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TEST BOOKLET

Sl. No: **0662**

Subject Code: **03**

Subject: **CHEMISTRY**

**WRITTEN TEST FOR RECRUITMENT OF POST GRADUATE TEACHERS FOR
NON-GOVT. AIDED HIGHER SECONDARY SCHOOLS OF ODISHA**

Time Allowed : 2 Hours

Maximum Marks: 150

: INSTRUCTIONS TO CANDIDATES:

- 1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET CONTAINS 20 PAGES AND DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.**
- 2. You have to enter your Roll No. on the Test Booklet in the Box provided alongside. DO NOT write anything else on the Test Booklet.**

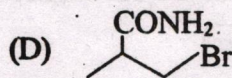
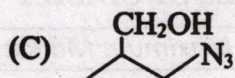
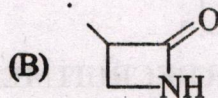
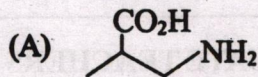
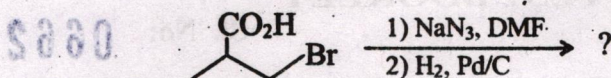
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- 3. The Test Booklet contains 100 questions. Each question comprises four options. You have to select the correct answer which you want to mark (darken) on the OMR Answer Sheet. In any case, choose ONLY ONE answer for each question. If more than one answer is darkened, it will be considered wrong.**
- 4. You have to mark (darken) all your answers only on the OMR Answer Sheet using BLACK BALL POINT PEN provided by the State Selection Board. You have to do rough work only in the space provided at the end of the Test Booklet. See instructions in the OMR Answer Sheet.**
- 5. All questions carry equal marks. While 1.5 marks will be awarded for each correct answer, each wrong answer will result in negative marking of 0.50 mark.**
- 6. Before you proceed to mark (darken) the answers in the OMR Answer Sheet to the questions in the Test Booklet, you have to fill in some particulars in the OMR Answer Sheet as per the instructions in your Admit Card.**
- 7. On completion of the Examination, you should hand over the original copy of OMR Answer Sheet issued to you to the Invigilator before leaving the Examination Hall. You are allowed to take with you the candidate's copy (second copy) of the OMR Answer Sheet along with the Test Booklet for your reference.**

Candidate's full signature

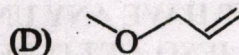
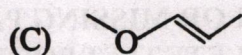
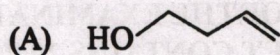
Invigilator's signature

P.T.O.

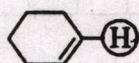
1. The major product formed in the following reaction is



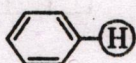
2. An organic compound $P(C_4H_8O)$ is positive to Baeyer's test, but inert to sodium metal. On treatment with conc. HCl, P gives CH_3CH_2Cl and CH_3CHO . The structure of P is



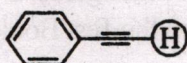
3. The correct order of 1H -NMR chemical shift values (δ) for the indicated hydrogens (circled) in the following compounds is



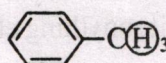
[I]



[II]



[III]



[IV]

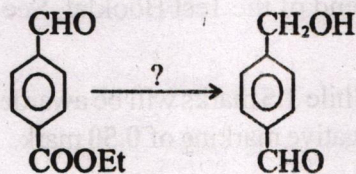
(A) I > II > III > IV

(B) II > I > III > IV

(C) III > II > I > IV

(D) II > III > IV > I

4. Identify the correct reagents required for the following transformation.



(A) (i) $NaBH_4$; (ii) H_3O^+

(B) (i) $LiAlH_4$; (ii) H_3O^+

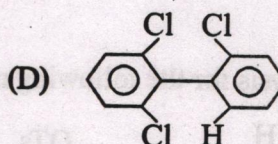
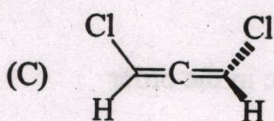
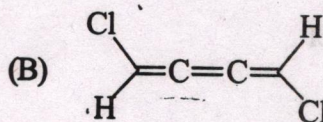
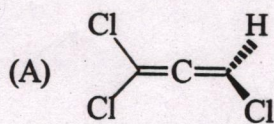
(C) (i) H^+ ; (ii) $LiAlH_4$; (iii) H_3O^+

(D) (i) H^+ ; (ii) $LiAlH_4$; (iii) H_3O^+

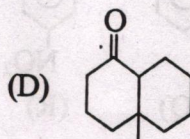
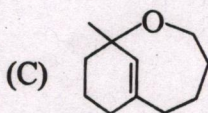
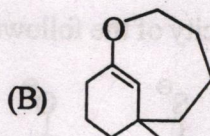
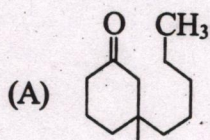
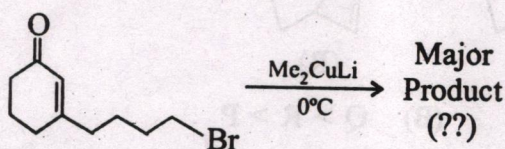
5. Tollen's reagent will be negative for

- (A) Glucose (B) Mannose
(C) Sucrose (D) Galactose

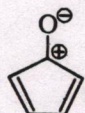
6. Which one among the following molecules is chiral?



7. The structure of the major product of the following reaction is



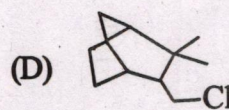
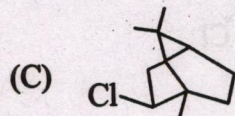
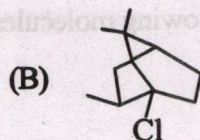
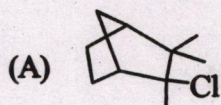
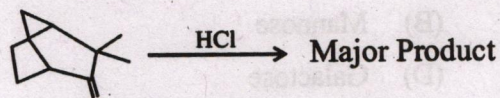
8. The species/compounds that are aromatic among the following are



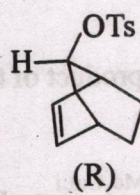
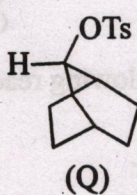
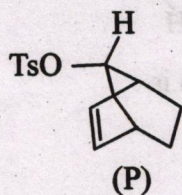
- (A) R and S
(C) Q and S

- (B) P and Q
(D) P and S

9. The major product obtained in the reaction given below is



10. The rates of acetylation for the following norbornyl derivatives are in the order



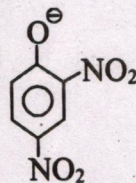
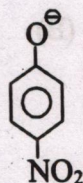
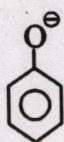
(A) $R > Q > P$

(B) $Q > R > P$

(C) $P > R > Q$

(D) $R > P > Q$

11. The order of nucleophilicity of the following anions in a S_N2 reaction is



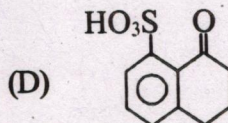
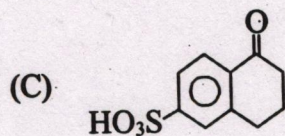
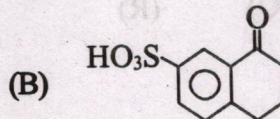
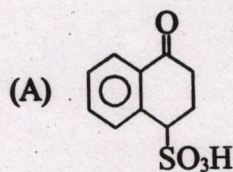
(A) $Q > R > S > P$

(B) $Q > P > R > S$

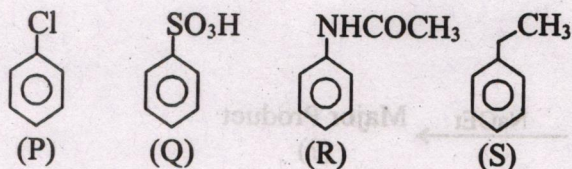
(C) $Q > R > P > S$

(D) $P > S > R > Q$

12. The major mono-sulfonation product of α -tetralone () is

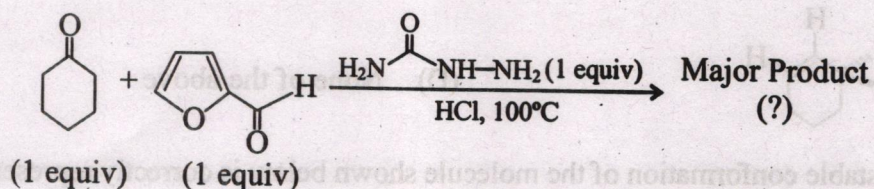


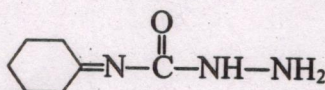
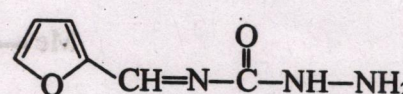
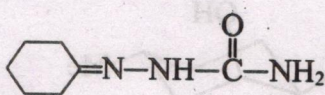
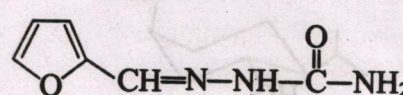
13. Electrophilic nitrations of the following compounds follow the trend



- (A) $S > R > P > Q$ (B) $R > S > P > Q$
 (C) $R > P > S > Q$ (D) $P > S > R > Q$

14. The major product in the following reaction is

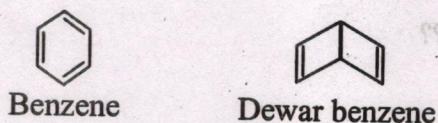


- (A)  (B) 
 (C)  (D) 

15. In which of the following C-H bond has the highest s-character?

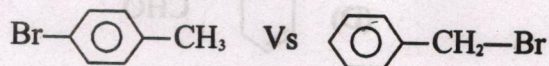
- (A) $\text{HC} \equiv \text{CH}$ (B) $\text{H}_2\text{C} = \text{CH}_2$
 (C) CH_4 (D) CH (radical)

16. Benzene and Dewar benzene are



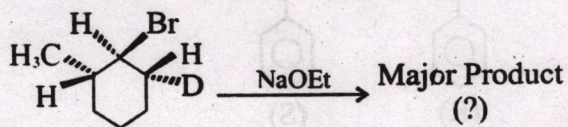
- (A) Canonical forms (B) Structural isomers
 (C) Tautomers (D) Conformational isomers

17. Which chemical test will distinguish the compounds shown below?



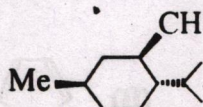
- (A) Beilstein's flame test (B) Ethanolic AgNO_3 test
 (C) Sodium fusion test (D) Fehling's test

18. The reaction of the Bromo compound shown below with NaOEt gives predominantly the major product as.



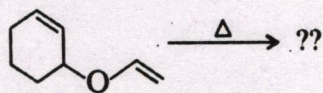
- (A) (B)
- (C) (D) None of the above

19. The most stable conformation of the molecule shown below is correctly represented by



- (A) (B)
- (C) (D)

20. Thermal rearrangement of the following compound would give

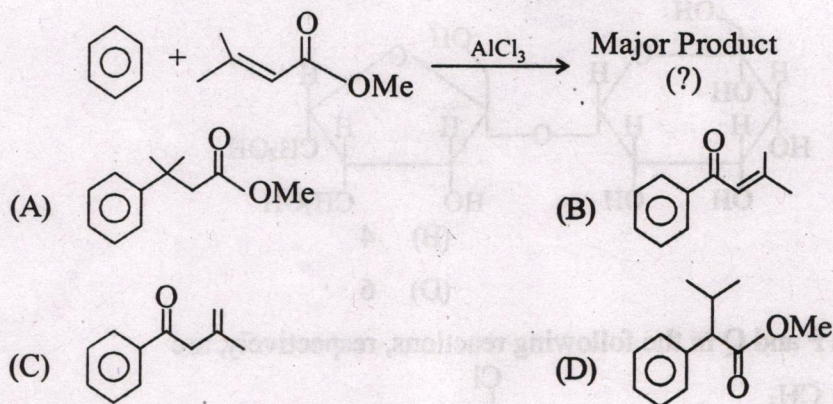


- (A) (B)
- (C) (D)

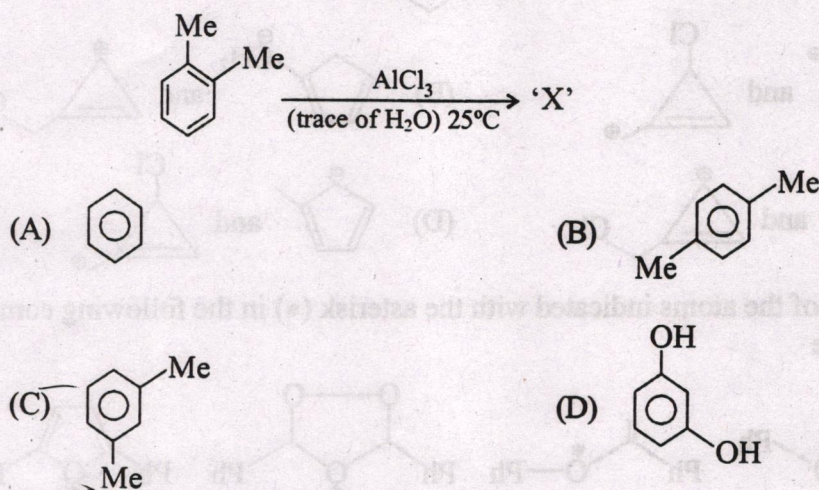
21. The maximum number of stereoisomers possible for 4-phenyl but-3-en-2-ol is

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

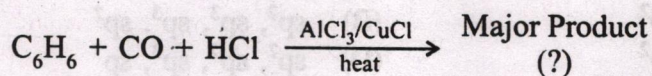
22. The major product of the reaction



23. The major product (X) in the reaction



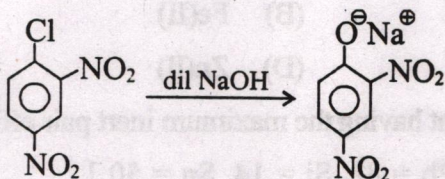
24. The major product of the reaction



gives negative test with Fehling's solution. The major product is

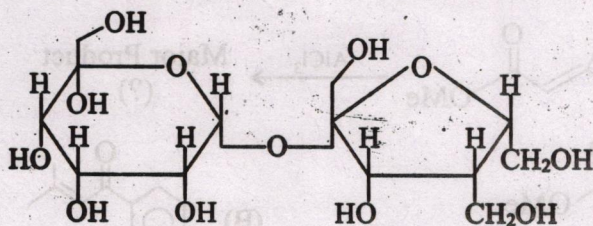
- (A) $\text{C}_6\text{H}_5\text{-OH}$
 (B) $\text{C}_6\text{H}_4(\text{Cl})\text{CHO}$
 (C) $\text{C}_6\text{H}_4(\text{OH})\text{CHO}$
 (D) $\text{C}_6\text{H}_5\text{-CHO}$

25. The following transformation proceeds through



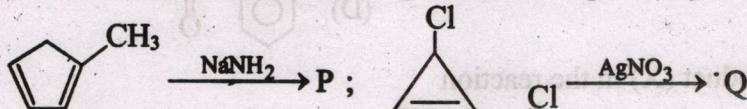
- (A) electrophilic addition
 (B) benzyne intermediate
 (C) activated nucleophilic substitution
 (D) Oxirane

26. How many moles of HIO_4 will be completely consumed by the following sugar?



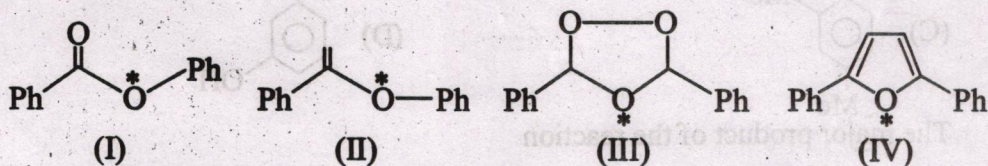
- (A) 3
(B) 4
(C) 5
(D) 6

27. The products P and Q in the following reactions, respectively, are



- (A) and
- (B) and
- (C) and
- (D) and

28. Hybridisation of the atoms indicated with the asterisk (*) in the following compounds sequentially are



- (A) sp^2, sp^2, sp^3, sp^2
(B) sp^2, sp^3, sp^3, sp^2
(C) sp^3, sp^3, sp^3, sp^2
(D) sp^2, sp^2, sp^3, sp^3

29. The predicted geometry of TeF_4 by VSEPR theory is

- (A) Octahedral
(B) Square planar
(C) Tetrahedral
(D) Trigonal bipyramidal

30. The metal ion of an enzyme involved in the hydration of CO_2 is

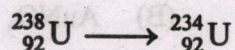
- (A) Cu(II)
(B) Fe(II)
(C) Mg(II)
(D) Zn(II)

31. Among the following, the element having the maximum inert pair effect is

[Given : At. no. of Ge = 30, Pb = 82, Si = 14, Sn = 50]

- (A) Ge
(B) Pb
(C) Si
(D) Sn

32. The no. of α and β particle(s) generated in the following radioactive decay process are

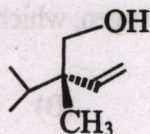


- (A) One α and two β particles (B) Two α and one β particles
(C) One α and four β particles (D) No α and four β particles
33. The most polar compound among the following is
(A) SF_4 (B) BF_3
(C) XeF_4 (D) SO_3
34. Which one of the following order of the carbonates is correct for their decomposition?
(A) $\text{BaCO}_3 > \text{CaCO}_3 > \text{SrCO}_3 > \text{MgCO}_3$
(B) $\text{BaCO}_3 > \text{SrCO}_3 > \text{CaCO}_3 > \text{MgCO}_3$
(C) $\text{MgCO}_3 > \text{CaCO}_3 > \text{SrCO}_3 > \text{BaCO}_3$
(D) $\text{MgCO}_3 > \text{CaCO}_3 > \text{BaCO}_3 > \text{SrCO}_3$
35. Among the following, the ligand that best stabilises low oxidation state of tungsten (W) is
(A) H_2O (B) NH_3
(C) CO (D) F^\ominus
36. Which one of the following statements is correct?
(A) Naturally occurring DNA has β -configuration
(B) Nucleic acids are derived from proteins
(C) Proteins store genetic information
(D) Vitamins generally act as enzymes
37. Molecular shape of SOCl_2 is
(A) Square planar (B) Trigonal bipyramial
(C) Trigonal planar (D) T-shaped
38. Number of $3\text{C}-2\text{e}$ bonds presentation in diborane is
(A) 2 (B) 4
(C) 6 (D) 8
39. The lattice energy of LiF calculated from Born-Lande equation is -1000 kJmol^{-1} . Assume that for both LiF and MgO the Madelung constants, inter ionic distances and Born exponents have the same value. The lattice energy of MgO in KJmol^{-1} is
(A) -4000 (B) -2000
(C) 2000 (D) 4000

40. The compound found by dissolving elemental gold in aqua regia is
 (A) AuCl (B) AuNO₃
 (C) H[AuCl₄] (D) H[Au(NO₃)₄]
41. The correct order of acidic character is
 (A) Al₂O₃ > MgO > SiO₂ > P₄O₁₀
 (B) P₄O₁₀ > Al₂O₃ > MgO > SiO₂
 (C) P₄O₁₀ > SiO₂ > Al₂O₃ > MgO
 (D) SiO₂ > P₄O₁₀ > Al₂O₃ > MgO
42. The pair of amphoteric oxides is
 (A) VO, Cr₂O₃ (B) V₂O₃, Cr₂O₃
 (C) VO₂, Cr₂O₃ (D) V₂O₅, CrO₃
43. The pH of an aqueous solution of Al³⁺ is likely to be
 (A) Neutral (B) Acidic
 (C) Slightly basic (D) Highly basic
44. Hydrolysis of Me₂SiCl₂ and MeSiCl₃ leads to
 (A) linear chain and cross-linked silicones respectively
 (B) cross-linked and linear chain silicones respectively
 (C) linear chain silicones only
 (D) cross-linked silicones only
45. The metal that is extracted by the reduction method is
 (A) Al (B) Au
 (C) Hg (D) Mg
46. Addition of an aqueous solution of Fe (II) to potassium hexacyano chromate (III) produces a brick-red coloured complex, which turns dark green at 100°C. The dark green complex is
 (A) Fe₄[Cr(CN)₆]₃ (B) KFe[Cr(CN)₆]
 (C) KCr[Fe(CN)₆] (D) Fe[Cr(CN)₆]
47. The colour of K₂Cr₂O₇ is due to
 (A) d-d transition (B) transition in K⁺ ion
 (C) LMCT (D) MLCT

48. Which one of the following configuration will show John-Teller distortion in an octahedral field?
- (A) High spin d^8 (B) High spin d^4
 (C) High spin d^5 (D) High spin d^6
49. Which of the following has a square planar geometry according to VSEPR theory?
- (A) XeO_2F_2 (B) SF_4
 (C) BF_4^- (D) XeF_4
50. Among lithium, nitrogen, carbon and oxygen, which element has the highest first ionisation potential?
- (A) Lithium (B) Nitrogen
 (C) Carbon (D) Oxygen
51. Which one of the following has the highest lattice energy?
- (A) $LiCl$ (B) $CaCl_2$
 (C) LiF (D) KCl
52. At room temp, HCl is a gas while HF is a liquid because
- (A) of a strong bond between H and F in HF
 (B) HF is less acidic as compared to HCl
 (C) of strong inter molecular H-bonding in HF
 (D) HCl is less acidic as compared to HF
53. The number $P=O$ bonds present in the tetrabasic acid $H_4P_2O_7$ is
- (A) 3 (B) 2
 (C) 1 (D) None of the above
54. The metals involved in nitrogenase are
- (A) Fe and Mg (B) Mo and K
 (C) Mo and Fe (D) Fe and K
55. Match the following :
- | | | |
|------------------|-------|-----------------------|
| P : Ferritin | I : | electron transport |
| Q : Vit B_{12} | II : | ionophore |
| R : Cytochromes | III : | oxygen transport |
| S : Valinomycin | IV : | nitrogen fixation |
| | V : | organometallic enzyme |
| | VI : | iron storage |
- (A) P - VI ; Q - IV ; R - II ; S - I
 (B) P - I ; Q - III ; R - VI ; S - IV
 (C) P - III ; Q - V ; R - IV ; S - VI
 (D) P - VI ; Q - V ; R - I ; S - II

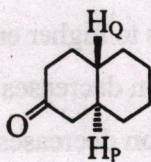
56. Conversion of Cyclohexene to Cyclohexanol can be achieved by
- (A) NaOH - H₂O
 (B) Br₂ - H₂O
 (C) Hydroboration followed by oxidation
 (D) Hydroboration followed by hydrolysis
57. The Cahn-Ingold-Prelog (CIP) priorities of the groups and the absolute configuration (R/S) of the following compound are



- (A) $-\text{CH}_2\text{OH} > -\text{CH} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix} > -\text{CH}=\text{CH}_2 > -\text{CH}_3$ and S
- (B) $-\text{CH}_2\text{OH} > -\text{CH}=\text{CH}_2 > -\text{CH} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix} > -\text{CH}_3$ and S
- (C) $-\text{CH}_2\text{OH} > -\text{CH}=\text{CH}_2 > -\text{CH} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix} > -\text{CH}_3$ and R
- (D) $-\text{CH}_2\text{OH} > -\text{CH} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix} > -\text{CH}=\text{CH}_2 > -\text{CH}_3$ and R
58. In the UV spectrum of cyclohexenone, the absorption of $\lambda_{\text{max}} \sim 215 \text{ nm}$ is due to the transition
- (A) $\sigma \rightarrow \sigma^*$ (B) $\sigma \rightarrow n$
 (C) $\pi \rightarrow n$ (D) $\pi \rightarrow \pi^*$
59. The most convenient spectroscopic technique to establish the presence of inter-molecular hydrogen bonding in hydroxy compound is
- (A) UV (B) IR
 (C) EPR (D) Mass
60. The source of UV radiation used in UV-visible spectrophotometer is
- (A) Mercury vapour lamp (B) Sodium vapour lamp
 (C) Halogen vapour lamp (D) Hydrogen vapour lamp
61. During photolysis of ketones in Norrish type II cleavage
- (A) A homolytic cleavage leads to the formation of a radical intermediate
 (B) CO is produced
 (C) Photoexcited carbonyl group abstracts a gamma hydrogen in the primary step
 (D) radicals formed dimerize

62. Among the following the correct statement is
- (A) absorption of radiation shifts to longer wave length region with increase in conjugation
 (B) absorption of radiation shifts to higher energy region with increase in conjugation
 (C) intensity of $n \rightarrow \pi^*$ transition decreases upon conjugation
 (D) intensity of $\sigma \rightarrow \sigma^*$ transition decreases upon conjugation
63. The transmittance of an alcoholic solution of a certain compound at 500 nm is 1 per cent in a 1cm cell. The absorbance is
- (A) 1.0 (B) 2.0
 (C) 2.5 (D) 4.0
64. Match the compounds P-S with their carbonyl stretching frequencies (cm^{-1}) I-VI in IR spectroscopy :
- | | | |
|---------------------|-------|------|
| P : Acetone | I : | 1870 |
| Q : Ethyl acetate | II : | 1800 |
| R : Acetamide | III : | 1740 |
| S : Acetyl Chloride | IV : | 1700 |
| | V : | 1660 |
| | VI : | 1600 |
- (A) P - IV ; Q - III ; R - I ; S - VI
 (B) P - III ; Q - VI ; R - V ; S - II
 (C) P - IV ; Q - III ; R - V ; S - II
 (D) P - II ; Q - V ; R - III ; S - VI
65. Which one of the following IR frequencies is the closest to that of a triply bridged CO group?
- (A) 1700 cm^{-1} (B) 1810 cm^{-1}
 (C) 1920 cm^{-1} (D) 2140 cm^{-1}
66. The C-O bond in an organic compound absorbs electromagnetic radiation of frequency $6 \times 10^{13} \text{ Hz}$. The frequency corresponds to the region
- (A) Infrared (B) Microwave
 (C) Ultraviolet (D) Visible

67. The vicinal coupling constant (J) expected for the protons H_P and H_Q in the compound given below will be in the range



- (A) 0-2 Hz (B) 4-6 Hz
(C) 8-10 Hz (D) 12-15 Hz
68. The number of signals observed in 1H NMR spectrum of 3,5-dibromotoluene is
(A) 3 (B) 4
(C) 2 (D) 6
69. In the 1H NMR spectrum of toluene, the resonance due to CH_3 group is expected at
(A) δ 0.5 (B) δ 2.5
(C) δ 1.25 (D) δ 3.5
70. The number of peaks in 1H NMR signals of N,N-Dimethyl formamide (DMF) at $25^\circ C$ is
(A) 3 (B) 1
(C) 2 (D) 4
71. In a polarogram, the wave height is a measure of
(A) migration current (B) diffusion current
(C) residual current (D) decomposition potential
72. The diffusion current in a polarogram is proportional to
(A) the residual current
(B) the migration current
(C) the wave height
(D) the concentration of the supporting electrolyte
73. The function of the reference electrode in coulometric analysis is to
(A) control the potential of the cathode
(B) control the potential of the anode
(C) enable the measurement of the potential of the auxiliary electrode
(D) enable the measurement of the potential of the working electrode

74. In polarography, if 'm' is the mass of the mercury drop and 't' is the drop time, the diffusion current is proportional to

(A) $(m)^{\frac{1}{3}}(t)^{\frac{1}{6}}$

(B) $(m)^{\frac{2}{3}}(t)^{\frac{1}{3}}$

(C) $(m)^{\frac{2}{3}}(t)^{\frac{1}{6}}$

(D) $(m)^{\frac{3}{2}}(t)^{\frac{1}{6}}$

75. Which of the following particles is a Fermion?

(A) α -particle

(B) β -particle

(C) γ -particle

(D) $^{12}\text{C}_6$

76. The kinetics of the reaction $2\text{N}_2\text{O}_5 \longrightarrow 4\text{NO}_2 + \text{O}_2$ in liquid Bromine medium was measured independently for three different initial concentrations of N_2O_5 : 0.11, 0.07 and 0.05 mol L⁻¹. The half-life of the reaction was found to be 4.5 hours for all these concentrations. The order of the reaction is

(A) 0

(B) 1

(C) 2

(D) 0.5

77. According to the equipartition principle of energy the molar heat capacity at constant volume for $\text{CO}_2(\text{g})$, $\text{SO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{g})$ follow the trend

(A) $\text{CO}_2 = \text{SO}_2 = \text{H}_2\text{O}$

(B) $\text{CO}_2 > \text{SO}_2 = \text{H}_2\text{O}$

(C) $\text{H}_2\text{O} > \text{SO}_2 = \text{CO}_2$

(D) $\text{CO}_2 = \text{SO}_2 > \text{H}_2\text{O}$

78. The ionic strength of 0.1M aqueous solution of $\text{Fe}_2(\text{SO}_4)_3$ is

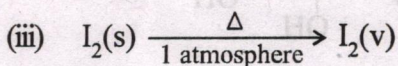
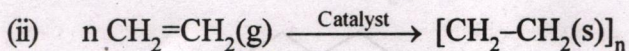
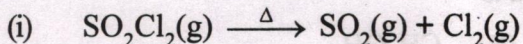
(A) 0.1M

(B) 0.65M

(C) 1.3M

(D) 1.5M

79. The change in entropy for the following transformations is respectively (+ indicates increase, - indicates decrease and 0 indicates no change)



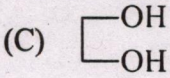
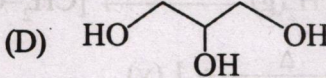
(iv) Adiabatic reversible expansion of an ideal gas

(A) +, -, 0, +

(B) +, -, 0, 0

(C) -, +, +, 0

(D) +, -, +, 0

80. For physisorption process, which one of the following statements is NOT correct?
- (A) There are van der Waals' interactions between the adsorbate and adsorbent.
 (B) The process predominates at low temperature.
 (C) The process cannot proceed beyond a mono layer.
 (D) The process is reversible.
81. The enthalpy of vaporisation (ΔH_{vap}) is zero at
- (A) Boyle's temperature (B) Critical temperature
 (C) Inversion temperature (D) Boiling temperature
82. The average speed of H_2 , N_2 and O_2 gas molecules is in the order
- (A) $\text{H}_2 > \text{N}_2 > \text{O}_2$ (B) $\text{O}_2 > \text{N}_2 > \text{H}_2$
 (C) $\text{H}_2 > \text{O}_2 > \text{N}_2$ (D) $\text{N}_2 > \text{O}_2 > \text{H}_2$
83. For the equilibrium $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, the equilibrium constant K_p is expressed as
- (A) $3^3 K_p = \frac{P_{\text{NH}_3}}{P_{\text{N}_2}^2}$ (B) $3^3 K_p = \frac{P_{\text{NH}_3}^2}{P_{\text{N}_2} P_{\text{H}_2}^3}$
 (C) $3^3 K_p = \frac{P_{\text{NH}_3}^2}{P_{\text{N}_2}^4}$ (D) $3^{3/2} K_p^{1/2} = \frac{P_{\text{NH}_3}^2}{P_{\text{N}_2}^4}$
84. The half-life of a zero-order reaction is
- (A) independent of concentration
 (B) proportional to the inverse of concentration
 (C) proportional to concentration
 (D) proportional to the square of concentration
85. Among the following the most viscous liquid is
- (A) H_2O (B) CH_3OH
 (C)  (D) 
86. The minimum concentration of Ag^{\oplus} ions that is required to start the precipitation of Ag_2S ($K_{\text{sp}} = 1 \times 10^{-51}$) in a 0.1M solution of S^{2-} ion is
- (A) 1×10^{-49} M (B) 1×10^{-50} M
 (C) 1×10^{-26} M (D) 1×10^{-25} M

87. The hydrolysis constant (K_h) of NH_4Cl is 5.6×10^{-10} . The concentration of H_3O^+ in a 0.1M solution of NH_4Cl at equilibrium is
- (A) $\sqrt{5.6 \times 10^{-11}}$ (B) $\sqrt{5.6 \times 10^{-10}}$
 (C) 5.6×10^{-10} (D) 2.8×10^{-5}
88. If ψ is the eigen function to the Hamiltonian operator with α as the eigen value then α must be
- (A) Positive (B) Negative
 (C) An integer (D) Real
89. A quantum mechanical particle of mass 'm' free to rotate on the surface of a sphere of radius r is in the state with energy $\frac{10\hbar^2}{mr^2}$. The degeneracy of the state is
- (A) 20 (B) 10
 (C) 9 (D) 4
90. The work done during the free expansion of one mole of an ideal gas at 27°C to twice its original volume is
 [Given : $RT = 2494 \text{ J mol}^{-1}$; $\ln 2 = 0.7$; $\log 2 = 0.3$]
- (A) 1746 J mol^{-1} (B) -1746 J mol^{-1}
 (C) zero (D) 7482 J mol^{-1}
91. Which of the following is a fundamental particle?
- (A) Proton (B) Electron
 (C) Neutron (D) All
92. Consider two identical containers, one with 1 mole of H_2 and the other with 1 mole of He. If the RMS velocities of the two gases are the same, then the ratio of the temperatures $T_{(\text{H}_2)}/T_{(\text{He})}$ is
- (A) $\frac{1}{2}$ (B) 2
 (C) $\frac{1}{\sqrt{2}}$ (D) $\sqrt{2}$
93. An electron is found in an orbital with one radial node and two angular nodes. Which orbital the electron is in?
- (A) 1s (B) 2p
 (C) 3d (D) 4d

94. The pH of aq. 1×10^{-8} M HCl solution is close to
(A) 8.0 (B) 7.1
(C) 6.9 (D) 6.0
95. ${}^2P_{\frac{3}{2}}$ is the ground state of
(A) H (B) Li
(C) B (D) F
96. The number of epr signals expected in $\text{CH}_3\cdot$ (methyl radical) is
(A) 1 (B) 2
(C) 3 (D) 4
97. The point group symmetry of the staggered form of ethane molecule is
(A) C_{3v} (B) D_{3d}
(C) D_{3h} (D) D_3
98. The lowest energy term symbol for the Si atom is
(A) 3P (B) 3S
(C) 3D (D) 3R
99. Calcium fluoride crystallises in fluorite structure. The coordination number for the cation and anion is respectively
(A) 6, 6 (B) 6, 4
(C) 4, 6 (D) 8, 4
100. The orbital angular momentum (in the units of $\frac{h}{2\pi}$) of an electron in the 3d orbital is
(A) 2 (B) 3
(C) $\sqrt{2}$ (D) $\sqrt{6}$

SPACE FOR ROUGH WORK

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