60412

ROLL No. | | | | | |

TEST BOOKLET No. 691

TEST FOR POST GRADUATE PROGRAMMES

CHEMISTRY

Time: 2 Hours

Maximum Marks: 450

INSTRUCTIONS TO CANDIDATES

1. You are provided with a Test Booklet and an Optical Mark Reader (OMR) Answer Sheet to mark your responses. Do not soil the Answer Sheet. Read carefully all the instructions given on the Answer Sheet.

2. Write your Roll Number in the space provided on the top of **this page**.

3. Also write your Roll Number, Test Code, and Test Subject in the columns provided for the same on the **Answer Sheet**. Darken the appropriate bubbles with a **Ball Point Pen.**

4. The paper consists of 150 objective type questions. All questions carry equal marks.

5. Each question has four alternative responses marked **A, B, C** and **D** and you have to **darken** the bubble fully by a **Ball Point Pen** corresponding to the correct response as indicated in the example shown on the Answer Sheet.

6. Each correct answer carries **3** marks and each wrong answer carries **1** minus mark.

7. Please do your rough work only on the space provided for it at the end of this Test Booklet.

8. You should return the Answer Sheet to the Invigilator before you leave the examination hall. However, you can retain the Test Booklet.

9. Every precaution has been taken to avoid errors in the Test Booklet. In the event of such unforeseen happenings the same may be brought to the notice of the Observer/Chief Superintendent in writing. Suitable remedial measures will be taken at the time of evaluation, if necessary.

SEAL

60412

CHEMISTRY

1. The IUPAC name of $[CoCl(NO_2)(en)_2]Cl$ is

   (A) chloronitrobis(ethylenediamine)cobalt(III) chloride
   (B) bis(ethylenediamine)nitrochlorocobalt(III) chloride
   (C) chlorobis(ethylenediamine)nitrocobalt(III) chloride
   (D) bis(ethylenediamine)chloronitrocobalt(III) chloride

2. Polyanion formation is maximum in

   (A) nitrogen (B) oxygen
   (C) sulphur (D) boron

3. Choose the correct statement for proton.

   (A) Proton is the nucleus of deuterium
   (B) Proton is alpha particle
   (C) Proton is ionised hydrogen molecule
   (D) Proton is ionised hydrogen atom

4. Hypo is used in photography because it is a

   (A) strong oxidising agent (B) strong reducing agent
   (C) strong complexing agent (D) good fixing agent

5. Which of the following sets of quantum numbers is allowable?

   (A) $n = 2, l = 1, m = 0, s = +1/2$ (B) $n = 2, l = 2, m = -1, s = -1/2$
   (C) $n = 2, l = -2, m = 1, s = +1/2$ (D) $n = 2, l = 1, m = 0, s = 0$

6. Bohr's model of atom is not in agreement with

   (A) line spectra of hydrogen atom
   (B) Pauli's principle
   (C) Planck's theory
   (D) Heisenberg's principle

7. Oxidation state of oxygen in H_2O_2 is

(A) –2 (B) –1
(C) 0 (D) +2

8. One mole of calcium phosphide on reaction with excess water gives

(A) one mole of phosphene
(B) two moles of phosphoric acid
(C) two moles of phosphine
(D) one mole of phosphorus pentoxide

9. How many unpaired electrons are there in Ni^{2+} ?

(A) 0 (B) 2
(C) 4 (D) 8

10. Which one of the following statements about alkali metals and their compounds is correct?

(A) Caesium is used in photoelectric cell
(B) Molten sodium chloride on electrolysis gives sodium at the anode and chrorine at the cathode
(C) Alkali metal atom has the smallest size in its period
(D) Alkali metals do not react with water

11. Crude common salt is hygroscopic because of the presence of impurities like

(A) $CaSO_4$ and $MgSO_4$ (B) $CaCl_2$ and $MgCl_2$
(C) $CaBr_2$ and $MgBr_2$ (D) $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$

12. Which of the following has the highest bond order?

(A) O_2 (B) O_2^-
(C) O_2^+ (D) O_2^{++}

13. Which one of the following is not considered as an organometallic compound?

(A) Cisplatin (B) Ferrocene
(C) Zeise's salt (D) Grignard reagent

14. Fusion mixture is

(A) $K_2CO_3 + Na_2CO_3$
(B) $KHSO_4 + NaHSO_4$
(C) $K_2CO_3 + NaHSO_4$
(D) $KHSO_4 + Na_2SO_3$

15. Which one of the following statements is not correct?

(A) Iodine oxidises sodium thiosulphate to sodium tetrathionate.
(B) Sodium thiosulphate is soluble in water.
(C) Ozone is used to identify the presence of unsaturation in alkene.
(D) Sodium thiosulphate reacts with iodine to form sodium sulphate.

16. $KMnO_4$ produces a colourless solution at a pH of

(A) 7
(B) 10
(C) 0
(D) 12

17. BCl_3 molecule is planar while NCl_3 is pyramidal because

(A) BCl_3 does not have lone pair on B but N of NCl_3 has
(B) B-Cl bond is more polar than N-Cl bond
(C) N atom is smaller than B
(D) N-Cl bond is more covalent than B-Cl bond

18. Ca^{2+} ion is isoelectronic with

(A) Na
(B) Ar
(C) Mg^{2+}
(D) Sr^{2+}

19. The element with atomic no. 56 belongs to

(A) s-block
(B) p-block
(C) d-block
(D) f-block

20. Epsom salt is the hydrate of

(A) magnesium sulphate
(B) ferrous ammonium sulphate
(C) magnesium ammonium phosphate
(D) calcium sulphate

21. The decreasing order of second ionisation potential of K, Ca and Ba is

(A) K > Ca > Ba
(B) Ca > Ba > K
(C) Ba > K > Ca
(D) K > Ba > Ca

22. Boric acid is polymeric due to

(A) its acidic nature
(B) the presence of hydrogen bonds
(C) its monobasic nature
(D) its geometry

23. $FeSO_4$ forms brown ring with

(A) NO_2
(B) N_2O_3
(C) NO
(D) N_2O_5

24. Inorganic graphite is

(A) $B_3N_3H_6$
(B) B_3N_3
(C) SiC
(D) $Fe(CO)_5$

25. In a calcium fluoride structure, the co-ordination number of cation and anion respectively are

(A) 6, 6
(B) 8, 4
(C) 4, 4
(D) 4, 8

26. Borazine (Inorganic benzene) is the product of reaction between

(A) boron and hydrogen
(B) boron and ammonia
(C) diborane and nitrogen
(D) diborane and ammonia

27. The type of hybridisation of boron in diborane is

(A) sp hybridisation
(B) sp^2 hybridisation
(C) sp^3 hybridisation
(D) sp^3d^2 hybridisation

28. Colour of the solution of sodium metal in liquid ammonia is

(A) violet
(B) red
(C) colourless
(D) blue

29. An example of a low spin complex is

(A) $[FeF_6]^{3-}$ (B) $[Fe(CN)_6]^{3-}$

(C) $[Ti(H_2O)_6]^{3+}$ (D) $[NiCl_4]^{2-}$

30. Wrought iron is prepared

(A) by heating cast iron with Fe_2O_3
(B) by heating cast iron in air
(C) by heating steel
(D) by heating pig iron in N_2

31. Consider the following two reactions

(i): $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$; (ii) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

The correct statement is

(A) HOCl is reduced and PbS is oxidised
(B) HOCl is oxidised and PbS is reduced
(C) both HOCl and PbS are oxidised
(D) both HOCl and PbS are reduced

32. A metal M reacts with N_2 to give a compound of the formula M_3N, which reacts with water to produce B. When 'B' is passed through $CuSO_4$ solution, a deep blue coloured solution is formed. The metal 'M' and the compound 'B' are, respectively,

(A) In, NH_3 (B) Na, NH_3

(C) Li, NH_3 (D) Al, NO_2

33. In the complex, $CrCl_3.6H_2O$, two chlorines are in the coordination sphere. The volume of 0.1 N $AgNO_3$ required to precipitate chlorine in 200 mL of 0.01 M solution of the complex is

(A) 60 mL (B) 40 mL

(C) 200 mL (D) 20 mL

34. The hybridisation which leads to square planar and tetrahedral geometry are respectively,

(A) sp^3 and dsp^2 (B) dsp^2 and sp^3
(C) dsp^3 and d^2sp^3 (D) d^2sp^3 and sp^3

35. Froth floation is normally employed for the concentration of

(A) sulphide ores (B) oxide ores
(C) chloride ores (D) carbonate ores

36. What combination of halogens is likely to yield a stable molecule of the type XY_7?

(A) X = F, Y = I (B) X = Cl, Y = I
(C) X = I, Y = Br (D) X = I, Y = F

37. The number of –OH groups present in H_3PO_3 and H_3PO_4 are respectively,

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

38. Which among the following compounds would have optical isomers?
I : $[Co(gly)_3]$, II: trans–$[Co(en)_2Cl_2]^+$, III :$[Pt(NH_3)_2Cl_2]$
and IV: $[Ni(CO)_2(PPh_3)_2]$. (gly = glycine; en = ethylenediamine)

(A) both I and II (B) both I and III
(C) All the four (D) I only

39. In which of the following pairs of species, all bond angles are equal?

(A) CO_3^{2-}, $COCl_2$ (B) PO_4^{3-}, $POCl_3$
(C) BF_4^-, BH_4 (D) CH_3F, CH_4

40. Consider the following complexes. How many of them are paramagnetic?
$[Mn(CN)_6]^{3-}$, $[Cr(H_2O)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Ni(NH_3)_6]^{2+}$, $[PtCl_4]^{2-}$, $[Cu(CN)_4]^{3-}$

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

41. An alloy of gold and copper crystallises in a cubic lattice with gold atoms occupying the corners of the cube and the copper atoms at the centres of each of the cubic faces. The empirical formula of the alloy is

(A) AuCu
(B) $AuCu_3$
(C) Au_2Cu_3
(D) Au_3Cu

42. For a transition metal ion having eight electrons in its d-orbitals, the effective magnetic moment will be

(A) $\sqrt{18}$ B.M
(B) $\sqrt{8}$ B.M
(C) $\sqrt{9}$ B.M
(D) $\sqrt{10}$ B.M

43. Four elements, labelled A, B, C and D have electronegativities 3.8, 3.2, 2.8 and 1.2 respectively. The order of increasing covalent character in the compounds AB, AC, AD and BD is

(A) AB < AC < BD < AD
(B) AB < AD < BD < AC
(C) AD < AC < BD < AB
(D) AD < BD < AC < AB

44. The hybridisation in $[FeF_6]^{3-}$ is

(A) sp^3
(B) d^2sp^3
(C) sp^3d^2
(D) dsp^3

45. The correct order of bond angles in ClO_3^-, BrO_3^- and IO_3^- is

(A) $ClO_3^- > BrO_3^- > IO_3^-$
(B) $BrO_3^- > ClO_3^- > IO_3^-$
(C) $IO_3^- > BrO_3^- > ClO_3^-$
(D) $ClO_3^- > IO_3^- > BrO_3^-$

46. The number of lone pairs present in PH_3, BH_4^- and $XeOF_2$ are respectively,

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

47. Which among the following is /are electron deficient?
ICl, NH_3, PCl_5 and BCl_3

(A) ICl and NH_3
(B) ICl and PCl_5
(C) ICl, NH_3 and PCl_5
(D) BCl_3

48. In a diatomic molecule, AB, the bond axis is taken as z-axis. Then which of the following orbitals will not have positive overlap?

(A) 2s(A) and 2s(B)
(B) 2s(A) and $2p_x$(B)
(C) 2s(A) and $2p_z$(B)
(D) $2p_z$(A) and $2p_z$(B)

49. For accurate results in acid-base titrations, the indicator should change its colour at a pH

(A) equal to 7
(B) slightly greater than 7
(C) slightly lesser than 7
(D) equal to that at the stoichiometric point.

50. Among SO_4^{2-}, H_2S, SF_4 and SF_2, the species in which S is NOT sp^3 hybridised is

(A) SO_4^{2-}, H_2S,
(B) H_2S, SF_2
(C) SF_4
(D) H_2S

51. Which of the following has the highest mass?

(A) 20 g of sulphur
(B) 4 mol of carbon dioxide
(C) 12×10^{24} atoms of hydrogen
(D) 11.2 L of helium at N.T.P

52. For a process to be spontaneous

(A) ΔG must be –ve
(B) ΔG should be + ve
(C) ΔH must be – ve
(D) ΔS must be – ve

53. Hess's law deals with

(A) changes in heat of reaction
(B) rate of reaction
(C) equilibrium constant
(D) influence of pressure on volume of a gas

54. The intensive property among the following quantities is

(A) mass
(B) volume
(C) enthalpy
(D) mass/volume

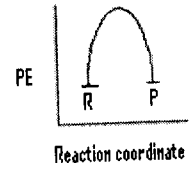
55. NiO is an example of

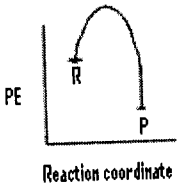
(A) n-type semiconductor
(B) insulator
(C) metallicconductor
(D) p-type semiconductor

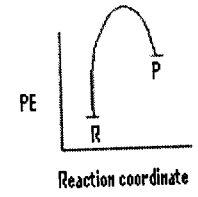
56. Which of the following quantities (expressed in KJ mol^{-1}) would you expect to be largest for a substance?

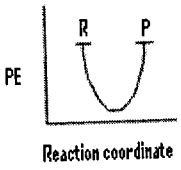
(A) Heat capacity of the liquid
(B) Enthalpy of sublimation
(C) Enthalpy of vaporisation
(D) Enthalpy of fusion

57. An endothermic reaction with high activation energy for the forward reaction is given by

(A) 

(B) 

(C) 

(D) 

58. Cathode rays are

(A) electromagnetic waves
(B) radiations
(C) stream of α particles
(D) stream of electrons

59. Ostwald's dilution law is applicable to

(A) strong electrolytes only
(B) weak electrolytes only
(C) non-electrolytes
(D) strong as well as weak electrolytes

60. Which of the following electronic transitions in hydrogen atom results in the emission of light of longest wave length?

(A) $n = 4$ to $n = 3$
(B) $n = 1$ to $n = 2$
(C) $n = 1$ to $n = 6$
(D) $n = 3$ to $n = 2$

61. The occurrence of a reaction is impossible if

(A) $\Delta H > 0, \Delta S > 0$
(B) $\Delta H > 0, \Delta S < 0$
(C) $\Delta H < 0, \Delta S < 0$
(D) $\Delta H < 0, \Delta S > 0$

62. Which set of conditions represents easiest way to liquify a gas?

(A) low temperature and high pressure
(B) high temperature and low pressure
(C) low temperature and low pressure
(D) high temperature and high pressure

63. The rate of diffusion of a gas is proportional to

(A) $\frac{P}{\sqrt{d}}$
(B) $\sqrt{\frac{P}{d}}$
(C) $\frac{P}{d}$
(D) $\frac{\sqrt{P}}{d}$

64. The effect of temperature on reaction rate is given by

(A) Clausius Clapeyron equation
(B) Arrhenius equation
(C) Gibb's Helmholtz equation
(D) Kirchoff's equation

65. The unit of rate constant for a zero order reaction is

(A) litre sec^{-1}
(B) litre $mol^{-1} sec^{-1}$
(C) mol $litre^{-1} sec^{-1}$
(D) mol sec^{-1}

66. Tin plague means

(A) a conversion of stannous salt into stannic salt
(B) conversion of white tin to grey tin
(C) tin plating
(D) emission of sound while bending a tin plate

67. A reaction involving two different reactants can never be

(A) unimolecular reaction
(B) first order reaction
(C) second order reaction
(D) bimolecular reaction

68. For a zero order reaction

(A) the time taken for half the reaction to complete is inversely proportional to its rate constant
(B) the time taken for half-change is directly proportional to its initial concentration
(C) the time taken for completion of the reaction is independent of initial concentration
(D) there is no effect on the rate of reaction if concentration of reactants is doubled

69. Which one of the following is a colligative property?

(A) Change in free energy
(B) Dipole moment
(C) Heat of vapourisation
(D) Osmotic pressure

70. Blood is isotonic with

(A) 0.16 M NaCl
(B) conc. NaCl
(C) 50% NaCl
(D) 30% NaCl

71. Number of moles of a solute per kilogram of a solvent is called

(A) molarity
(B) molality
(C) normality
(D) formality

72. Distribution law $K = c_1/c_2$ is true

(A) when dissociation takes place in one of the phases
(B) when association takes place in one of the phases
(C) when solute is normal in both phases
(D) when association takes place in one phase and dissociation in the other

73. Adsorption is

(A) colligative process
(B) oxidation process
(C) reduction process
(D) surface phenomenon

74. In which of the following states, the particle size would be greater than 300mμ?

(A) Suspensions
(B) True solutions
(C) Colloidal solutions
(D) None of the above

75. Blood may be purified by

(A) dialysis
(B) electroosmosis
(C) coagulation
(D) filtration

76. The stability of colloid is determined by

(A) zeta potential
(B) Brownian movement
(C) streaming potential
(D) sedimentation potential

77. A dilute aqueous solution of sodium sulphate is electrolysed using Pt electrodes. The products formed at the cathode and anode are, respectively

(A) H_2 and O_2
(B) Na and $S_2O_8^{2-}$
(C) Na and O_2
(D) H_2 and $S_2O_8^{2-}$

78. A solid element showing tetravalency reacts with just sufficient O_2 and during the reaction, there is no change in volume at constant pressure. The vapour density of the gaseous product is 32, then the atomic mass of the element will be

(A) 16
(B) 32
(C) 48
(D) 64

79. The R M S velocities of the gases are in the order

(A) $H_2 > CH_4 > NH_3 > CO_2$ (B) $H_2 < CH_4 < NH_3 < CO_2$
(C) $H_2 < CH_4 > NH_3 > CO_2$ (D) $H_2 > CH_4 < NH_3 < CO_2$

80. For the reaction, $CaCO_3(s) \leftrightarrows CaO(s) + CO_2(g)$, addition of CaO causes

(A) decrease in the concentration of CO_2
(B) increase in the concentration of CO_2
(C) no change in the concentration of CO_2
(D) increase in the concentration of $CaCO_3$

81. The E^0 values for Ag^+/Ag, K^+/K, Mg^{2+}/Mg and Cr^{3+}/Cr are 0.80, –2.93, –2.37 and –0.74 V respectively. The reducing power of the metals is in the order

(A) Ag > Cr > Mg > K (B) Ag < Cr < Mg < K
(C) Ag > Cr > K > Mg (D) Cr > Ag > Mg > K

82. The criterion for the spontaneity of a process is

(A) $\Delta S_{sys} > 0$ (B) $\Delta S_{surr} > 0$
(C) $\Delta S_{sys} + \Delta S_{surr} > 0$ (D) $\Delta S_{sys} - \Delta S_{surr} > 0$

83. For a first order reaction, the half life is 50 s. Identify the correct statement among the following.

(A) The reaction is complete in 100 s.
(B) The reaction begins after 50 s.
(C) Quantity of substrate remaining after 100 s is half of what remains at 50 s.
(D) The same quantity of substrate is consumed for every 50 s of reaction

84. Consider the half cell reactions of Zn^{2+}/Zn; E^0 = –0.763 V vs. standard hydrogen electrode (SHE) and $Cl_2/2Cl^-$ E^0 = 1.358 V vs SHE. For the cell represented by the reaction, $Zn(s) + Cl_2(g) \rightarrow Zn.Cl_2(aq)$, the E^0 will be

(A) (–0.763 + 1.358) V (B) (0.763–1.358) V
(C) (–0.763 – 1.358) V (D) (1.358 + 0.763) V

85. A plot of log [A] versus time (t) is a straight line with a negative slope. The order of the reaction is

(A) zero
(B) one
(C) two
(D) three

86. If one mole of an ideal gas expands isothermally and reversibly at T K from 10 L to 100 L, then the expression for ΔG would be

(A) $\Delta G = 2.303\ RT \log(10/100)$
(B) $\Delta G = -2.303\ RT \log(10/100)$
(C) $\Delta G = 2.303\ RT \log(100/10)$
(D) $\Delta G = -2.303\ RT \log(100/10)$

87. Among the following, identify the reaction which is attended by an increase in entropy.

(A) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
(B) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
(C) $H_2(g) + I_2(g) \rightarrow 2HI(g)$
(D) $C(graphite) + H_2O(g) \rightarrow CO(g) + H_2(g)$

88. Zinc is used to protect ship hulls against corrosion because

(A) zinc is lighter than iron
(B) zinc is oxidised in preference to iron
(C) zinc is cheaper than iron
(D) zinc is reduced in preference to iron

89. One of the substances is out of order in the following list based on increasing boiling point. Identify it.

(A) F_2
(B) Ar
(C) O_3
(D) Cl_2

90. With which of the following bases will the ionisation of acetic acid proceed to completion?

(A) H_2O
(B) NO_3^-
(C) Cl^-
(D) NH_3

91. When a non volatile solute is added to a solvent, the vapour pressure of the solution is

(A) lowered
(B) increased
(C) becomes equal to the atmospheric pressure
(D) unaffected

92. In the equilibrium reaction, $AB_2(g)+2B(g)+\text{heat} \rightleftharpoons AB_2(g)$, the reaction shifts in forward direction if there is

(A) an increase in the volume of the reaction vessel
(B) a decrease in temperature
(C) an increase in system pressure.
(D) a decrease in concentration of A

93. Three vessels of volumes V, 2V and 3V are filled with n, 2n and 3n moles of an ideal gas respectively and maintained at the same temperature. The pressure in the vessel of volume V is P. If the three vessels are connected, then the final pressure will be

(A) 2P/3
(B) P/3
(C) P
(D) 2P/4

94. If a mixture of 3 moles of hydrogen and 1 mole of nitrogen is converted completely into ammonia, the ratio of initial and final volume under the same conditions of pressure and temperature would be

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

95. If $\Delta G^\circ = 0$ for a reaction, which of the following statements must also be true?

(A) $\Delta H^\circ = 0$
(B) $\Delta S^\circ = 0$
(C) Keq = 0
(D) Keq = 1

96. The enthalpy of hydrogenation of cyclohexene is 121.8 kJ/mol while that of cyclohexadiene is 235.2 kJ/mol. So the resonance energy of cyclohexadiene is

(A) 357 kJ/mol
(B) 8.4 kJ/mol
(C) 178.5 kJ/mol
(D) 479.8 kJ/mol

97. Under which condition is F_2 most likely to behave like an ideal gas?

(A) 200°C and 0.5 atmosphere
(B) 100° C and 10.0 atmosphere
(C) 0°C and 0.5 atmosphere
(D) −100° C and 10.0 atmosphere

98. The maximum number of phases that can coexist for a 2 component system at constant pressure is

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

99. A process in which a photon is absorbed by a second species and then the excitation energy is transferred to the reactant molecule is known as

(A) photoillumination
(B) phosphorescence
(C) fluorescence
(D) photosensitisation

100. BrF_3 which is a liquid undergoes considerable self-ionisation as follows: $2BrF_3 \rightleftharpoons [BrF_2]^+ [BrF_4]^-$. Based on VSEPR theory, the number of 90° F–Br–F bond angles in the anionic species is

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

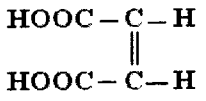
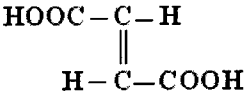
101. Cyclohexene reacts with cold dilute alkaline $KMnO_4$ to give

(A) cis-1, 2-cyclohexanediol
(B) trans-1, 2-cyclohexanediol
(C) cyclohexenone
(D) cyclohexene-3-ol

102. A salt producing hydrocarbon from among the following compounds is

(A) ethyne
(B) ethene
(C) methane
(D) ethane

103. An organic compound which readily decolourises bromine water and forms an anhydride on heating could be

(A) HOOC.COOH
(B) $HOOC.CH_2.COOH$
(C) 
(D) 

104. If empirical formula of a compound is CH_2O and its molecular mass is 90, then the molecular formula of the compound will be

(A) $C_3H_6O_3$ (B) $C_2H_4O_2$
(C) $C_6H_{12}O_6$ (D) CH_2O

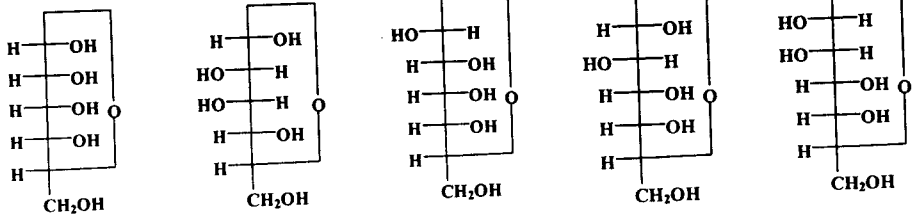
105. Which one of the following is an example of aralkyl halide?

(A) p-chlorotoluene (B) chlorobenzene
(C) allyl chloride (D) benzyl chloride

106. The process of converting one enantiomer of an optically active compound into racemic mixture is called

(A) resolution (B) inversion
(C) epimerisation (D) racemisation

107. Identify the anomers and epimers from among the following



i ii iii iv v

(A) i and iii are anomers, i and ii are epimers
(B) i and v are anomers, ii and iv are epimers
(C) iii and iv are anomers, i and v are epimers
(D) i and iii are anomers, iii and v are epimers

108. Benzotrichloride reacts with milk of lime to form

(A) benzal (B) benzoic acid
(C) benzyl alcohol (D) phenol

109. Which of the following is not true for S_N^1 reaction?

(A) It occurs through a single step concerted mechanism
(B) It is favoured by polar solvents
(C) Tertiary alkyl halides generally react through this mechanism
(D) Concentration of nucleophile does not affect the rate of such reactions

110. Saponification of ethyl benzoate with caustic soda gives

(A) benzyl alcohol and ethanoic acid
(B) sodium benzoate and ethanol
(C) benzoic acid and sodium ethoxide
(D) phenol and ethanoic acid

111. Match compounds with uses and select the correct answer given below the list:

Compounds	Uses
i) Acetyl salicylic acid	a) Insecticide
ii) D.D.T.	b) Drug
iii) Naphthalene	c) Moth repelling
iv) Carbon tetrachloride	d) Fire extinguisher
	e) Refrigerant

(A) i-b, ii-a, iii-c, iv-d
(B) i-e, ii-c, iii-d, iv-a
(C) i-b, ii-c, iii-d, iv-a
(D) i-e, ii-a, iii-c, iv-d

112. How many isomeric alcohols with formula $C_4H_{10}O$ are possible?

(A) 2
(B) 3
(C) 4
(D) 5

113. Cumene, the compound used for commercial preparation of phenol is

(A) isopropyl benzene
(B) ethylbenzene
(C) n-propylbenzene
(D) n-butyl benzene

114. Decarboxylation of sodium salicylate with soda lime forms

(A) salicylic acid
(B) phenol
(C) benzene
(D) benzoic acid

115. Which one of the following compound is predominantly formed when phenol is allowed to react with bromine in aqueous medium?

(A) Picric acid
(B) Salicylic acid
(C) 2, 4, 6 - Tribromophenol
(D) p-Bromophenol

116. Salol is

(A) acetyl salicylic acid
(B) phenol benzoate
(C) acetyl salicylate
(D) phenyl salicylate

117. Which of the following alcohols will give iodoform test?

(A) Methanol
(B) 1-Butanol
(C) 1-Propanol
(D) 2-Butanol

118. Fusel oil is a mixture of

(A) ethers
(B) alcohols
(C) alcohols and ethers
(D) alcohols and ketones

119. The Hammett equation in organic chemistry relates structure to both equilibrium constants and rate constants for

(A) reactions of meta and para substituted benzene
(B) free radical reactions
(C) photochemical reactions
(D) multicentered reactions

120. α, β-Unsaturated carbonyl compounds undergo a ring closure reaction with conjugated dienes. This is known as

(A) Hofmann reaction
(B) Sandmeyer reaction
(C) Diels-Alder reaction
(D) Perkin reaction

121. Which of the following is the strongest acid?

(A) CH_3CH_2COOH
(B) CH_2FCH_2COOH
(C) $CH_2ClCOOH$
(D) Cl_3COOH

122. Benzaldehyde $\xrightarrow[\text{ii) } H_2O]{\text{i) } CH_3MgI}$ X $\xrightarrow{Cu/575K}$ Y

The compound Y in the above sequence is

(A) 2-Methyl-2-phenyl-1-propanol
(B) 2-Phenyl-2-propanol
(C) Acetophenone
(D) 2-Methyl-1-phenyl-2-propanol

123. $CHO\text{-}CHO \xrightarrow{OH^-}$?

(A) $CH_3OH + CH_3OH$ (B) $HOH_2C - COO^-$
(C) $H_3COH + HCOOH$ (D) $^-OOC - COO^-$

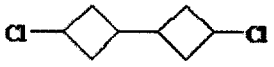
124. Rearrangement of an oxime to an amide in the presence of strong acid is called

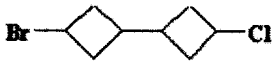
(A) Curtius rearrangement (B) Fries rearrangement
(C) Beckman rearrangement (D) Aldol condensation

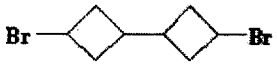
125. Carboxylic acids are more acidic than phenol and alcohol because of

(A) intermolecular hydrogen bonding
(B) formation of dimmers
(C) highly acidic hydrogen
(D) resonance stabilisation of their conjugate bases

126. The reaction of 1-bromo-3-chloro cyclobutane with metallic sodium in dioxane under reflux conditions gives

(A) 

(B) 

(C) 

(D) 

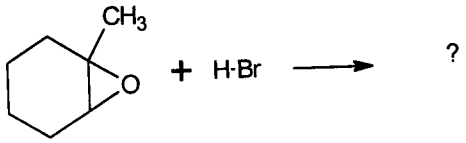
127. In the S_N2 reaction, $RBr + Cl^- \rightarrow RCl + Br^-$, which of the following alkyl bromides react fastest?

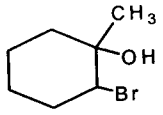
(A) CH_3–Br (B) CH_3–CH_2–Br
(C) CH_3–CH_2–CH_2–Br (D) CH_3–$CH(CH_3)$–Br

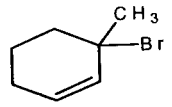
128. Ease of oxidation of I: nitrobenzene, II: toluene and III: benzene will be

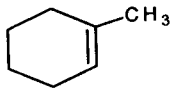
(A) I > II > III
(B) III > II > I
(C) I > III > II
(D) II > III > I

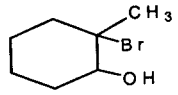
129. The product of the reaction,



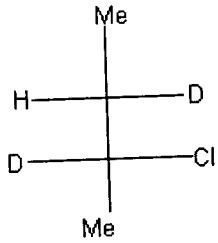
(A) 

(B) 

(C) 

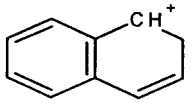
(D) 

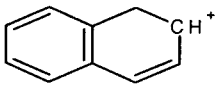
130. The correct R-S configuration of the following compound is

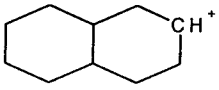


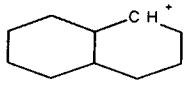
(A) 2R, 3S
(B) 2S, 3R
(C) 2S, 3S
(D) 2R, 3R

131. The correct order of the stability of carbocations is

I 

II 

III 

IV 

(A) I > II > III > IV
(B) I > II > IV > III
(C) II > I > III > IV
(D) II > I > IV > III

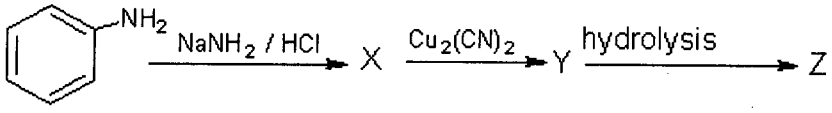
132. The correct order of increasing acidity among the following is:

(A) benzoic acid < p-methoxybenzoic acid < p-nitrobenzoic acid
(B) p-nitrobenzoic acid < p-methoxybenzoic acid < benzoic acid
(C) p-methoxybenzoic acid < benzoic acid < p-nitrobenzoic acid
(D) benzoic acid < p-nitrobenzoic acid < p-methoxybenzoic acid

133. The reagent which can be used to reduce only a –CHO group of an unsaturated aldehyde is

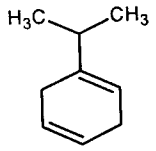
(A) $NaBH_4$
(B) $LiAlH_4$
(C) Zn /HCl
(D) NH_2NH_2

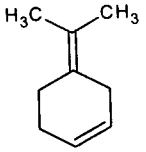
134. Identify 'Z' in the following reaction

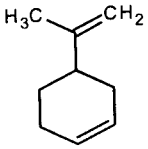


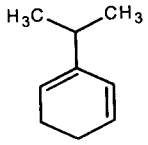
(A) $C_6H_5CH_2COOH$
(B) C_6H_5COOH
(C) $C_6H_5NHCH_3$
(D) $C_6H_5CH_2NH_2$

135. Which of the following will give acetone as one of the products on ozonolysis?

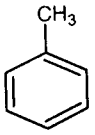
(A) 

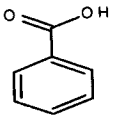
(B) 

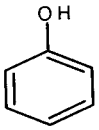
(C) 

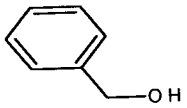
(D) 

136. Which of the following reagents would undergo Reimer-Tiemann reaction?

(A) 

(B) 

(C) 

(D) 

137. Ethyl acetoacetate is prepared from ethyl acetate by

(A) Benzoin condensation
(B) Aldol condensation
(C) Claisen condensation
(D) Dieckman condensation

138. When aldehydes and ketones react with α-bromoesters and zinc, the product formed is

(A) β-hydroxy esters
(B) β-keto alcohols
(C) γ-keto acids
(D) δ-keto esters

139. The IUPAC name of tetramethylallene (Me_2-C=C=C-Me_2) is

(A) 1,1,3,3–tetramethylpropa–1,2–diene
(B) 1,1,3, –trimethylbuta–1,2–diene
(C) 2,4,4–trimethylbuta–2,3–diene
(D) 2,4–dimethylpenta–2,3–diene

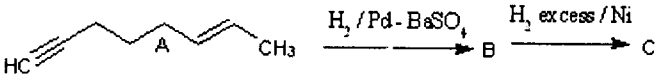
140. In the Wittig reaction, an aldehyde or a ketone is converted to an alkene. The reagent involved in this is

(A) $LiAlH_4$
(B) $N_2H_4.H_2O$
(C) H_2 / Pd
(D) Phosphonium Ylide

141. For which of the following compounds, Lessaigne's test for detection of nitrogen will fail?

(A) $H_2N–CO–NH–NH_2.HCl$
(B) $H_2N–NH_2.HCl$
(C) $H_2N–CO–NH_2$
(D) $C_6H_5–NH–NH_2.HCl$

142. Select the correct statement regarding the following reactions



(A) A, B and C are optically active
(B) A is optically active, but B and C inactive
(C) A and B are optically active, but C is inactive
(D) A, B and C are optically inactive

143. Which of the following methods of separation can be applied to the mixture of liquids having different boiling points?

(A) solvent extraction
(B) differential crystallisation
(C) fractional distillation
(D) steam distillation

144. In Benzilic acid rearrangement

(A) Benzaldehyde is converted into Benzoin
(B) Benzoin is converted into Benzilic acid
(C) Benzilic acid is converted into Benzil
(D) Benzil is converted into Benzilic acid

145. Which one of the following represents Freon?

(A) Acetylene tetrachloride
(B) Trichloroethylene
(C) Dichlorodifluoromethane
(D) Ethylene dichloride

146. S_N^2 reactions are

(A) stereoselective as well as stereospecific
(B) stereoselective but not stereospecific
(C) sterospecific but not stereoselective
(D) Neither sterospecific nor steroselective

147. Optically active isomers that are not mirror images are called

(A) enantiomers
(B) mesomers
(C) tautomers
(D) diastereoisomers

148. When ethyl iodide is allowed to react with sodium phenolate the product formed is

(A) phenetole
(B) phenol
(C) ethylbenzene
(D) ethylphenol

149. Glycol is used in the manufacture of

(A) terylene
(B) glyptal
(C) antifreeze
(D) All the above

150. In the estimation of oxalic acid with $KMnO_4$, the indicator used is

(A) methyl orange
(B) phenolphthalein
(C) starch
(D) None of the above

***