.

22. Among the following species, the one which has the largest size is

a) Mg^{2+}, b) F^{-},* c) Ne, d) Na^{+}.

23. A normal hydrogen molecule has a bond distance of 2.4A°. The bond distance for a hypothetical hydrogen molecule in which the electrons were each in second Bohr orbit will be (in A°)

a) 4.8 , b) 9.6,* c) 13.2, d) 14.4.

24. The photoelectric emission from a surface starts only when the light is incident upon the surface has certain minimum

a) velocity, b) wave length , c) intensity, d) frequency*.

25. The electrons in two hydrogen atoms A and B move around the nucleus in circular orbits of radius r and 4r respectively. To complete one complete revolution the ratio of the times taken is

a) 1:8,* b) 1:4, c) 1:2, d) 2:1.

26. A solution of $MgCl_2$ in water has pH

a) 14, b) 7, c) <7,* d) >7.

27. The diatomic molecule among the following in which the shortest bond length is present is a) C_2, b) N_2,* c) O_2, d) F_2.

28. The property possessed by the species O^{2+} according to MO theory is

a) bond order is 2.5,* b) lower stability than O_2,

c) diamagnetic character, d) presence of three unpaired electrons.

29. The set among the following consisting of all paramagnetic species is

a) B_2, N_2, O_2 , b) B_2, O_2, F_2,

c) B_2, O_2, NO, * d) Li_2, B_2, O_2.

30. The compound among the following showing highest viscosity is

a) glycerol,* b) water, c) ethanol, d) ethylene glycol.

31. The allowed wave lengths for a free particle in a one dimensional box of length L are given by a) 2L/3n, b) L/2n, c) L/n, d) 2L/n*.

32. The bond order in NO molecule is

a) 2.5, * b) 3, c) 3, d) 2.

33. In an alkaline medium a monosaccharide forms enediols which may reduce metal ions like:

a. Cu^{2+} b. Ag^{+} c. Fe^{3+} d. all of the mentioned*

34. The value of Bohr radius is 0.54 A^o. The value of the radius of the fourth orbit in Be^{2+} is (in A^o)

a) 4.32, b) 1.08, c) 8.64, d) 2.16.*

35. A 1s orbital refers to
a) circular track in which an electron travels, b) a one-electron wave function,*

c) an observable property of the system,

d) a Hermitian operator.

36. The orbit angular momentum of an electron of an element in 2s orbital is

a) h/2π,* b) h/4π, c) h/8π, d) zero.

37. In the brown ring compound , iron has the oxidation number

a) 0, b) +1,* c) +2, d) +3.

38. Among NO^+, NO and NO^-, which one has the longest N—O bond length?

a) NO^- *, b) NO, c) NO^+, d) same for all of them.

39. The hybridization state of Xe atom in XeO_2F_2 is

a) sp^3d^2, b) dsp^3, c) sp^3d, * d) d^2sp^3.

40. Among CH_4, NH_3, HF, and BeH_2, the boiling point is highest for
a) CH_4, b) NH_3, c) HF,* d) BeH_2.

41. The coordination sphere [$Cr^{III}(NH_3)_2(H_2O)_2Cl_2$] bears a charge of

a) 0, b) +1,* c) -1, d) +2.

42. The value of x in the carbonyl $HxCr(CO)_5$ is

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

43. Diborane is

a) an electron deficient compound,* b) an electron excess compound,

c) an electron precise compound, d) none of them.

44. The most effective projectile in radioactive capture reaction is

a) $_2He^4$, b) $_1H^1$, c) gamma photon, d) $_1n^1$.*

45. Bonding of F^- with HF to form HF^{2-} is

a) hydrogen bond, * b) ionic bond, c) covalent bond, d) van der Waal's force.

46. An inner-metallic complex is

a) anionic, b) cationic, c) neutral,* d) zwitterionic.

47. Repulsion among orbital is maximum in

a) lp – lp,* b) bp – bp, c) lp – bp, d)none of them.

48. The most stable electronic configuration of Fe^{3+} has a total spin multiplicity of

a) 0, b) 2, c) 4, d) 6.*

49. ψ^2 represents

a) total probability, b) probability density,* c) probability, d) position.

50. The hybridization used by Te in forming the ion $TeCl_6^{2-}$ is
a) $5s5p^35d^2$, b) $5s5p^36d^2$, c) $5d^26s6p^3$, d)$6s5p^35d^2$.*

51. The most acidic among the following is
a) $[Al(H_2O)_6]^{3+}$,* b) $[Ni(H_2O)_6]^{2+}$, c) $Mn[(H_2O)_6]^{2+}$, d)$[Na(H_2O)_n]^{+}$.

52. The shape of $XeOF_2$ molecule is

a) trigonal bipyramid, b) square pyramid,* c) regular pentagon, d)tetrahedron.

53. The oxidation number of nitrogen in azide ion is

a) -1/3,* b)-1, c)-3, d) -5.

54. Which property of the elements does not depend upon the electronic

configuration of the atoms ?

a) magnetic, b) nuclear,* c) physical, d) chemical.

55. The product formed in the reaction between PCl_5 and F_2 is

a) PCl_4F, b) PCl_2F_3, c) PF_5, d) PCl_3F_2.*

56. The number of unpaired electrons present in Ni^{2+} ion is

a) 0, b) 2,* c) 4, d) 8.

57. The coordination number of a Ti atom in rutile is

a) 10, b) 8, c) 6,* d) 4.

58. The total number of valence electrons in carbonate ion is

a) 20, b) 22, c) 24,* d) 32.

59. The ion among the following which does not have S – S linkage is

a) $S_2O_8^{2-}$,* b) $S_2O_6^{2-}$, c) $S_2O_5^{2-}$, d) $S_2O_3^{2-}$.

60. The wave number of the first line in Balmer series of hydrogen spectrum is nearly

a) 82,259 cm^{-1} b) 82,000 cm^{-1} c)97,492 cm^{-1} d) 15,200 cm^{-1}*

61. The solvent (dielectric constant given in bracket) in which KI is most soluble is

a) CCl_4 (0), b) C_6H_6 (0), c) methanol (32),* d) acetone (2).

62. The dipole moment of HBr is $0.78X10^{-18}$ esu cm and interatomic spacing is1.41 A°. The is1.41 A°. The percent ionic character of HBr

a) 7.5, b) 11.7,* c) 15.2, d) 27.3.

63. Injury by shot of a gun may cause poisoning by

a) Pb,* b) Hg, c) As, d) Fe.

64. P_4O_{10} molecule has both long and short P—O bonds. The number of such short bond(s) is

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

65. Burning of fossil fuels is the main source of which of the following pollutants?

a) nitric oxide, b) sulphur oxide,* c) carbon monoxide, d) particulate matters.

66. Which one among the following will emit β-particle ?

a) ${}_1H^3$, b) ${}_6C^{14}$, c) ${}_{19}K^{40}$, d) all of them.*

67. The general formula among the following which is associated with Fac-Mer isomerism is

a) $M(AA')_2$, b) $M(AA)_3$, C) MABCD d) MA_3B_3.*

68. Which one among the following bases will be suitable to generate acetylide anion from acetylene?

a) OEt^-, b) OMe^-, c)OH^-, d) NH_2^-.*

69. Addition of singlet carbene on cis -2-butene gives 1,2 dimethylcyclopropane with two methyl groups as

a) cis,* b) trans, c) both cis and trans, d) can't be predicted.

70. The product obtained on trapping of benzyne with furan on treatment with acid gives

a) 2-naphthol, b) 1-naphthol,* c) naphthalene, d) none of them.

71. The spin state of difluorocarbene in the ground state is

a) triplet, b) either singlet or triplet, c) singlet,* d) not known.

72. The stability order of alkyl carbocations is

a) $3^o > 2^o > 1o$,* b) $1^o > 2^o > 3^o$, c) $2o > 3^0 > 1^o$, d) all of equal stability.

73. The geometry of the carbanion $^-CH_2—NO_2$ is

a) tetrahedral, b) linear, c) pyramidal, d) planar trigonal.*

74. The reagent for epoxidising an alkene is

a) $KMnO_4$, b) HCO_3H,* c) $NaOH + H_2O_2$ d) BaO_2.

75. Which of the following will not give Cannizzaro reaction ?

a) Ph-CHO, b) H_2CO, c) Me_3C-CHO, d) Cl_3C-CHO.*

76. Which of the following reagents can be used for purification of a ketone?

a) NH_3, b) HCN, c) $NaHSO_3$,* d) $NaHCO_3$.

77. The reagent(s) used for converting 2-butyne to cis-2-butene is (are)

a) H_2 + Lindlar catalyst,* b) H_2 + Ni, c) Na + liq NH_3, d) H_2 + Pd.

78. The product formed when acetone is boiled with conc. H_2SO_4 is

a) mesityl oxide, b) mesitylene,* c) diacetone alcohol, d) none of them.

79. DDT is prepared by the reaction between chlorobenzene (in the presence conc. H_2SO_4) and another compound which is

a) chlorine, b) lindane, c) gammaxene, d) chloral.*

80. 1-Butene reacts with HBr in the presence of UV light to give

a) 2-bromobutane, b) 1,2-dibromobutane, c) 1- bromobutane,*

d) none of them.

81. In the nitration of benzene with conc. HNO_3, the other reagent along with conc. HNO_3 used is .

a) conc. H_2SO_4,* b) anhyd. $FeCl_3$, c) UV light d) $NaNO_2$.

82. The ester (+)- Ph-CO-OCHMePh on alkaline hydrolysis give the alcohol Ph-CHPh-OH, which has optical rotation

a) (+), b) (-), c) (±),* d) can't be predicted.

83. Acetyl nitrene reacts with water to furnish

a) CH_3-COOH, b) CH_3-$CONH_2$, c) CH_3-CN d) CH_3-NHOH.*

84. The one among the following which does not give haloform reaction is

a) CH_3-CO-CH_3, b) CH_3-COOH,* c) C_2H_5-OH, d) CH_3-CHO.

85. For allylic or benzylic bromination , the reagent to be used is

a) Br_2 in CCl_4, b) Br_2 in acetic acid, c) NBS,* d) HBr.

86. Boiling point of glycerol is higher than that of ethanol because of

a) hydrogen bonding,* b) higher molecular weight,

c) higher number of carbon atoms, d) none of them.

87. Acetaldehyde on boiling reacts with chlorine to give

a) CH_3-COCl, b) Cl_3C-CHO,* c) CH_3-$CHCl_2$, d) none of these.

88. The stereochemistry of Br_2 addition on cis or trans alkene is generally

a) syn, b) anti,* c) both syn and anti, d) can't be predicted.

89. The isomerism shown between cis- and trans- 2-butenes is

a) structural, b) enantiomerism, c) diastereomerism,* d) none of them.

90. The order of dipole moment of ethyl chloride (A), vinyl chloride (B) and Ethynyl chloride (C) is

a) A<B<C, b) B<C<A, c) C<A<B, d) C<B<A.*

91. All naturally occurring chiral amino acids have the configuration

a) D b) L* c) mixture of D and L d) anyone of D and L.

92. Cycloheptatrienyl cation is classified as

a) nonaromatic, b) antiaromatic, c) homoaromatic, d) aromatic.*

93. A racemic modification is optically inactive because of

a) internal compensation,* b) external compensation,

c) achiral nature, d) none of these.

94. The isoelectric pH of aspartic acid is

a) equal to 0, b) >7, c) <7,* d) equal to 7.

95. Amino acids exist in the form known as

a) nonpolar form b) staggerd form

c) chelated form d) zwitterionic form.*

96. In the synthesis of the dye Bismarck brown, the main starting material is

a) aniline, b) m-phenylenediamine,* c) benzaldehyde, d) phenol.

97. The alcohol obtained in the Cannizzaro reaction of Ph-CDO with NaOH is

a) Ph-CD_2-OH,* b) Ph-CHD-OH, c) Ph-CD_2-OD, d) Ph-CHD-OD.

98. The alkene R-CH = CH_2 [-R = CMe_3] on hydroboration-oxidation gives

a) R-CHOH=CH_2, b) R-CH_2-CH_2OH,*, c) (R-CH_2-CH_2)$_3$B

d) none of these.

99. When Ph-NH_2 is heated with $CHCl_3$ and alcoholic alkali, the poisonous compound formed is

a) Ph-CN, b) Ph-NHCl, c) Ph-NC,* d) Ph-NH-OH.

100. Among the following which one cannot reduce Tollens' reagent ?

a) glucose, b) fructose, c) sucrose,* d) arabinose.

101. The major strain present in cyclopropane is

a) torsional strain, b) steric strain, c) angle strain,* d) Pitzer strain.

102. On reaction with $KMnO_4$ trans-2-butene produces butane-1,2-diol which is

a) meso b) dl * c) only d d) only l

103. The reagent best suited for converting (S)-propylene oxide to (S)-propane-1,2 diol is

a) aq. alkali* b) aq. Acid c) water d) none of these

104. When a diazotized solution of aniline is added to a cooled solution of alkaline β-naphthol, a colored dye is obtained which is

a) a diazo compound b) an azo compound *

c) an aminoazo compound d) a diazoamino compound

105. The reagent(s) for conversion of phenol to salicylaldehyde will be

a) formaldehyde b) NaOH + CO_2

c) NaOH + salol d) NaOH + $CHCl_3$ *

106. The number of possible alkanes that could be formed in the reaction of two different alkyl chlorides with sodium in dry ether is

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

107. In Kolbe electrolysis of potassium succinate, the product formed at the anode is

a) ethane b) butane c) succinic anhydride d) ethylene *

108. The best suited reaction for the preparation of the alkane $Me_3C\text{-}CH_2\text{-}CH_3$ is a) Wurtz reaction, b) Kolbe electrolysis, c) Corey-House synthesis,* d) Grignard reaction.

109. 2,3-Dimethyl -2-butene is stablest among all isomeric C_6 alkenes, which is due to the effect known as

a) hyperconjugation * b) resonance

c) inductive effect d) mesomeric effect

110. When $R\text{-}CH_2\text{-}COOH$ is reacted with bromine and a little red P, the product formed is a) R-CH2-COBr b) R-CHBr-COBr

c) R-CHBr-COOH * d) $R\text{-}CH_2\text{-}COOBr$

111. Order of the strength of the acids benzoic acid (I), salicylic acid (II) and 2,6-dihydroxybenzoic acid (III) is

a) I > II > III, b) II > III > I, c) III > II > I, * d) II > I > III.

112. The preferred conformation of ethylene glycol is the gauche form, because it is stabilized by

a) van der Waal's force b) intramolecular hydrogen bonding,*

c) dipolar force d) none of these

113. Which of the following would not form complex with boric acid ?

a) ethylene glycol b) propane-1,2-diol

c) butane-2,3-diol d) butane-1,4-diol *

114. The reactivity of the carbonyl compounds acetaldehyde (I), formaldehyde (II) and benzaldehyde (III) follows the order

a) I > II > III. b) III > II > I, c) II > III > I, d) II > I > III.*

115. Which of the following will not evolve CO_2 from $NaHCO_3$?

a) phenol,* b) 2,4,6-trinitrophenol, c) acetic acid, d) propenoic acid.

116. The number of possible stereoisomers that benzene hexachloride can have is

a) 2 b) 4 c) 6 d) 8 *

117. D-arabinose on step up gives a mixture of

a) D-glucose and D-gulose b) D-glucose and D-mannose *

c) D-mannose and D-gulose d) D-allose and D-idose

118. The percent content of carbon in anthracite coal is

a) 98 - 90,* b) 83 – 93, c) 70 – 73, d) 55 – 60.

119. When optically active 2-iodooctane is warmed with I_2 in acetone, the stereochemical consequence is

a) inversion b) racemization * c) retention d) can't be predicted.

120. The rates of hydrolysis of $CH_3(CH_2)_3CH_2Cl$ (I), CH_3-S-CH_2CH_2Cl (II), and CH_3-O-CH_2CH_2Cl (III) with dilute alkali follows the order

a) I > II > III, b) III > II > I, c) II > III > I,* d) II > I > III.

121. The octane number of gasoline is measured with respect to the hydrocarbon taken as standard, which is

a) heptane, b) isooctane,* c) octane, d) isoheptane.

122. When allene is reacted with excess carbene ($:CH_2$), the product is

a) $CH_2=C=C(CH_3)_2$, b) spiropentane,* c) CH_3-CH=C=CH-CH_3,

d) none of these.

123. Reformatsky reaction is employed to synthesize

a) γ-hydroxyesters, b) γ-hydroxyacids, c) β-hydroxyesters*

d) β-hydroxyacids.

124. Dehydrobromination of Ph-CD_2-CH_2Br by alkali is about 6.5 times faster than that of its protium analogue. The mechanism followed is

a) E_2,* b) E_1cB, c) E_1, d) mixed E_2 and E_1cB.

125. The order for the rates of nitration of Ph-Cl (I), Ph-H (II) and Ph-NO2 (III) will be as follows

a) I > II > III, b) III > II > I, c) II > I > III,* d) II > III > I.

126. Friedel-Craft's alkylation of benzene with n-propyl chloride in the

presence of anhydrous $AlCl_3$ gives mainly

a) n-Propylbenzene, b) isopropylbenzene,*

c) Ph- CH=CH-CH_3, c) Ph-CH_2-CH=CH_2.

127. When Me_3C-O-CH_3 is reacted with cold dilute HI, the iodide formed is

a) Me_3C-I,* b) CH_3-I, c) mixture of CH_3-I and Me_3C-I,

d) no reaction takes place.

128. Which of the following hydrocarbons will have acidic hydrogen ?

a) ethane, b) ethene, c) ethyne,* d) 2-butyne.

129. The product obtained on ozonolysis of benzene is

a) phenol, b) glyoxal,* c) acetone, d) propionaldehyde.

130. The states of hybridizations of C-1 and C-2 in buta-1,2,3-triene are respectively

a) sp^3 and sp^2, b) both sp^2, c) sp and sp^2, d) sp^2 and sp.*

131. Which of the following alkynes will not give precipitate with ammoniacal silver nitrate ?

a) 1-butyne, b) 2-butyne,* c) 1-propyne, d) ethyne.

132. The most stable carbanion among the following is

a) Allyl anion, b) pentadienyl anion,

c) cyclopentadienyl anion, * d) cycloheptatrienyl anion.

133. The polymer obtained on polymerization of phenol with formaldehyde is

a) bakelite,* b) teflon, c) nylon, d) PVC.

134. The dimension of isothermal compressibility is

a) V^{-1}, b) P^{-1},* c) V, d) P.

135. For isothermal free expansion of an ideal gas, which of the following statement is incorrect ?

a) $\Delta S = 0$,* b) $\Delta U = 0$, c) $\Delta T = 0$, d) $q = 0$.

136. When is the change in enthalpy equal to the change in internal energy ?

a) at constant pressure, b) at constant volume,*

c) at constant temperature, d) none of them.

137. A chemical reaction is exothermic and the heat evolved instantaneously given to the surroundings and the temperature of the system does not rise at all. Such a process is known as

a) adiabatic, b)isobaric, c) isochoric, d) isothermal.*

138. In which of the following cases does entropy decrease ?

a) solid changing to liquid, b) polymerization,*

c) expansion of gas, d)dissolution of crystals.

139. Effect of temperature on ΔH is given by

a) Clausius-Clayperon equation, b) Gibb's-Duhem equation,

c) Kirchhoff's equation,* d) Berthelot equation.

140. In a reaction both ΔH and ΔS are greater than zero. In which of the following cases the reaction would be spontaneous?

a) H > ΔTAS, b) ΔH= TΔS, c) TΔS = -ΔH, d)TΔS > ΔH.*

141. For the reaction A --→ B+C, when the concentration of A is doubled, the rate becomes eight times. The order of the reaction is

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

142. The equation for the rate constant is given by $K = PZe^{-E/RT}$. A chemical reaction will proceed more rapidly if there is a decrease in

a) E,* b) P, c) T, d) Z.

143. The product ε.c.l (c= conc. , l = path length and ε = extinction coefficient) is known as

a) distribution coefficient , b) optical density,*

c) absorption coefficient, c) molar absorption coefficient.

144. A catalyst increases the rate of a chemical reaction by

a) increasing the average KE of the molecules,

b) increasing the number of active molecules,

c) increasing the activation energy,

d) decreasing the activation energy.*

145. A molecule returns from excited singlet state to ground singlet state with emission of light. The phenomenon is known as

a) chemiluminiscence, b) fluorescence,*

c) phosphorescence, d) scattering.

146. At very low temperature, specific heat of a solid varies with absolute temperature as

a) T^3,* b) T^2, c) T^{-2}, d) T^{-3}.

147. Iodine is solid due to

a) Debye interaction, b) van der Waal's interaction,

c) London interaction,* d) all of them.

148. In the FCC unit cell of closest packed atoms, the radius of atoms in terms of the edge length (a) of the unit cell is

a) $\sqrt{3}a/4$, b) $a/2$, c) $a/\sqrt{2}$, d) $a/2\sqrt{2}$.*

149. Unit of ionic mobility is

a) volt cm^{-1} sec, b) cm^2 $volt^{-1}$ sec^{-1},* c) $cm^{-2}volt^{-1}sec$, d)cm $volt^{-1}sec^{-1}$.

150. The equivalent conductance(Λ) is related to the ionic mobility of the cation (U^+) and the anion (U^-) as

a) $\Lambda = U^+ + U^-$, b) $\Lambda = U^+F + U^-F$,* c) $\Lambda = U^+/F + U^-/F$, d) $\Lambda = U^+/2 + U^-/2$.

151. The emf of a cell may be expressed in terms of the reduction potentials RHS electrode (R_H) and the LHS electrode (R_L) as

a) $E_L - E_R$, b) $E_R + E_L$, c) $E_R - E_L$,* d) E_R/E_L.

152. In the radial distribution of a 3d orbital the number of node(s) is/are

a) 0,* b) 1, c) 2, d) 3.

153. Bragg's law is best applicable for

a) higher order of diffraction,* b) lower order of diffraction,

c) any order of diffraction, d) none of them.

154. For A and B to form an ideal solution, which of the following conditions should be satisfied?

a) $\Delta H_{mixing} = 0$, b) $\Delta S_{mixing} = 0$, c) $\Delta V_{mixing} = 0$, d) all of them.*

155. The order of a reaction of which the rate constant is equal to the rate of the reaction at all concentrations should be

a) 0,* b) 1, c) 2, c) 3.

156. The unit of the rate of a reaction is

a) s^{-1}, b) mol s^{-1}, c)mol L^{-1} sec^{-1},* d) mol^{-1} L sec^{-1}.

157. A radioactive decay follows the kinetics of order

a) 0, b) 1,* c) 2, d) complicated .

158. The half-life period of a radioactive element is 130 days. After 520 days, one gram of the element will reduce to

a) 1/4 gm, b) 1/2 gm, c) 1/8 gm, d) 1/16 gm.*

159. The rate constant of a reaction depends upon

a) temperature,* b) time of the reaction, c) initial concentration of the reaction, d) extent of the reaction.

160. In the collision theory, pre-exponential factor is

a) T,* b) T, c) T^2, d) none of these.

161. In a cubic unit cell, the total number of symmetry is

a) 20, b) 21, c) 22, d) 23.*

162. The edge length of the unit cell of NaCl is 564 pm. If the size of Cl^- ion is 181 pm, the size of Na^+ ion will be

a) 80 pm, b) 95 pm, c) 101 pm,* d) 167 pm.

163. Considering the cell potentials $E^o_{Mg2+/Mg}$ = -2.37 V and $E^o_{Fe3+/Fe}$ = -0.04 V, the best reducing agent would be

a) Fe, b) Mg,* c) Mg^{2+}, d) Fe^{3+}.

164. ZnO is yellow when hot, but white when cold because of

a) d-d transition, b) s-p transition, c) crystal defect,* d) scattering.

165. The number of atoms in a single primitive cubic unit cell is

a) 1,* b) 2, c) 4, d) 8.

166. Which of the following is an extensive property ?

a) equivalent conductance, b) specific conductance,*

c) molar conductance, d) activity.

167. The quantum yield in primary process of a photochemical reaction is

a) 0, b) 1,* c) 2, d) 3.

168. Which of the following anions has the highest equivalent conductance at infinite dilution ?

a) OH^-,* b) Cl^-, c) NO^{3-}, d) $SO4^{2-}$.

169. The energy of photon having frequency in the UV-Vis region is (in eV)

a) 1 to 10, b) 10^3 to 10^5, c) 10^6 to 10^8 d)10^{-2} to 10^{-4}.*

170. When a lead storage cell is charged

a) H_2SO_4 is formed,* b) H_2SO_4 is consumed,

c) PbSO4 is formed, d) Pb is consumed.

171. In the potentiometric titration of $AgNO_3$, the electrolyte used as a salt bridge is

a) NaCl, b) KCl, c) $CaCl_2$, d) NH_4NO_3.*

172. The logarithm of mean activity coefficient of an electrolytic solution decreases with ionic strength (μ) as

a) $\mu^{1/2}$,* b) μ, c) $\mu^{3/2}$ d) μ^2.

173. For a gas obeying the equation of state P(V-b) = RT, Joule-Thomson coefficient is

a)always zero, b) always negative,* c) always positive,

d) alters from negative to positive through zero.

174. Spontaneous adsorption of gases on solid surface is always

a) endothermic, b) exothermic,* c) isoentropic, d) isothermal.

175. Two moles of an ideal gas is expanded isothermally at 20°C from volume V to 2.5V. If the expansion is free, ΔS for the surrounding is

a) 15.2 JK^{-1}, b) -15.24 JK^{-1}, c) 7.26 JK-1 d) zero.*

176. The decrease in Gibb's free energy can be identified with the

a) total work, b) total heat, c) total energy, d) maximum available work.*

177. For an isothermal reversible expansion, entropy of a system

a) decreases,* b) increases, c) remains unchanged, d)none of them.

178. Which of the following thermodynamic quantities is not a state function ?

a) heat,* b) enthalpy, c) entropy, d) Gibb's free energy.

179. When T $\rightarrow$ 0, for a perfect crystalline solid, which one of the following is true ?

a) $\Delta H > \Delta G$, b) $\Delta H < \Delta G$, c) $\Delta H = \Delta G$,* d) $\Delta H = \frac{1}{2} \Delta G$.

180. For two moles of an ideal gas, the difference between Cp and Cv is

a) 2R,* b) R, c) R/2, d) R^2.

181. A Carnot engine is connected to two reservoirs of temperatures 300 K and 400 K. The efficiency of this engine is

a) 4/3, b) 1, c) 4/3,* d) 0.

182. For a first order phase transition at the transition temperature, specific heat at constant pressure is

a)infinity,* b) zero, c) same as both phases, d) none of them.

183. According to Debye-Huckel theory of strong electrolytes, an ion moving in an atmosphere of oppositely charged ions experiences a drag. This effect is known as

a) interionic effect, b) asymmetric effect,*

c) electrophoretic effect, d) concentration effect.

184. "Only those radiations which are absorbed by the system can bring about chemical change" – this is a statement of the

a) Lambert-Beer law, b) Grothus-Draper law,*

c) Einstein law, d) Photochemical equivalence law.

185. pH of 10-9 (M) aqueous solution of hydrochloric acid at 298K is

a) 8.99, b) 9.99, c) 13.99, d) 6.99.*

186. Miller indices (h,k,l) represent

a) a set of parallel planes,* b) a particular crystal plane,

c) a transition vector with components h, k, l. d) none of them.

187. Catalytic poisons act by

a) preferential adsorption on the catalyst surface,

b) chemical combination with any of the reactants,*

c) increasing the rate of backward reaction,

d) making the product chemically inactive.

188. Average velocity of the molecules of a gas along a particular axis is

a) $(8RT/\pi M)^{1/2}$, b) $(5RT/\pi M)^{1/2}$, c) $(3RT/\pi M)^{1/2}$, d) zero.*

189. In polymer formation process, the enthalpy change and the entropy change should be respectively

a) both less than zero,* b) both greater than zero,

c) zero and less than zero, d) greater than zero and zero.

190. For spontaneity at constant temperature and volume, $\Delta U_{T,V}$ should be

a) 0, b) >0, c) <0,* d) can't be predicted.

191. What will be the temperature of both reservoirs when a Carnot engine ceases to perform ($T_1 > T_2$) ?

a) $(T_1.T_2)^{1/2}$,* b) $(T_1.T_2)^{3/2}$, c) $(T_1.T_2)^{5/2}$, d) none of them.

192. The number of intersection points between an isotherm and an adiabate is

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

193. The residual entropy for one mole of CDH_3 will be

a) Rln3, b) Rln4, c) Rln5,* d) Rln2.

194. When a number of ideal gases are mixed together at equilibrium point, ΔG_T will be

a) zero, b) minimum,* c) maximum, d) anything.

195. In laminar flow of gases, molecules reaching a layer suffer last collision in a layer at a distance with respect to the mean free path is

a) equal, b) 1/4 th, c) 1/6 th, d) 2/3 rd.*

196. Find the amino acid that does not exhibit optical activity?

a. Metheonine b. Valine c. Glycine* d. Alanine

197. The Joule-Thomson effect shown by a gas obeying the equation P(V-b) = RT will be

a) no cooling,* b) no heating, c) no change in temperature,

d) can't be predicted.

198. Which of the following wave functions are acceptable for a quantum mechanical system over the range $0 \leq x \leq 2\pi$?

a) tanx, b) sinx.cosx, c) sinx + cosx* d) sinx - cosx.

199. An electron volt (eV) is the energy necessary to move an electric charge (e) through a potential of 1 eV. This energy in kCal/mole of electron will be

a) $1.6X10^{-19}$, b) 23,* c) 96.4, d) 6.023.

200. The magnitude of charge on an electron is $4.8X10^{-10}$ esu . The magnitude of charge on the protons in the nucleus of a helium atom will be

a) $4.8X10^{-10}$ esu, b) $4.8X10^{-8}$ emu, c) $9.6X10^{-10}$ esu,* d) $2.4X10^{-8}$ emu.