28/25

Question Booklet Alpha Code

A

Question Booklet Sl. No.

A

Total Number of Questions : 100 **Time : 90 Minutes**

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C** & **D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

A

1. Which set of quantum numbers is not permitted ?
   A) n = 3, l = 2, m = 0, s = +½ B) n = 4, l = 3, m = 0, s = +½
   C) n = 2, l = 1, m = 0, s = +½ D) n = 5, l = 4, m = 5, s = +½
2. Born-Haber cycle is used to determine
   A) Lattice energy B) Entropy C) Free energy D) Electrode potential
3. Which of the following statements is/are correct ?
   i. 2S orbital has no spherical node.
   ii. Lyman series of Hydrogen spectrum appear in the visible region.
   iii. 6S orbital has lower energy than 4f orbital.
   A) Only i B) Only ii C) Only iii D) Both i and ii
4. Which compound is known as 'Inorganic benzene' ?
   A) Diborane B) Borazine C) Boron nitride D) Boric acid
5. If the limiting radius ratio is between 0.414 to 0.732, the possible coordination number is
   A) 2 B) 4 C) 6 D) 8
6. Which of the following statements is/are correct ?
   i. N_2O is a neutral oxide.
   ii. $[Fe(H_2O)_5NO]^{2+}$ is responsible for the colour in the 'brown-ring' test for nitrates.
   iii. NO is an acidic oxide.
   iv. $[Fe(H_2O)_5NO]^{3+}$ is responsible for the colour in the 'brown-ring' test for nitrates.
   A) Both i and ii B) Both iii and iv C) Only iii D) Only iv
7. The colour of KCl crystals when heated in the presence of potassium vapour is
   A) Yellow B) Green C) Violet D) Red
8. The correct order of increase in bond dissociation energy is
   A) $O_2^- < O_2 < NO < CO$ B) $O_2^- < O_2 < CO < NO$
   C) $O_2 < O_2^- < NO < CO$ D) $O_2 < NO < CO < O_2^-$
9. The strongest acid among the following is
   A) HClO B) $HClO_2$ C) $HClO_3$ D) $HClO_4$
10. Which of the following statements is/are correct ?
    i. F_2O has higher bond angle than Cl_2O.
    ii. XeF_4 has tetrahedral geometry.
    iii. CN^- is a pseudo halogen.
    iv. Cl_2O has higher bond angle than F_2O.
    A) Only i B) Only ii C) Both i and ii D) Both iii and iv

11. The geometrical shape of tetracyanonickelate (II) ion is
    A) Tetrahedral B) Distorted octahedron
    C) Square planar D) Trigonal pyramidal
12. The electrogenic activity of Na^+/K^+ pump is due to
    A) The development of negative potential inside the cell
    B) The development of positive potential inside the cell
    C) The continuous reduction of negative charge inside the cell
    D) The passive transport
13. The metal present in carboxy peptidase A is
    A) Zinc B) Iron C) Cobalt D) None of the above
14. What is the oxidation state of iron in Haemoglobin when oxygen is not bound ?
    A) Zero B) + 2 C) + 3 D) + 1
15. Which of the following statement is/are correct about Kroll process ?
    i. It is a pyro metallurgical process used to produce metallic titanium from titanium tetrachloride.
    ii. The process is invented by William J. Kroll.
    iii. In Kroll process, liquid magnesium is employed.
    A) Only i and ii B) Only ii and iii
    C) Only ii D) All of the above (i, ii and iii)
16. Which process is used for the purification of Nickel ?
    A) Van Arkel de Boer process B) Zone refining
    C) Mond's process D) None of the above
17. The chelating agent used for iron toxicity is
    A) Ethylene diamine B) Penicillamine
    C) Dimercaprol D) Deferoxamine
18. What is the CFSE of $[Fe(H_2O)_6]^{3+}$ octahedral complex ?
    A) – 24Dq B) Zero C) – 20Dq D) 6Dq
19. Which of the following complexes is significantly showing Jahn-Teller distortion ?
    A) $[Cu(H_2O)_6]^{2+}$ B) $[Mn(H_2O)_6]^{2+}$ C) $[Fe(CN)_6]^{4-}$ D) $[Co(NH_3)_6]^{3+}$
20. What is the correct order of ligands in terms of their trans effect ?
    A) $CN^- > CO > OH > Cl^- > NO_2^- > H_2O$ B) $CN^- > CO > OH > Cl^- > H_2O > NO_2^-$
    C) $CO, CN^- > NO_2^- > Cl^- > OH^- > H_2O$ D) $CN^-, CO > Cl^- > OH^- > NO_2^- > H_2O$
21. An organometallic compound having bridging structure and multi-center bonding is
    A) $Zn(C_2H_5)_2$ B) C_2H_5BeH C) $Al_2(CH_3)_6$ D) CH_3SnH_2Cl

22. The term hapticity in an organometallic compound refers to the
    A) Number of ligands attached to the central metal atom
    B) Number of carbon atoms of a ligand that are attached to the metal
    C) Total number of electron pairs shared between ligands and the central metal
    D) Number of back bonded electron pairs

23. Select reductive carbonylation method of preparation of organo carbonyls
    A) $Ni + 4CO \rightarrow Ni(CO)_4$ B) $Fe + 5CO \rightarrow Fe(CO)_5$
    C) $CrCl_3 + Al + 6CO \rightarrow Cr(CO)_6 + AlCl_3$ D) $2Co_2(CO)_8 \rightarrow Co_4(CO)_{12} + 4CO$

24. Which of the following statements related to Zeise's salt are correct ?
    i. It is an olefin organometallic compound
    ii. It involves meal-ligand back bonding
    iii. It involves σ-type and π-type bonds
    A) Only i and ii B) Only ii and iii C) Only i and iii D) All are correct

25. Ethylene in presence of a mixture of $TiCl_4$ and $Al_2(C_2H_5)_6$ in heptane forms
    A) Isotactic polythene B) Syndiotactic polythene
    C) Atactic polythene D) Ethane

26. Pick up correct statements related to ferrocene.
    i. It follows 18 electron rule
    ii. Ferrocene undergoes Mannich condensation reaction
    iii. It gives Friedel-Crafts acylation reaction
    A) All are correct B) Only i and ii C) Only ii and iii D) Only i and iii

27. Gases used in the Fischer-Tropsch reaction for the production of hydrocarbons with the help of heterogeneous catalyst
    A) CO_2 and H_2 B) CO and H_2 C) CO and NH_3 D) CO_2 and NH_3

28. Which of the following not belonging to the category of determinate errors ?
    A) Error arises from imperfection in pipette
    B) Uncertainties associated with chemical measurements
    C) Non ideality originates from slowness of reaction
    D) Errors arise from the judgement of the colour of solution at the end point in a titration

29. Which of the following is used to express the closeness of a measurement or set of measurements to the true or accepted value ?
    A) Average deviation from the mean B) Standard deviation
    C) Relative error D) Relative standard deviation

30. When perform large number of replicate analyses, one of the result may differ excessively from the average value, we have to take a decision whether we should retain or reject that suspect result. Which of the following test have to propose for this purpose ?
A) Q test B) F test C) T test D) Confidence limit

31. For the analysis of group II cations, H_2S gas is passed through their solution in presence of HCl. Here the role of HCl is
A) Presence of HCl will increase the dissociation of H_2S
B) Presence of HCl will suppress the dissociation of H_2S
C) Presence of HCl has no effect
D) HCl act as catalyst

32. Which of the following is not a method for removing chemical interference in flame emission spectrometry ?
A) Addition of releasing agent
B) Using graphical-standard addition technique
C) Addition of releasing agents
D) Selective spectral line modulation

33. Which of the following is a wrong statement related to conductometric titration ?
A) Principle involved in conductometric titration is that electrical conductance depends upon the number and mobility of ions
B) Coloured solution can be titrated where indicators cannot be used
C) Mixture of strong and weak acids cannot be titrated
D) Accurate results are obtained as end point is determined graphically

34. Which of the following is true for complexometric titration ?
A) EDTA forms complexes with metal ions best in neutral solution
B) Metal-indicator complex must be more stable than metal-EDTA complex
C) Organic dyes have been used as indicators
D) End point is detected by a pH sensitive indicator

35. Homolytic fission of hydro-carbon result in the formation of
A) Carbanion B) Free radical C) Carbocation D) Carbene

36. Which of the following statement is true about diastereomers ?
i. Stereoisomers that are mirror image of each others are called diastereomers.
ii. Diastereomers have different physical properties.
iii. Diastereomers can be separated by fractional distillation or fractional crystallisation.
A) Only i B) Only ii
C) Only iii D) All of the above statements (i, ii and iii)

37. Which of the following is correct about stability of carbocation ?

A) Tropylium cation > $(C_6H_5)_3\overset{+}{C}$ > $CH_2 = CH - \overset{+}{C}H_2$ > $(CH_3)_2\overset{+}{C}H$

B) $(C_6H_5)_3\overset{+}{C}$ > $(CH_3)_2\overset{+}{C}H$ > $CH_2 = CH - \overset{+}{C}H_2$ > Tropylium cation

C) Tropylium cation > $(C_6H_5)_3\overset{+}{C}$ > $(CH_3)_2\overset{+}{C}H$ > $CH_2 = CH - \overset{+}{C}H_2$

D) $(C_6H_5)_3\overset{+}{C}$ > Tropylium cation > $(CH_3)_2\overset{+}{C}H$ > $CH_2 = CH - \overset{+}{C}H_2$

38. Which of the following is capable of showing optical isomerism ?

A) $CH_3CH(OH)COOH$

B) $(CH_3)_2\,CH - COOH$

C) $CH_3 - CO - CH_3$

D) $CH_3 - \underset{\displaystyle COOH}{\underset{|}{CH}} - COOH$

39. Which of the following statement is true about carbanion ?

i. In methyl carbanion central carbon atom is sp^3 hybridised.

ii. The methyl carbanion is isoelectronic with ammonia.

iii. Increase in the S character of hybridised state of carbanion carbon atom destabilize the anion.

A) Only i and iii

B) Only i and ii

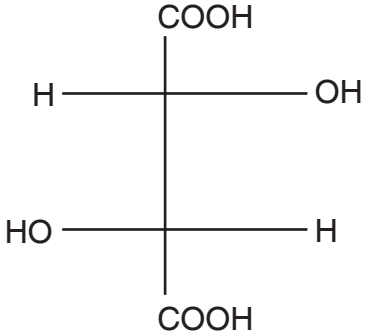
C) Only ii and iii

D) All of the above statements (i, ii and iii)

40. Which of the following compound do not show geometrical isomerism ?

A) 1–propene B) 2–butene C) 3–hexene D) Butenedioic acid

41. The configuration (RS notation) at C – 2 and C – 3 of the compound below is



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

42. Which reagent is used in the Wurtz reaction for the formation of alkanes ?

A) $AlCl_3$ B) Na/ether C) Zn/HCl D) None of these

43. The rate-determining step in free radical halogenation is
A) Initiation B) Propagation C) Termination D) None of these

44. Which of the following favors the E2 mechanism ?
A) Low temperature B) Polar solvent
C) Weak base D) Strong base

45. In the Diels-Alder reaction, the diene must be in which conformation ?
A) Cis B) Trans C) Anti D) None of these

46. Which group is an ortho/para director in Electrophilic aromatic substitution reactions ?
A) –OH B) $-NO_2$ C) –CN D) None of these

47. According to Huckel's rule, aromatic compounds must have
A) 4n π electrons B) 2n π electrons
C) Odd number of π bonds D) None of these

48. In an S_N2 reaction, the rate depends on
A) The concentration of both the Substrate and Nucleophile
B) The concentration of both the Substrate and Solvent
C) The concentration of both the Solvent and Nucleophile
D) None of these

49. Which reaction is used to prepare aryl halides from diazonium salts ?
A) Wurtz reaction B) Friedel-Crafts reaction
C) Sandmeyer reaction D) None of these

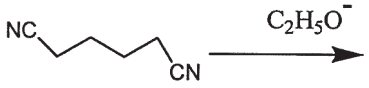
50. Which of the following is least reactive towards nucleophilic substitution ?
A) Vinyl chloride B) Allyl chloride
C) Ethyl chloride D) Benzyl chloride

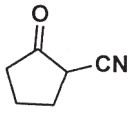
51. Pyridine is aromatic because it obeys some conditions. One of those is, it has
A) 4π electrons B) 6π electrons
C) Non-planar structure D) Delocalized σ bonds

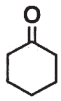
52. Which of the following is prepared using Skraup synthesis ?
A) Furan B) Pyridine C) Pyrrole D) Quinoline

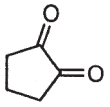
53. On oxidation, furfural gives
A) Furan B) Furoic acid C) Phenol D) None of these

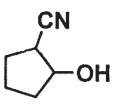
54. Predict the product of the following reaction :



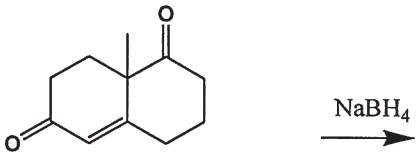
A) 

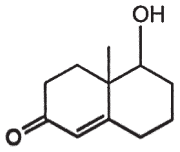
B) 

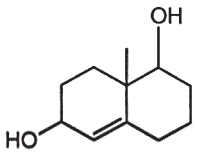
C) 

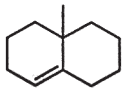
D) 

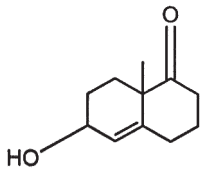
55. Predict the product of the below mentioned reaction :



A) 

B) 

C) 

D) 

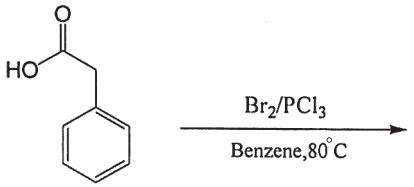
56. The base catalysed condensation reaction between an α-halo ester and an aldehyde to give glycidic ester is called

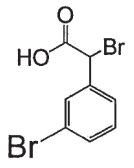
A) Thorpe reaction
B) Stobbe reaction
C) Darzen's reaction
D) Perkin reaction

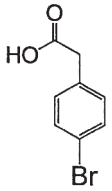
57. cis 1,2-dimethyl cyclohexane 1,2-diol on treating with dilute acid gives

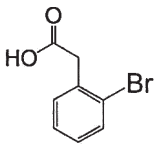
A) cyclo pentane derivative
B) 2,2-dimethyl cyclohexanone
C) 1,2-dimethyl cyclo hexanone
D) None of these

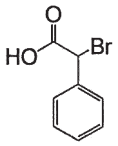
58. Predict the product for the following reaction :



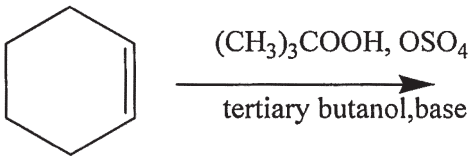
A) 

B) 

C) 

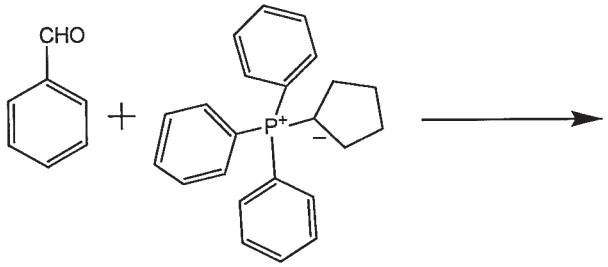
D) 

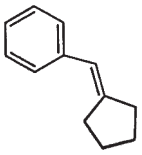
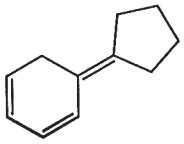
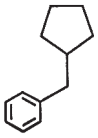
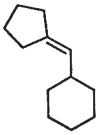
59. Choose the major product for the below given reaction from the given options.



A) trans 1,2-cyclohexane diol
B) cyclohexane
C) cis 1,3-cyclohexane diol
D) cis 1,2-cyclohexane diol

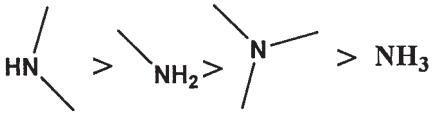
60. Choose the product of the below given reaction.

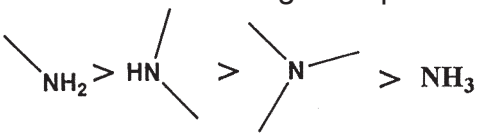


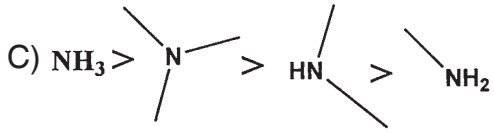
A) 
B) 
C) 
D) 

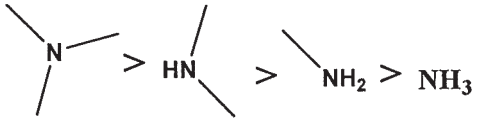
61. Hinsberg reagent is
A) benzoyl chloride
B) benzenesulphonyl chloride
C) trimethylaluminium chloride
D) benzanilide

62. Choose the correct order of basicity of amines from the below given options.

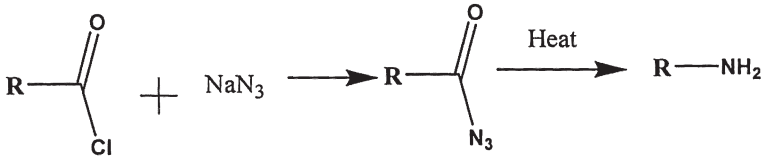
A) 

B) 

C) 

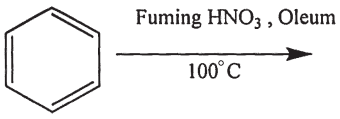
D) 

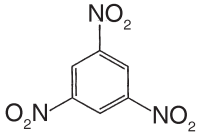
63. Identify the following reaction.

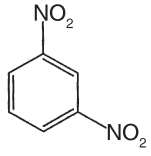


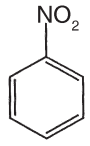
A) Schmidt reaction
B) Curtius rearrangement
C) Hoffmann rearrangement
D) Leuckart reaction

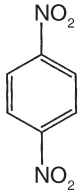
64. Predict the major product from the below given options :



A) 

B) 

C) 

D) 

65. _____ is a synthetic fibre made using acrylonitrile.
A) Nylon 6,6 B) Nylon 6 C) Orlon D) Dacron

66. For one mole of hydrogen gas, van der Waal's equation can be rearranged as
A) $PV = RT - a/V$ B) $(P + a/V^2)V = RT$
C) $PV = RT - Pb$ D) $PV - Pb = RT$

67. Which among the following statements is correct ?
A) Surface tension of a liquid increases with increase of temperature.
B) Surface tension of a liquid becomes zero at critical temperature.
C) Surface tension of a liquid decreases with increase of surface free energy.
D) Surface tension of a liquid becomes maximum at critical temperature.

68. In the first order X-ray diffraction by a crystal when the interplanar spacing is equal to the wavelength of X-ray, what could be the angle of diffraction ?
A) 30° B) 60° C) 45° D) 80°

69. The number of space lattices and space groups for monoclinic system respectively are
A) 4, 59 B) 3, 36 C) 2, 13 D) 1, 25

70. Under identical conditions, 100 mL of hydrogen gas effuses through a tiny hole in 2 minutes, while same volume of an unknown gas (A) effuses in 8 minutes. Gas A is
A) Nitrogen B) Carbon monoxide
C) Fluorine D) Oxygen

71. Assuming 20% vibrational contribution, what could be the estimated value for C_v of CO_2 at room temperature ?
A) 2.7 R B) 1.5 R C) 3.3 R D) 2.5 R

72. At sublimation temperature, during the phase transition, free energy change can be represented as
A) ΔG = +ve B) $\Delta G = 0$ C) ΔG = –ve D) ΔG = +ve or –ve

73. For a 10% decomposition represented as $AB_2C_2 \rightleftharpoons AB_2 + C_2$ at 5 atmosphere pressure, the value of equilibrium constant at constant pressure can be approximately
A) 0.05 atmosphere B) 0.5 atmosphere
C) 0.01 atmosphere D) 0.1 atmosphere

74. Which among the following is basic in aqueous solution ?
A) $CuSO_4$ B) $FeCl_3$ C) CH_3COOK D) NH_4Br

75. What will be the approximate pH of a solution obtained by mixing 50 mL each of 0.04 M KOH and 0.03 M H_2SO_4 solutions ?
A) 1.0 B) 2.0 C) 11.7 D) 12.7

76. Variance at congruent melting point of a two-component system as per the condensed equation of phase rule is
A) 1 B) 2 C) 0 D) 3

77. What concentration of a weak acid ($K_a = 10^{-7}$) is required to prepare a buffer solution with a pH of 8, given that the concentration of its salt (formed with a strong base) is 0.1 N ?
A) 1 N B) 0.1 N C) 10 N D) 0.01 N

78. The enthalpy change, ΔH for the reaction $2H_2 + O_2 \rightarrow 2H_2O$ is
[Given bond enthalpies : H – H = 436 kJ/mol, O = O = 498 kJ/mol, O – H = 463 kJ/mol].
A) –486 kJ B) –572 kJ C) –970 kJ D) –480 kJ

79. For 1 mole of an ideal gas expanding isothermally from 10 L to 50 L at 300 K, the entropy change is
A) 23.0 J/K B) 57.6 J/K C) 30.5 J/K D) 42.8 J/K

80. A Carnot engine operates between 1200 K and 600 K. If it absorbs 1500 J, what is the work output ?
A) 750 J B) 500 J C) 1000 J D) 600 J

81. In a Joule-Thomson expansion, which of the following remains constant ?
A) Internal energy (U) B) Helmholtz free energy (A)
C) Entropy (S) D) Enthalpy (H)

82. For a real gas undergoing a Joule-Thomson expansion, the inversion temperature (T_i) is the temperature at which the Joule-Thomson coefficient (μ_{JT}) is zero. If the van der Waal's constants for a gas are a = 4.2 L^2 atm/mol^2 and b = 0.042 L/mol, the inversion temperature (T_i) is
A) 99.2 K B) 126.5 K
C) 200.4 K D) 252.3 K

83. Which of the following statements about thermodynamic laws and principles is/are incorrect ?
    1. Zeroth Law of Thermodynamics states that if two systems are in thermal equilibrium with a third system, they may not necessarily be in equilibrium with each other.
    2. First Law of Thermodynamics states that the total energy of an isolated system increases over time.
    3. Second Law of Thermodynamics states that entropy of an isolated system remains constant in all natural processes.
    4. Third Law of Thermodynamics states that the entropy of a perfect crystal at absolute zero is zero.
    5. Hess's Law states that enthalpy change of a reaction depends on the reaction pathway.

    A) Only 1 and 3 B) Only 2, 3 and 5
    C) Only 1, 2, 3 and 5 D) All of the above

84. A reaction's rate constant doubles when the temperature increases from 300 K to 310 K. Assuming Arrhenius behavior, what is the approximate activation energy (E_a) in kJ/mol ?

    A) 52 kJ/mol B) 63 kJ/mol C) 74 kJ/mol D) 85 kJ/mol

85. Which of the following statements about adsorption is correct ?
    A) Physical adsorption increases with temperature.
    B) Langmuir isotherm assumes multilayer adsorption.
    C) Freundlich isotherm accounts for heterogeneous surface adsorption.
    D) Chemisorption occurs at low temperature.

86. Which of the following isotherms explains chemisorption ?

    A) Langmuir B) Freundlich C) BET D) Henry's law

87. For a reaction A + B $\rightarrow$ Products, the rate law is $r = k[A][B]^3$. The change in the rate of the reaction when the concentration of A is tripled without affecting the concentration of B is

    A) Increases to 9 times B) Increases to 3 times
    C) Increases to 6 times D) Increases to 27 times

88. For a reaction where the rate constant (k) has units of $L^2\ mol^{-2}\ s^{-1}$, what is the order of the reaction ?

    A) Zero-order B) First-order C) Second-order D) Third-order

89. Larger ions satisfy Walden's rule more accurately than the smaller ions. This is because
    A) Larger ions are more solvated than smaller ions
    B) Smaller ions are more solvated than larger ions
    C) Smaller and larger ions are solvated equally and have different effective radius
    D) Smaller and larger ions have same effective radius in viscous solvents

90. For a solution of a strong electrolyte at a particular temperature, the Debye-Huckel-Onsager equation is
    A) $\Lambda_m = \Lambda_m^0 - \left(A + B\,\Lambda_m^0\right)c^{1/2}$
    B) $\Lambda_m^0 = \Lambda_m - \left(A + B\,\Lambda_m\right)c^{1/2}$
    C) $\Lambda_m = \Lambda_m^0 - \left(A + B\,\Lambda_m\right)c^{1/2}$
    D) $\Lambda_m = \Lambda_m^0 - \left(A + B\,\Lambda_m^0\right)c$

91. The liquid junction potential arises due to
    A) The presence of an external electric field
    B) The movement of solvent molecules
    C) The difference in diffusion rates of cations and anions
    D) The difference in oxidation-reduction at the junction

92. Hittorf's method for the determination of transport number is based on
    A) Direct observation of migration of ions
    B) Measurement of ionic velocity
    C) Measurement of electrode potential
    D) Change in concentration near the electrodes

93. The Wein effect and Debye-Falkenhagen effect respectively describes
    A) Conductance under high A.C. frequencies and conductance under high potential gradient
    B) Conductance under high temperature and conductance under high potential gradient
    C) Conductance under high A.C. frequencies and conductance under high temperature
    D) Conductance under high potential gradient and conductance under high A.C. frequencies

94. The molar ionic conductance at infinite dilution of NaOH, NaCl and $BaCl_2$ are 0.025, 0.0125 and 0.028 S m^2mol^{-1} respectively. Calculate the molar ionic conductance at infinite dilution of $Ba(OH)_2$.

A) 0.053 S m^2mol^{-1} B) 0.0405 S m^2mol^{-1}

C) 0.0265 S m^2mol^{-1} D) 0.081 S m^2mol^{-1}

95. The selection rules that govern the transitions leading to rotational-vibrational Raman spectrum are

A) $\Delta v = +1$ and $\Delta J = \pm 2$ B) $\Delta v = +2$ and $\Delta J = \pm 1$

C) $\Delta v = +1$ and $\Delta J = 0, \pm 2$ D) $\Delta v = 0, +1$ and $\Delta J = \pm 2$

96. The hyperfine structure in the ESR spectrum of methyl radical consists of

A) Three equally spaced lines B) Four equally spaced lines

C) A single line D) Two equally spaced lines

97. The vibrational degrees of freedom of H_2O and CO_2 molecules are respectively

A) 4 and 3 B) 4 and 4 C) 3 and 3 D) 3 and 4

98. The rotational spectrum of a rigid diatomic molecule consists of

A) Equally spaced lines with spacing equal to 2B

B) Equally spaced lines with spacing equal to 4B

C) Unequally spaced lines

D) Equally spaced lines with spacing equal to B

99. An organic compound with molecular formula C_3H_6O gives three signals in its ^1H NMR spectrum. The compound is more likely to be

A) An alcohol B) An ether C) A ketone D) An aldehyde

100. An electronic transition takes so rapidly that a vibrating molecule does not changes its internuclear distance appreciably during the transition. This is in accordance with

A) Born-Oppenheimer approximation B) Franck-Condon principle

C) Rayleigh scattering D) Mutual exclusion principle

Space for Rough Work