CHEMISTRY BSC LEVEL
(FINAL)

1. According to the principle of equipartition of energy, the contribution of one vibrational degree of freedom to total energy of a molecule is

   (A) k_BT
   (B) $\frac{1}{2}k_BT$
   (C) $2\,k_BT$
   (D) $\frac{3}{2}k_BT$

2. Above Boyle Temperature, the compressibility factor of a gas …….with increase in pressure

   (A) remains constant
   (B) decreases
   (C) increases
   (D) first decreases and then increases

3. The pH of a buffer solution obtained by mixing equimolar amounts of a weak acid (dissociation constant at 298 K == 1×10^{-5}) and its salt is

   (A) 3
   (B) 5
   (C) 14
   (D) 8

4. What is the point group of Ammonia?

   (A) C_{3v}
   (B) D_{3d}
   (C) D_{3h}
   (D) C_{2v}

5. For a tetragonal crystal,

   (A) $a=b=c,\ \alpha=\beta=\gamma=90°$
   (B) $a=b\neq c,\ \alpha=\beta=\gamma=90°$
   (C) $a\neq b\neq c, \alpha\neq\beta\neq\gamma\neq 90°$
   (D) $a\neq b\neq c, \alpha=\beta=\gamma=90°$

6. Miller Indices of the plane with intercepts 2a, - 3b and 4c along the crystallographic axes are

(A) 6 $\bar{4}$3
(B) 2 -3 4
(C) 2 $\bar{3}$ 4
(D) 4 $\bar{6}$ 2

7. When an ideal gas expands isothermally against vacuum,

(A) work done is positive
(B) internal energy change is positive
(C) heat exchanged is negative
(D) work done is zero

8. Which thermodynamic parameter is known as Time's arrow?

(A) internal energy
(B) enthalpy
(C) entropy
(D) Gibbs free energy

9. Residual entropy is *not* observed in

(A) Ice
(B) Nitric oxide
(C) Nitrous oxide
(D) Oxygen

10. On expansion, a gas gets……. above Joule Thomson inversion temperature

(A) cooled
(B) Heated
(C) liquefied
(D) solidified

11. As per Maxwell's relations, $\left(\frac{\partial T}{\partial V}\right)_s$ is equal to

(A) $\left(\frac{\partial S}{\partial P}\right)_v$

(B) $\left(\frac{\partial P}{\partial T}\right)_v$

(C) $-\left(\frac{\partial P}{\partial S}\right)_v$

(D) $\left(\frac{\partial P}{\partial S}\right)_v$

12. Which spectroscopic technique is particularly useful for studying electronic transitions in molecules?

(A) IR spectroscopy
(B) Mass spectrometry
(C) UV-Vis spectroscopy
(D) NMR spectroscopy

13. Identify the molecule which is microwave active

(A) CO_2
(B) H_2O
(C) C_6H_6
(D) O_2

14. Mutual exclusion principle in spectroscopy is applicable for molecules

(A) having a plane of symmetry
(B) lacking a centre of symmetry
(C) having a centre of symmetry
(D) lacking a plane of symmetry

15. The frequency of mid-IR region is

(A) 400 cm^{-1}–10 cm^{-1}
(B) 4000 cm^{-1}– 400 cm^{-1}
(C) 12500 cm^{-1}– 4000 cm^{-1}
(D) 10 cm^{-1} – 1 cm^{-1}

16. "Einstein" is a unit of

(A) Electricity
(B) Viscosity
(C) Energy
(D) Mechanical strength

17. The light produced by fire fly is an example of

(A) Thermoluminescence
(B) Photoluminescence
(C) Electroluminescence
(D) Chemiluminescence

18. According to Lindemann theory,the unimolecular reactions at low pressuresare of

(A) second order
(B) zero order
(C) first order
(D) third order

19. A species that is preferably adsorbed on the surface from the solution

(A) increases the surface tension of liquid
(B) decreases the surface tension of liquid
(C) does not change the vapour pressure of the liquid
(D) does not change the surface tension of liquid

20. Which among the following is *not*applicable for physisorption?

(A) involves weak forces
(B) spontaneous in nature
(C) reversible process
(D) irreversible process

21. Among the following, choose the **wrong** statement about Langmuir adsorptionmodel

(A) It is monolayer adsorption process
(B) The heat of adsorption is independent of the number of adsorption sites
(C) Adsorbed molecules interact with each other
(D) Each active site can adsorb only one molecule

22. Which one among the following is an acceptable wave function?

(A) e^x
(B) x^2
(C) $\sin x$
(D) $\tan x$

23. Degeneracy of the first excited state of a particle in a cubical box having energy $\frac{6h^2}{8ml^2}$ is

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

24. Energy levels in harmonic oscillators have a spacing of

(A) 3 hν
(B) 2 hν
(C) hν
(D) $\frac{1}{2}$hν

25. For the precipitation of a solute, the solubility product should be

(A) smaller than the ionic product
(B) larger than the ionic product
(C) equal to the ionic product
(D) zero

26. In a conductance cell, the resistance of a given salt solution is 300 ohm. If the specific conductance of the solution is 1.5×10^{-2} $ohm^{-1}cm^{-1}$, the cell constant is

(A) 0.0
(B) 4.5
(C) 450
(D) 2.25

27. Equivalent conductance of a weak electrolyte is 39.07 ohm^{-1} cm^2 eq^{-1}. If the equivalent conductance of it at infinite dilution is 390.7 ohm^{-1} cm^2 eq^{-1}, the degree of dissociation of the electrolyte is

(A) 20%
(B) 90%
(C) 10%
(D) 1%

28. If $E^{o}_{(Cd^{2+}, Cd)}$ and $E^{o}_{(Cu^{2+}, Cu)}$ are -0.40 V and 0.36 V respectively, the standard EMF of the cell $Cd \mid Cd^{2+} \| Cu^{2+} \mid Cu$ is

(A) 0.06 V
(B) -0.06 V
(C) 0.76 V
(D) -0.74 V

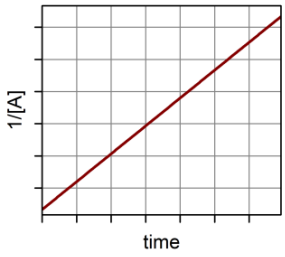
29. Fora redox reaction to occur spontaneously, the EMF of the cell should be

(A) Negative
(B) positive
(C) zero
(D) None of the above

30. The rate constant increases by a factor of 10 upon increasing the temperature from 300 K to 320 K. The activation energy of the reaction in $kJ.mol^{-1}$ is

(A) 22
(B) 44
(C) 66
(D) 88

31. The plot of a chemical reaction in which the reactant A converts to product is represented below



The order of the reaction is

(A) 0
(B) 1
(C) 2
(D) 3

32. Which of the following is ***true*** regarding adsorption?

(A) Adsorption is accompanied by an increase in entropy ($\Delta S > 0$)
(B) Adsorption is accompanied by a decrease in entropy ($\Delta S < 0$)
(C) Adsorption does not affect the entropy
(D) Adsorption is always accompanied by a significant increase in enthalpy ($\Delta H > 0$)

33. In which region of the electromagnetic spectrum is nuclear magnetic resonance (NMR) studied?

(A) Radio frequency
(B) Microwave
(C) UV – Visible
(D) X-ray

34. At a given temperature, the molar solubility of $PbBr_2$ is 2.17×10^{-3} M. K_{sp} for $PbBr_2$ is

(A) 3.4×10^{-6}
(B) 6.4×10^{-7}
(C) 4.1×10^{-8}
(D) 3.4×10^{-9}

35. How does the electrical conductivity of metals and semiconductors change with temperature?

(A) The conductivity of metals increases with temperature, while that of semiconductors decreases
(B) The conductivity of metals decreases with temperature, while that of semiconductors increases
(C) The conductivity of both metals and semiconductors increases with temperature
(D) The conductivity of both metals and semiconductors decreases with temperature

36. If 58.5 grams of NaCl are dissolved in 1 liter of water, what will be the boiling point of the resulting solution? (Assume complete dissociation of NaCl and K_b for water = 0.512 °C·kg/mol)

(A) 102.00 °C
(B) 101.52 °C
(C) 101.02 °C
(D) 100.51 °C

37. How long (in hours) must a current of 5.0 amperes be maintained to electroplate 60 g of calcium from molten $CaCl_2$?

(A) 8.05
(B) 16.1
(C) 24.15
(D) 32.2

38. What is the electrode potential (E) for the following half-reaction?

$MnO_4^-(0.010M) + 8H^+(0.20M) + 5e^- \rightarrow Mn^{2+}(0.020M) + 4H_2O$

Given that the standard electrode potential E^0 is +1.51V

(A) 1.44 V
(B) 1.51 V
(C) 1.86 V
(D) 2.04 V

39. A diatomic molecule has a dissociation energy of 602 kJ/mol. The maximum wavelength of radiation that can dissociate the molecule is

(A) 499 nm
(B) 399 nm
(C) 299 nm
(D) 199 nm

40. A microscope using suitable photons is employed to locate an electron in an atom within a distance of 0.1 Å. The uncertainty involved in the measurement of its velocity is …… (Given: Mass of electron = 9.1×10^{-31} kg)

(A) 5.790×10^{7} m s^{-1}
(B) 0.579×10^{7} m s^{-1}
(C) 5.790×10^{-7} m s^{-1}
(D) 0.579×10^{-7} m s^{-1}

41. de Broglie wavelength of an electron moving with a velocity of 1.20×10^{5} m s^{-1} is ……. (Given: Mass of electron = 9.1×10^{-31} kg)

(A) 6.068×10^{-6} m
(B) 6.068×10^{-7} m
(C) 6.068×10^{-8} m
(D) 6.068×10^{-9} m

42. The efficiency of a heat engine is maximum when the

(A) source temperature is less than the sink temperature
(B) source temperature is equal to the sink temperature
(C) temperature difference between source and sink is maximum
(D) temperature difference between source and sink is minimum

43. The molar heat of vaporisation of a liquid expressed in joules divided by the normal boiling point of the liquid on absolute scale is approximately equal to 88. This is known as

(A) Raoult's law

(B) Henry's law
(C) Vant Hoff's law
(D) Trouton's law

44. The entropy change in the melting of 1 kg of ice at $0^{o}C$ is equal to ……

(Given: ΔH_f for ice is equal to 334.72 J g^{-1}).

(A) 1.226 J K^{-1} kg^{-1}
(B) 12.26 J K^{-1} g^{-1}
(C) 1226 J K^{-1} kg^{-1}
(D) 1226 J K^{-1} g^{-1}

45. The cooling of a gas during Joule-Thomson effect is due to the

(A) decrease in the kinetic energy of the gaseous molecules
(B) increase in the kinetic energy of the gaseous molecules
(C) formation of van der Walls force of attraction between the gaseous molecules
(D) formation of covalent bonds between the gaseous molecules

46. Find out the ***correct*** statement

(A) Spontaneous adsorption is endothermic
(B) The solid that takes up a species is called adsorbate, while the species held to the surface of the solid is called adsorbent
(C) The uniform distribution of a species (gas or solute) throughout the body of a solid is called adsorption
(D) Adsorption is a phenomenon of accumulation of higher concentration of any species (gas or solute) at the surface of a solid

47. At absolute zero temperature, the entropy of every substance may become zero and it does become zero in the case of a perfectly crystalline solid. This is the statement of

(A) First Law of thermodynamics
(B) Second Law of thermodynamics
(C) Third Law of thermodynamics
(D) Zeroth Law of thermodynamics

48. The dissociation constant of aniline (as a base) at $25^{o}C$ is 5.93×10^{-10}. If the ionic product of water at $25^{o}C$ is 1.008×10^{-14}, then the percentage hydrolysis of aniline hydrochloride in 0.1 M solution at $25^{o}C$ is

(A) 1.30
(B) 1.83
(C) 2.13
(D) 2.73

49. The translational, rotational and vibrational degrees of freedom in water are respectively

(A) 3, 3, 2
(B) 3, 2, 4
(C) 3, 3, 3
(D) 3, 4, 2

50. The mole fraction of Schottky defect in NaCl crystal at 1000 K is …… (Given: The energy of formation for this defect is 2eV, 1eV = 1.602×10^{-19} J, $k = 1.38\times10^{-23}$ J K^{-1})

(A) 9.17×10^{-6}
(B) 8.27×10^{-8}
(C) 1.60×10^{-9}
(D) 1.38×10^{-3}

51. Which among the following can be detected by flame photometry?

(A) Ge
(B) Se
(C) Ca
(D) Br

52. The electronegativity of hydrogen is nearly similar to …… and therefore, the bond between them is considered ……..

(A) Carbon, Covalent
(B) Alkali metals, Covalent
(C) Alkali metals, Ionic
(D) Chlorine, Covalent

53. The molecule X_2 has 10 electrons in bonding molecular orbitals and 12 electrons in antibonding molecular orbitals. Which of the following is true for X_2?

(A) X_2 has a bond order of 1
(B) *X-X* bond is ionic
(C) *X-X* bond is coordinate covalent
(D) The molecule doesn't exist

54. Which refining technique is employed in Mond process and which metal is refined by this?

(A) Vapor phase refining and Silicon
(B) Vapor phase refining and Nickel
(C) Zone refining and Silicon
(D) Zone refining and Nickel

55. The name of the metal extraction process whose oxides are not easily reduced by carbon is

(A) Roasting
(B) Smelting
(C) Alumino-thermic process
(D) Calcination

56. Which one of the following ionic compounds has highest melting point?

(A) $MgCl_2$
(B) $CaCl_2$
(C) $SrCl_2$
(D) $BaCl_2$

57. Which molecule has two lone pair of electrons on the central atom as per VSEPR theory?

(A) SF_4
(B) SF_6
(C) ICl_4^-
(D) XeO_2F_2

58. The highest occupied molecular orbital in N_2^+ and O_2^+ are (Consider the z-axis as the internuclear axis)

(A) σ_{2pz} and π^*_{2px}
(B) σ_{2pz} and π_{2py}
(C) $\pi_{2px}$and π^*_{2px}
(D) $\pi_{2px}$and σ^*_{2pz}

59. Aluminium crystallizes in cubic close packed structure. The total number of voids present in 54 g of Aluminium will be: [Given, atomic mass of Aluminium: 27 u]

(A) $6\ N_A$
(B) $4\ N_A$
(C) $3\ N_A$
(D) $2\ N_A$

60. Which one of the following oxide is most basic?

(A) SeO_2
(B) P_2O_3
(C) Na_2O
(D) CaO

61. Which among the following is true for diborane, B_2H_6?

(A) Diborane is electron sufficient
(B) Diborane has a structure similar to ethane
(C) In diborane, the bond connecting boron and terminal hydrogen is strong in comparison to boron and bridging hydrogen
(D) In diborane, the bond connecting boron and terminal hydrogen is weak in comparison to boron and bridging hydrogen

62. Which of these acids form strong conjugate bases?

(A) HClO
(B) $HClO_2$
(C) $HClO_3$
(D) $HClO_4$

63. Muller-Rochow process is used for the manufacturing of

(A) $(PNCl_2)_3$
(B) R_2SiCl_2
(C) $(R_2SiO)_n$
(D) SiH_4

64. The structure of triphosphonitrilic chloride involves

(A) p_π-p_π bonding
(B) d_π-d_π bonding
(C) p_π-d_π bonding
(D) No π-bonding

65. The geometry of $[Ni(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$ are

(A) Square planar

(B) Tetrahedral
(C) Square planar and Tetrahedral respectively
(D) Tetrahedral and Square planar respectively

66. A blue colored compound has been formed when a transition metal ion M^{2+} is combined with ligand. If 0.04 moles of metal ions react with excess ligand, how much blue colored compound will be formed? [The compound has a molar mass of 280 g/mol].

(A) 5.6 g
(B) 11.2 g
(C) 1.12 g
(D) 0.56 g

67. The magnetic moment of an octahedral metal ion M^{2+} is 5.0 BM. Which combination of metal ion and electronic configuration suit the above statement?

(A) Fe^{2+}, $t_{2g}^{4} e_g^{2}$
(B) Co^{2+}, $t_{2g}^{5} e_g^{2}$
(C) Co^{2+}, $t_{2g}^{6} e_g^{1}$
(D) Fe^{3+}, $t_{2g}^{5} e_g^{0}$

68. The complexes $[Rh(NH_3)_4Cl_2]Br_2$ and $[Rh(NH_3)_4Br_2]Cl_2$ are examples of

(A) Linkage isomerism
(B) Geometric isomerism
(C) Ionization isomerism
(D) Solvate isomerism

69. *trans*-$[CoCl_2(CO)(PPh_3)]^- + Cl^- \rightarrow$?

(A) $[CoCl_3\ (PPh_3)]^{-2}$
(B) $[CoCl_3(CO)]^{-2}$
(C) $[CoCl_2(CO)(PPh_3)]^-$
(D) $[CoCl_3(CO)(PPh_3)]^{-2}$

70. Which metallocene has strong metal-carbon bond?

(A) $Fe(\eta^5\text{-}Cp)_2$
(B) $Co(\eta^5\text{-}Cp)_2$

(C) $Ni(\eta^5\text{-}Cp)_2$
(D) $Rh(\eta^5\text{-}Cp)_2$

71. The reaction of a metal complex leads to an increase in the coordination number and the oxidation number of the metal atom by two. The reaction is

(A) Reductive elimination
(B) Dissociation
(C) Oxidative addition
(D) Sigma bond metathesis

72. Oxyhaemoglobin's red color is due to

(A) Charge transfer
(B) Spin allowed and Laporte forbidden d-d transition
(C) Spin and Laporte allowed d-d transition
(D) π- π^* transition within the ligand

73. The metal ions involved in the dioxygen transport in biological systems are of

(A) Fe and Co
(B) Fe and Zn
(C) Fe and Mg
(D) Fe and Cu

74. The hydrogen bond in water has a dissociation energy of

(A) 432 kJ/mol
(B) 180 kJ/mol
(C) 23 kJ/mol
(D) 8 kJ/mol

75. Which isotope is produced when ^{216}Po decays by emitting an alpha particle followed by two beta particles?

(A) ^{212}Po
(B) ^{212}Pb
(C) ^{214}Bi
(D) ^{214}Po

76. The correct combination of metal, number of carbonyl ligands and the charge for a metal carbonyl complex $[M(CO)_x]^{y-}$ that satisfies the 18-electron rule is

(A) M = Mo, x = 5, y = 1
(B) M = Co, x = 4, y = 2
(C) M = V, x = 6, y = 1
(D) M = Ti, x = 6, y = 1

77. How many significant numbers are there in 1.006500?

(A) 5
(B) 7
(C) 3
(D) 6

78. The wave numbers correspond to the wavelength 4.0 μm is

(A) 3500 cm^{-1}
(B) 2000 cm^{-1}
(C) 5000 cm^{-1}
(D) 2500 cm^{-1}

79. Which of the following basic molecular structure shows three different values of bond angles?

(A) Trigonalbipyramidal
(B) Tetrahedral
(C) Octahedral
(D) Icosahedral

80. G^-, L^{2-} and M^{3-} are isotonic and isoelectronic species. The correct order of their atomic masses is

(A) G < L < M
(B) M < G < L
(C) G = L = M
(D) M < L < G

81. Separation of lanthanides ischallengingbecause of

(i) similar size and charge of lanthanide ions
(ii) slightdifferences in solubilities
(iii) increasedstabilityoffered by ligand fieldstabilizationenergy

The CORRECT statement/s is/are

(A) (i) only
(B) (i) and (ii)
(C) (iii) only
(D) (ii) and (iii)

82. FeS is much less soluble than $Fe(OH)_2$ because of

(A) larger size of S^{2-} than O^{2-}
(B) decreased covalent character for S^{2-}
(C) similar charge on Fe^{2+} andO^{2-}
(D) less polarizability of S^{2-} than O^{2-}

83. The most acidic oxide is

(A) CO
(B) N_2O_5
(C) V_2O_5
(D) Ag_2O

84. The trend of first ionization energy going from lower to higher is CORRECT in

(A) Ar< Na < P < Ne
(B) Na < P <Ar< Ne
(C) Ar< Ne < Na < P
(D) Ne <Ar< Na < P

85. The effective atomic number for the complex $[C_2H_4Fe(CO)_3]$ is

(A) 34
(B) 35
(C) 36
(D) 37

86. The complex with highest Δ_o value is

(A) $[Co(H_2O)_6]^{3+}$
(B) $[Co(H_2O)_6]^{2+}$
(C) $[Co(NH_3)_6]^{3+}$
(D) $[Co(NH_3)_6]^{2+}$

87. The pair of complex ions with correct order of crystal field splitting is

(A) $[CrF_6]^{3-} > [Cr(CN)_6]^{3-}$
(B) $[Fe(OH_2)_6]^{2+} > [Cr(OH_2)_6]^{3+}$

(C) $[Co(CN)_6]^{4-} > [Co(CN)_6]^{3-}$
(D) $[Ru(NH_3)_6]^{3+} > [Fe(NH_3)_6]^{3+}$

88. The molecule that acts as a sigma-donor as well as a pi-donor ligand is

(A) CO
(B) O_2
(C) CN
(D) NO

89. The statement that appropriately describes the diamagnetic nature of oxyhemoglobin is

(A) Low-spin Fe^{2+} binds to singlet oxygen
(B) Low-spin Fe^{3+} binds to the superoxide ion
(C) Low-spin Fe^{4+} binds to the peroxide ion
(D) Low spin Fe^{3+} binds to dioxygen

90. The molecular geometries of ClF_3 and SO_3 are respectively

(A) Trigonal planar, trigonal planar
(B) Pyramidal, T-shaped
(C) T-shaped, trigonal planar
(D) Trigonal planar, pyramidal

91. Addition of a trace amount of arsenic to pure germanium will give

(A) n-type semiconductor
(B) p-type semiconductor
(C) germanium arsenide
(D) a superconducting alloy

92. The set in which all central atoms in the given molecular species are in sp^2 hybridization

(A) NO_3^-, CO_3^{2-}, ClO_3^-
(B) ClO_3^-, SO_3, CO_3^{2-}
(C) SO_3, ClO_3^-, NO_3^-
(D) SO_3, NO_3^-, CO_3^{2-}

93. In an interhalogen compound of the type PQ_n, P will not be

(A) F

(B) Cl
(C) Br
(D) I

94. Reaction of tin with concentrated nitric acid (70%) will give

(A) H_2SnO_3
(B) H_2SnO_2
(C) $Sn(NO_3)_2$
(D) $Sn(NO_3)_4$

95. The correct order of increasing bond strength in the following compounds is

(A) $[Mn(CO)_6]^+ > [Ni(CO)_4] > [Co(CO)_4]^- > [Fe(CO)_4]^{2-}$
(B) $[Fe(CO)_4]^{2-} > [Ni(CO)_4] > [Co(CO)_4]^- > [Mn(CO)_6]^+$
(C) $[Co(CO)_4]^- > [Fe(CO)_4]^{2-} > [Ni(CO)_4] > [Mn(CO)_6]^+$
(D) $[Ni(CO)_4] > [Fe(CO)_4]^{2-} > [Co(CO)_4]^- > [Mn(CO)_6]^+$

96. The molecule that exhibits different electron domain geometry and molecular geometry is

(A) XeO_4
(B) XeF_2
(C) $[XeO_6]^{4-}$
(D) ClF_7

97. Select the one which is not a source for UV-Visible spectroscopy

(A) Deuterium lamps
(B) Gunn diodes
(C) Tunsten-halogen lamps
(D) Light emitting diode

98. To analyze for phosphorous content in soil, which analytical method is adopted?

(A) Combustion
(B) Extraction using acid solutions
(C) Extraction using alkaline solutions
(D) Extraction using water

99. The reaction of borax ($Na_2[B_4O_5(OH)_4]$) with 2 moles of acid will give

(A) 2 moles of $B(OH)_3$
(B) 2 moles of $[B(OH)_4]^-$
(C) 2 moles each of $B(OH)_3$ and $[B(OH)_4]^-$
(D) 1 mole each of $B(OH)_3$ and $[B(OH)_4]^-$

100. The oxide of xenon that is known to react explosively with cellulose in dry condition is

(A) XeO_4
(B) XeO_2F_2
(C) $XeOF_2$
(D) XeO_3

101. Among ^{11}B, ^{32}S, ^{19}F and ^{31}P, the NMR *inactive* nuclei is

(A) ^{19}F
(B) ^{11}B
(C) ^{32}S
(D) ^{31}P

102. The product formed when methylmagnesium bromide reacts with carbon dioxide is

(A) acetaldehyde
(B) acetic acid
(C) acetone
(D) formic acid

103. Number of signals in ^{1}HNMR spectrum of $CH_3CH=CH_2$ is (ignore splitting)

(A) 3
(B) 2
(C) 6
(D) 4

104. Indole is treated with tin and conc. HCl. The product formed has

(A) 1 Double bond reduced
(B) All double bonds reduced

(C) 3 Double bonds reduced
(D) No reaction

105. Which among the following is *not* a test for proteins?

(A) Biuret test
(B) Ninhydrin test
(C) Millon's test
(D) Salkowski test

106. Identify the copolymer among the following.

(A) Buna-S
(B) PAN
(C) Teflon
(D) Cellulose

107. Which among these is *not* an azo dye?

(A) Congo red
(B) Alizarin
(C) Methyl red
(D) Methyl orange

108. Which of the following terms is not directly associated with α-amino acids?

(A) Denaturation
(B) Isoelectric point
(C) Electrophoresis
(D) Zwitterions

109. Highest bond energy among the following bonds is for

(A) C-O
(B) C-C
(C) C-H
(D) C-Cl

110. *Major product* formed when pyrrole is treated with chloroform and aqueous KOH at 340 K is

(A) pyrrole-2-carbaldehyde
(B) pyrrole-3-carbaldehyde
(C) 2-chloropyridine
(D) 3-chloropyridine

111. Glucose and mannose constitute a pair of

(A) anomers

(B) epimers
(C) conformers
(D) tautomers

112. Specific rotation of α- and β-D-glucose in water are +112 and +19 degrees respectively. However, equilibrium value of specific rotation of α and β (D) glucose in water is 52.7 degrees. This is taken to mean that:

(A) at equilibrium, both anomers of glucose are present in a 1:1 ratio
(B) at equilibrium, the two anomers of glucose are present in a 527:473 ratio
(C) at equilibrium, α- and β-D-glucose are present in a 64:36 (α:β) ratio
(D) in water, β-D-glucose is more stable than α-D-glucose

113. In a ^{1}H NMR spectrum, a highly deshielded peak at $\delta > 13$ probably indicates a proton of group

(A) COOH
(B) CHO
(C) Enol stabilized by *H*-bonding
(D) Terminal alkyne

114. D_2O exchange is used in proton NMR to ascertain the presence of

(A) OH protons only
(B) NH protons only
(C) SH protons only
(D) OH, NH and SH protons

115. Though lower hydrocarbons themselves are odorless, characteristic odor of domestic LPG is due to the presence of added

(A) $(CH_2)_2(SH)_2$
(B) CH_3CH_2SH
(C) CH_3SH
(D) H_2S

116. Which of the following produces deep blue colour with iodine?

(A) Cellulose
(B) Amylopectin
(C) Amylose
(D) All of the above

117. The deficiency of which of the following vitamins directly causes anemia?

(A) Vitamin A
(B) Vitamin B1
(C) Vitamin B12
(D) Vitamin K

118. The most stable conformer of all *cis*-2-bromo-4-methylcyclohexanol has the OH and Me groups in which positions?

(A) OH ax, Me eq
(B) OH and Me eq
(C) OH eq, Me ax
(D) OH and Me ax

119. A 3.20 g sample of an alkaloid ($[\alpha]_D = -132^o$) was dissolved in 10.0 mL of acetic acid ($[\alpha]_D = 0$). If it is put into a sample tube with a path length of 2.00 cm, what would be its observed rotation (α)?

(A) -8.45°
(B) +84.5°
(C) -84.5°
(D) +8.25°

120. Which of the following asymmetric molecule pairs is most difficult to be resolved to pure enantiomers?

(A) Phosphines
(B) Sulfoxides
(C) Tertiary amines
(D) α-amino acids (C_3 and above)

121. Arrange the following in order of acidity

(i) *o*-hydroxybenzoic acid

(ii) *m*-hydroxybenzoic acid

(iii) *p*-hydroxybenzoic acid

(A) i>ii>iii
(B) iii>ii>i
(C) ii>i>iii
(D) ii>iii>i

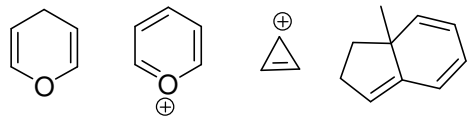
122. Arrangein order of basicity

(i) triethyl amine
(ii) pyridine

(iii) CH_3CN

(A) i>ii>iii
(B) ii>iii>i
(C) iii>ii>i
(D) i=ii>iii

123. The total number of aromatic species among the following is



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

124. From among the following, pick the *best* catalyst for Knoevenagel reaction between benzaldehyde and diethyl malonate

(A) Raney nickel
(B) Pyrrolidine
(C) Pd on Carbon
(D) Carbon nanotubes

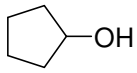
125. Conversion of benzaldehyde to ethyl cinnamate through Wittig reaction in minimum number of steps is achieved by using

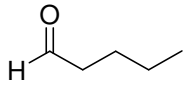
(A) Acetic acid
(B) Ethyl bromoacetate
(C) Ethyl acetate
(D) 2-bromoethyl acetate

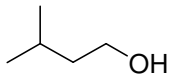
126. The product formed when 2 moles of benzaldehyde react with 1 mole of acetone in presence of base is

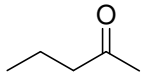
(A) Benzalacetone
(B) Dibenzylideneacetone
(C) β,β-dimethylstyrene
(D) Benzil

127. A molecule $C_5H_{10}O$ shows a prominent peak in IR at 3300 cm^{-1}. Predict its probable structure from the following:

(A) 

(B) 

(C) 

(D) 

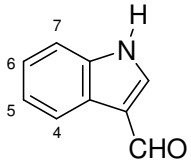
128. Index of H-deficiency of C_5H_6O is

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

129. Which among the following class of polymers is used to make foams?

(A) Polyurethane
(B) PVC
(C) PMMA
(D) Melamine

130. Indole-3-carboxaldehyde on nitration yields which among the following as the major product/products?



(A) 2-nitroindole-3-carboxaldehyde
(B) 5-nitroindole-3-carboxaldehyde
(C) a mixture of 5- and 7-nitroindole-3-carboxaldehyde
(D) a mixture of 4- and 6-nitroindole-3-carboxaldehyde

131. Amino acid containing indole ring is

(A) Tyrosine
(B) Tryptophan
(C) Histidine
(D) Threonine

132. Which among the following is not a prominent factor in stabilizing the tertiary structure of chymotrypsin?

(A) H bonding
(B) π-stacking
(C) disulfide covalent bonding
(D) hydrophobic interactions

133. RNA is devoid of:

(A) Adenine
(B) Guanine
(C) Uracil
(D) Thymine

134. Which of the following can be detected using electron spin resonance spectroscopy?

(A) Carbocation
(B) Carbanion
(C) Free-radical
(D) Singlet carbene

135. Neoprene contains which of the following groups?

(A) -CN
(B) -OAc
(C) -Cl
(D) $-CO_2CH_3$

136. Major product obtained in the reaction between naphthalene and bromine monochloride (Br-Cl, an interhalogen compound) under kinetically controlled conditions is

(A) 1-bromonaphthalene
(B) 2-bromonaphthalene
(C) 1-chloronaphthalene
(D) 2-chloronaphthalene

137. At which position does electrophilic substitution on indole occur most readily?

(A) 6
(B) 5
(C) 3
(D) 2

138. Identify the odd one.

(A) Progesterone
(B) Cholesterol
(C) Estrone
(D) prostaglandin

139. Among solvents listed below, the most suitable solvent to prepare Grignard reagent is

(A) Methanol
(B) DMF
(C) THF
(D) Toluene

140. Ebola is caused due to

(A) Fungus
(B) Virus
(C) Bacteria
(D) Parasite

141. The chemical name of laughing gas is

(A) Chloropicrin
(B) Nitric oxide
(C) Nitrous oxide
(D) Trichlorobenzene

142. 1% (w/w) aqueous solution of which among the following saccharides will freeze at the highest temperature?

(A) Glucose
(B) Galactose
(C) Maltose
(D) Altrose

143. Cyclohexene can be converted to cis-1,2-diol using

(A) peracid
(B) O_3, Me_2S
(C) peracid, NaOH
(D) OsO_4, NaOH

144. Ester can be reduced to alcohol using

(A) $NaBH_4$
(B) Na, EtOH
(C) H_2, Pd-C-$BaSO_4$
(D) $LiAlH_4$

145. Transition metal used most widely for C-C coupling reactions is

(A) Pd
(B) Cr
(C) Mn
(D) V

146. Among the following, lowest stretching frequency in FTIR spectroscopy is for the carbonyl group of

(A) benzamide
(B) methyl benzoate
(C) acetophenone
(D) benzaldehyde

147. Species produced by reaction of benzophenone with sodium is

(A) free-radical
(B) radical anion
(C) radical cation
(D) carbocation

148. Among the following, the one which gives positive Fehling's test most readily is

(A) Benzaldehyde

(B) naphthalene-2-carboxaldehyde
(C) sucrose
(D) propanal

149. Best method to separate benzophenone and 4,4'-dimethoxybenzophenone is

(A) sublimation
(B) steam distillation
(C) adsorption chromatography over silica gel
(D) fractional crystallization

150. Chemical process happening during adhesion using M-seal is

(A) Hydrolysis
(B) Esterification
(C) Reduction
(D) Curing

ANSWER KEY									
Subject Name:		**CHEMISTRY PG**							
Sl No.	**Key**	**Sl No.**	**Key**	**Sl No.**	**Key**	**Sl No.**	**Key**	**Sl No.**	**Key**
1	A	31	C	61	C	91	A	121	A
2	C	32	B	62	A	92	D	122	A
3	B	33	A	63	B	93	A	123	C
4	A	34	C	64	C	94	A	124	B
5	B	35	B	65	C	95	A	125	B
6	A	36	C	66	B	96	B	126	B
7	D	37	B	67	A	97	B	127	A
8	C	38	A	68	C	98	B	128	C
9	D	39	D	69	B	99	D	129	A
10	B	40	B	70	A	100	D	130	D
11	C	41	D	71	C	101	C	131	B
12	C	42	C	72	D	102	B	132	B
13	B	43	D	73	D	103	D	133	D
14	C	44	C	74	C	104	A	134	C
15	B	45	A	75	A	105	D	135	C
16	C	46	D	76	C	106	A	136	A
17	D	47	C	77	B	107	B	137	C
18	A	48	A	78	D	108	A	138	D
19	B	49	C	79	A	109	C	139	C
20	D	50	A	80	D	110	A	140	B
21	C	51	C	81	B	111	B	141	C
22	C	52	A	82	A	112	D	142	C
23	B	53	D	83	B	113	C	143	D
24	C	54	B	84	B	114	D	144	D
25	A	55	C	85	A	115	B	145	A
26	B	56	D	86	C	116	C	146	A
27	C	57	C	87	D	117	C	147	B
28	C	58	A	88	B	118	A	148	D
29	B	59	A	89	B	119	A	149	C
30	D	60	C	90	C	120	C	150	D