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Subject Code No. : **24**

Sl. No. : 0425

TEST BOOKLET

LECTURERS IN NON-GOVERNMENT AIDED COLLEGES

CHEMISTRY

Time Allowed : 2 Hours

Maximum Marks : 100

: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET OF THE SAME SERIES ISSUED TO YOU.

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.

SEAL

3. This Test Booklet contains **100** items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question). If more than one response is darkened it will be considered as wrong answer.

4. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided, by **using BALL POINT PEN (BLACK)**. See instructions in the Answer Sheet.

5. All items (questions) carry equal marks. All items (questions) are compulsory. Each wrong response will result in negative marking of **0.25** mark.

6. Before you proceed to mark (darken) in the Answer Sheet the responses to various items (questions) in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per the instructions in your **Admission Certificate**.

7. After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the *Answer Sheet* issued to you. You are allowed to take with you the candidate's copy/second page of the Answer Sheet along with the *Test Booklet* after completion of the examination for your reference.

Candidate's full signature

Invigilator's signature

2016

1. Example of intensive property of a system is :

(A) Energy

(B) Volume

(C) Mass

(D) Viscosity

2. Example of extensive property of a system is :

(A) Pressure

(B) Density

(C) Mass

(D) Viscosity

3. Value of w(J mol^{-1}) for the conversion of 1 mole of water at 100°C to steam at 1 atm pressure (Heat of vapourization of water at 100°C is 40670 J mol^{-1}) is :

(A) 310

(B) 31

(C) 3100

(D) 0.31

4. Assuming hydrogen(g) as a van der Waals gas, its fugacity at 100°C and 300 atm with a = 0.244 dm^6atm mol^{-2},b = 0.0266 dm^{-3} mol^{-1} and Vm = 0.119 dm^3 mol^{-1} will be :

(A) 386.6 atm

(B) 176.76 atm

(C) 672.1 atm

(D) 100 atm

5. Zero point entropy of CO crystal at 0K will be :

(A) 4.12 JK^{-1} mol^{-1}

(B) 5.76 JK^{-1} mol^{-1}

(C) 3.152 JK^{-1} mol^{-1}

(D) 7.56 JK^{-1} mol^{-1}

6. A zincrod is placed in 0.1M solution of zinc sulphate at 25°C. Assuming that the salt is dissociated to the extent of 95% at this dilution, the potential of the electrode at this temperature will be (given $E^{\circ}_{Zn2+, Zn} = -0.76V$) :

(A) 0.72 V

(B) –0.87 V

(C) –0.79 V

(D) –0.97 V

7. Limitation of quinhydrone electrode is that :

(A) It cannot be used in acidic medium

(B) It cannot be used for solutions of pH less than 7

(C) It cannot be used for solutions of pH more than 8

(D) It cannot be used for solutions of pH 7.0

8. If water vapour is assumed to be a perfect gas, molar enthalpy change for vaporization of 1 mol of water at 1 bar and 100°C is 1 kJ mol^{-1}. The internal energy (kJ mol^{-1}) when 1 mol of water is vaporized at 1 bar and 100°C will be :

(A) 36.9

(B) – 36.9

(C) 37.9

(D) 39.7

9. Which of the salts will give highest pH in water ?

(A) KCl

(B) NaCl

(C) Na_2CO_3

(D) $CuSO_4$

10. Activity of 2.5 mol of a substance changes from 0.05 to 0.35.What would be the change in free energy at 27°C ?

(A) 128321.8 J

(B) 1318.36 J

(C) 1213.360 J

(D) 12133.6 J

11. The transfer coefficient of a certain electrode in contact with M^{3+} and M^{4+} in aqueous solvents at 25°C is 0.39. The current density is found to be 55.0 mA cm^{-2} when the overvoltage is 125 mV. What is the overvoltage required for a current density of 75.0 mA cm^{-2} ?

(A) 118 mV

(B) 138 mV

(C) 218 mV

(D) 238 mV

12. What will be the effect of temperature on rates of exothermic and endothermic reaction ?

(A) In case of endothermic reaction, the rate will increase and that in case of exothermic reactions, the rate will decrease

(B) In case of endothermic reaction, the rate will decrease and that in case of exothermic reactions, the rate will increase

(C) In both the cases, the rate will be unaffected by temperature

(D) The rate of the reactions will increase in both the case

13. The reaction : $A + B \leftrightarrow C$ is order two in forward direction and is order 1 in backward direction. What will be overall order or the reaction ?

(A) 1

(B) 2

(C) 1.75

(D) Insufficient data to determine the order

14. $T_{1/2}$ of a reaction is doubled as the initial concentration of the reactant is doubled. What is the order of the reaction ?

(A) 1

(B) 2

(C) Zero

(D) 3

15. Which energy level of the triply ionized berylium (Be3+) has the same orbital radius as that of the ground state of hydrogen atom ?

(A) Ground state

(B) First

(C) Two

(D) None of these

16. A ball of 1g, confined to a one dimensional box of length 0.1 m moves with a velocity of 0.01 ms^{-1}. Calculate the quantum number n :

(A) 3×10^{27}

(B) 2

(C) 8×10^{21}

(D) 5

17. Assuming that the ionic character in HBr bond is 11%, what will be the fraction of the contribution of ionic character to the valence bond wave function ?

(A) 0.25

(B) 0.43

(C) 0.75

(D) 0.35

18. Find ΔH if 2000 mol of super cooled liquid water at $-15.00^{\circ}C$ freezes irreversibly at a constant pressure of 1.000 atm and a temperature of $-15.00^{\circ}C$. Assuming that $C_{P,m}$ of liquid water is constant and equal to 75.48 jK^{-1} mol^{-1} and that $C_{P,m}$ of ice is constant and equal to 37.15 jK^{-1} mol^{-1} :

(A) – 19.27 kJ

(B) – 10.87 kJ

(C) – 15.87 kJ

(D) – 12.87 kJ

19. 'It is not possible to determine rate determining step if relative rates of various steps of a complex chemical reaction are not known.' The statement is :

(A) Correct

(B) Partially correct

(C) Wrong

(D) Required more information to derive conclusion

20. The reaction : $SO_2Cl_2 \rightarrow SO_2 + Cl_2$ is a first order gas reaction with $k_1 = 2.2 \times 10^{-5} s - 1$ at 573K. What % of thionly chloride is decomposed on heating at 573K for 90 min ?

(A) 17.2

(B) 10.5

(C) 15.7

(D) 11.2

21. The nature of π-bond in perchlorate (ClO_4^-) ion is :

(A) $O_{(d\pi)} - Cl_{(p\pi)}$

(B) $O_{(p\pi)} - Cl_{(p\pi)}$

(C) $O_{(p\pi)} - Cl_{(d\pi)}$

(D) $O_{(d\pi)} - Cl_{(d\pi)}$

22. Which of the following is the correct order of the stability ?

(A) $CN < NO^+ < NO^-$

(B) $NO^- < CN < NO^+$

(C) $NO^+ < CN < NO^-$

(D) $CN < NO^- < NO^+$

23. Which among the following is soft base ?

$CH_3COO^-, NO_3^-, CO_3^{2-}, H^+, CN^-, SCN^-$

(A) H^+, CN^-, SCN^-

(B) $CH_3COO^-, NO_3^-, CO_3^{2-}$

(C) NO_3^-, CO_3^{2-}, H^+

(D) CH_3COO^-, NO_3^-, SCN^-

24. Which among the following is soft acid, according to Pearson's concept of hard and soft acids ?

$Ag^+, I^{7+}, NO^+, RO^+, Hg^{++}, Hg_2^{++}$

(A) $Ag^+, RO^+, Hg^{++}, Hg_2^{++}$

(B) Ag^+, I^{7+}, NO^+, RO^+

(C) $NO^+, RO^+, Hg^{++}, Hg_2^{++}$

(D) $Ag^+, I^{7+}, NO^+, RO^+, Hg^{++}, Hg_2^{++}$

25. Which of the following represent set of hard acid and soft base respectively ?

(A) Mg^{++}, O_2^{2-}

(B) Mg^{++}, SR^-

(C) BF_3, F

(D) BF_3, H_2O

26. Which of the following statement is true ?

(A) Hard acids are non-polarizable.

(B) Pyridine, SO_3, H_2O are Lewis base.

(C) According to HSAB principle, HA prefer SB for binding.

(D) Ag+ is hard acid.

27. In which of the following arrangements, the sequence is not strictly according to the property written against it ?

(A) $HF < HCl < HBr < HI$: increasing acid strength

(B) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing basic strength

(C) B < C < O < N : increasing first ionization enthalpy

(D) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidising power

28. In which of the following arrangements the order is NOT according to the property indicated against it ?

(A) $Al_{3+} < Mg_{2+} < Na_+ < F$ — increasing ionic size

(B) B < C < N < O < P — increasing first ionisation enthalpy

(C) I < Br < F < Cl — increasing electron gain enthalpy (with negative sign)

(D) Li < Na < K < Rb — increasing metallic radius

29. Which one of the following substances has the highest proton affinity ?

(A) H_2O

(B) H_2S

(C) NH_3

(D) PH_3

30. The correct sequence which shows decreasing order of the ionic radii of the elements is :

(A) $Al_{3+} > Mg_{2+} + Na_{+} > F_{-} > O_{2-}$

(B) $Na_{+} > Mg_{2+} > Al_{3+} > O_{2-} > F_{-}$

(C) $Na_{+} > F_{-} > Mg_{2+} > O_{2-} > Al_{3+}$

(D) $O_{2-} > F_{-} > Na_{+} > Mg_{2+} > Al_{3+}$

31. Consider the ions Eu(III), Gd(III), Sm(III) and Lu(III). The observed and calculated magnetic moment values are closest for the pair :

(A) Gd(III), Lu(III)

(B) Eu(III), Lu(III)

(C) Sm(III), Gd(III)

(D) Sm(III), Eu(III)

32. Identify the order representing increasing π-acidity of the ligands C_2F_4, NEt_3, CO and C_2H_4 :

(A) $CO < C_2F_4 < C_2H_4 < NEt_3$

(B) $C_2F_4 < C_2H_4 < NEt_3 < CO$

(C) $C_2H_4 < NEt_3 < CO < C_2F_4$

(D) $NEt_3 < C_2F_4 < C_2F_4 < CO$

33. Which of the following statement is false ?

(A) Liquid ammonia has levelling effect on strength of HF and HCl

(B) Water has levelling effect on strength on HF and HCl

(C) Acetic acid has a levelling effect on strength on HF HCl, HBr, HI

(D) Water is differentiating solvent for HF and HCl

34. $MnCr_2O_4$ is likely to have a normal spinel structure because :

(A) Mn^{2+} will have a LFSE in the octahedral site whereas the Cr^{3+} will not

(B) Mn is +2 oxidation state and both the Cr are in + 3 oxidation state

(C) Mn is +3 oxidation state and 1 Cr is in +2 and the other is in + 3 state

(D) Cr^{3+} will have a LFSE in the octahedral site wheareas the Mn^{2+} ion will not

35. $[CoL_6]^{3+}$ is red in colour whereas $[CoL'_6]^{3+}$ is green. L and L′ respectively corresponds to :

(A) NH_3 and H_2O

(B) NH_3 and 1,10-phenanthroline

(C) H_2O and 1,10-phenanthroline

(D) H_2O and NH_3

36. The increasing order of wavelength of the absorption for the complex ions :

(I) $[Cr(NH_3)_6]^{3+}$

(II) $[CrCl_6]^{3-}$

(III) $[Cr(OH_2)_6]^{3+}$

(IV) $[Cr(CN)_6]^{3-}$

(A) IV < II < I < III

(B) IV < I < III < II

(C) IV > I > III > II

(D) IV < III < II < I

37. Which of the following statement is false ?

(A) Liquid ammonia has levelling effect on strenth of HF and HCl.

(B) Water has levelling effect on strength of HF and HCl.

(C) Acetic acid has a levelling effect on strength on HF, HCl, HBr, HI.

(D) Water is differentiating solvent for HF and HCl.

38. Identified the correct statement about $[Ni(H_2O)_6]^{2+}$ and $[Cu(H_2O)_6]^{2+}$:

(A) All Ni-O and Cu-O bond length are identical in individual species

(B) Ni-O(equatorial) and Cu-O (equatorial) bond length are shorter than Ni-O(axil) and Cu-O(axil) respectively

(C) All Ni-O bond length are identical whereas Cu-O(equatorial) bond length are shorter than Cu-O(axil)

(D) Cu-O bond length are identical Ni-O(equatorial) bond length are shorter than Ni-O(axil)

39. Correct order of acidity among the following species :

(A) $[Na(H_2O)_6]^{+} > [Ni(H_2O)_6]^{2+} > [Mn(H_2O)_6]^{2+} > [Sc(H_2O)_6]^{3+}$

(B) $[Sc(H_2O)_6]^{3+} > [Mn(H_2O)_6]^{2+} > [Ni(H_2O)_6]^{2+} > [Na(H_2O)_6]^{+}$

(C) $[Mn(H_2O)_6]^{2+} > [Ni(H_2O)_6]^{2+} > [Sc(H_2O)_6]^{3+} > [Na(H_2O)_6]^{+}$

(D) $[Sc(H_2O)_6]^{3+} > [Na(H_2O)_6]^{+} > [Ni(H_2O)_6]^{2+} > [Mn(H_2O)_6]^{2+}$

40. The correct order of LMCT energies is :

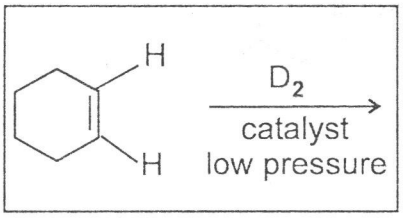
(A) $MnO_4^- > CrO_4^{2-} > VO_4^{3-}$

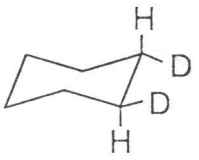
(B) $MnO_4^- < CrO_4^{2-} < VO_4^{3-}$

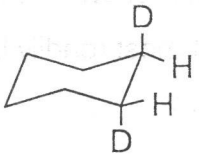
(C) $MnO_4^- > CrO_4^{2-} < VO_4^{3-}$

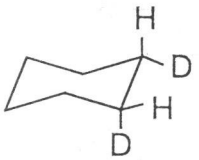
(D) $MnO_4^- < CrO_4^{2-} > VO_4^{3-}$

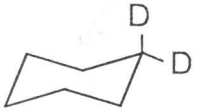
41. What is the major product obtained from the following reaction ?



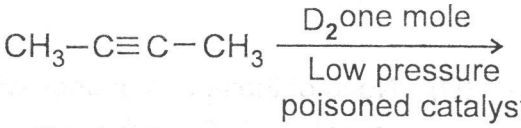
(A) 

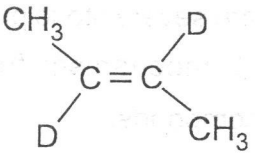
(B) 

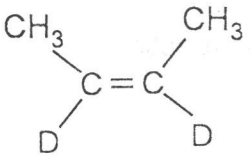
(C) 

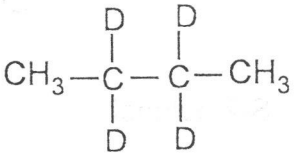
(D) 

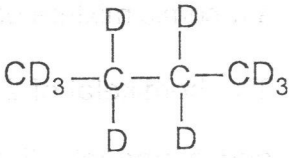
42. What is the major product expected from the following reaction ?



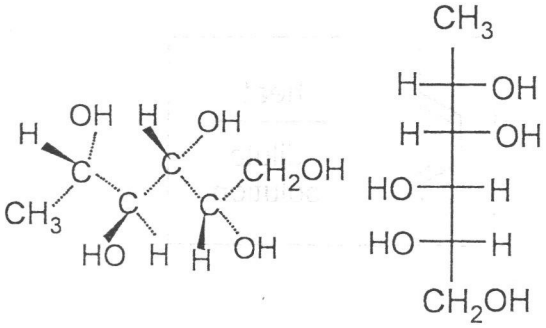
(A) 

(B) 

(C) 

(D) 

43. The following stereoisomers are related as :



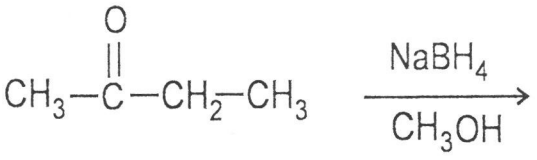
(A) Enantiomers

(B) Diastereomers

(C) Epimers

(D) Identical compounds

44. What is the major product of the following reaction ?



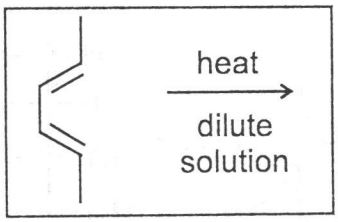
(A) S-2-butanol

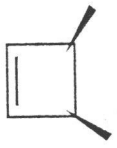
(B) R-2-butanol

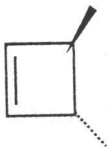
(C) a racemic mixture of 2-butanol

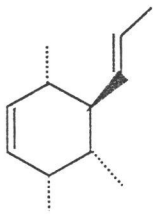
(D) The hemiketal of 2-butanone and methanol....2-hydroxy-2-methoxybutane

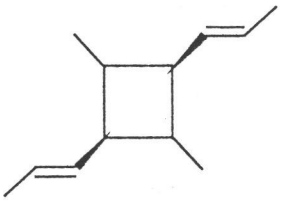
45. What is the major product obtained from the following reaction ?



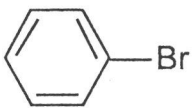
(A) 

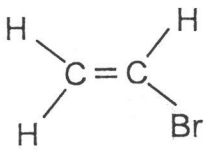
(B) 

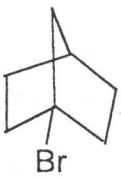
(C) 

(D) 

46. Which of the following compounds would react most readily by the S_N2 mechanism ?

(A) 

(B) 

(C) 

(D) None of these compounds will react by a S_N2 mechanism

There are severe steric problems for the S_N2 mechanism for each of these componds.

47. Which of the following nuclei will have a magnetic moment ?

(A) $^{2}_{1}D$

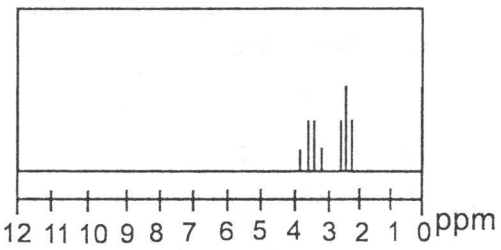
(B) $^{16}_{8}O$

(C) $^{12}_{6}C$

(D) $^{32}_{16}S$

Nuclei that have an odd atomic number, odd atomic mass or both will have magnetic moments.

48. Which of the following compounds best fits the PMR spectrum shown below ? The table shows the chemical shift for groups attached to a bromine atom or a cyano group measured to the centre of the multiplet :



Group	CH_3	CH_2	CH
CN	1.98 ppm	2.45 ppm	2.9 ppm
Br	2.7 ppm	3.4 ppm	4.25 ppm

(A) $CH_3 - CH_2 - Br$

(B) $CH_3 - \underset{\displaystyle CH_3}{\overset{|}{CH}} - Br$

(C) $CH_3 - CH_2 - C \equiv N$

(D) $CH_3 - \underset{\displaystyle CH_3}{\overset{|}{CH}} - C \equiv N$

49. What is the multiplicity expected in the hydrogen NMR spectrum for the hydrogen atoms marked by a "star" in the following compound ?

$$CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - \overset{*}{CH_2} - CH_3$$

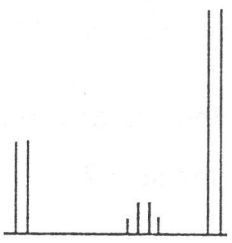
(A) Singlet

(B) Triplet

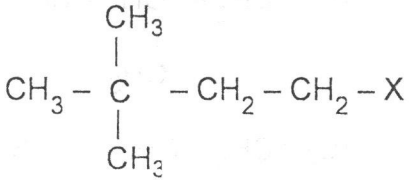
(C) Quartet

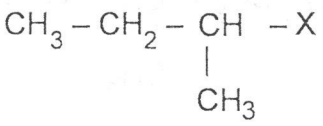
(D) Heptet

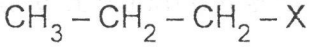
50. Which of the following alkyl groups would show the multiplet pattern depicted in the diagram ?



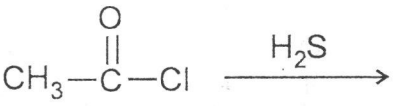
(A) $CH_3 - \underset{\displaystyle CH_3}{\overset{|}{CH}} - CH_3 - X$

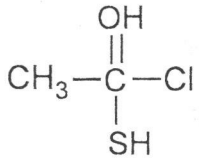
(B) 

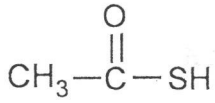
(C) 

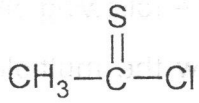
(D) 

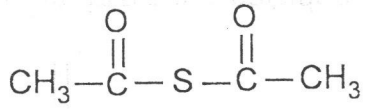
51. What is the major product of the following reaction ?



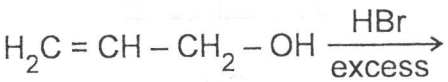
(A) 

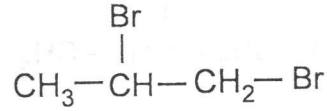
(B) 

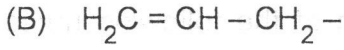
(C) 

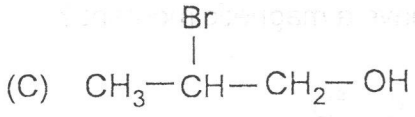
(D) 

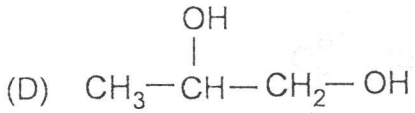
52. What is the major product of the following reaction ?



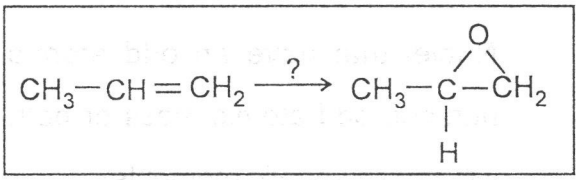
(A) 

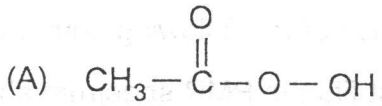
(B) 

(C) 

(D) 

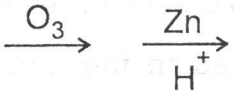
53. Which reagent would provide the product shown ?



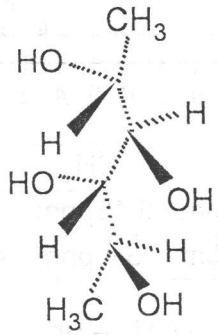
(A) 

(B) H_3O^+

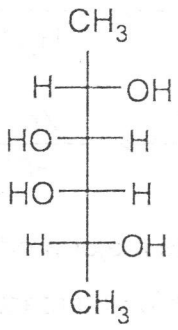
(C) CrO_3 pyridine, cold

(D) 

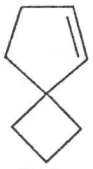
54. Which of the following compounds is optically active ?

(A) 

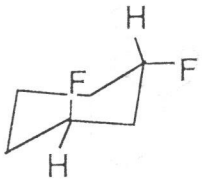
(B)



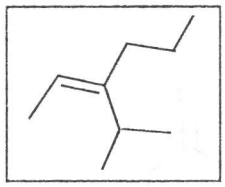
(C)



(D)



55. What is the best name for the following compound ?



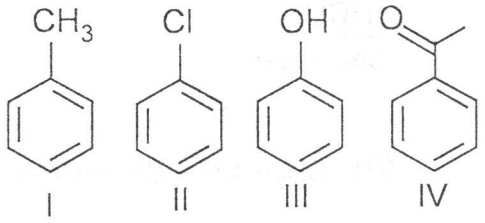
(A) E-3-isopropy-2-hexene

(B) Z-3-(1-methylethyl)-2-hexene

(C) *cis*-3-isopropy-2-hexene

(D) *trans*-3-(1-methylethyl)-2-hexene

56. Arrange the compounds in order of increasing reactivity toward electrophilic aromatic substitution (lowest first) :



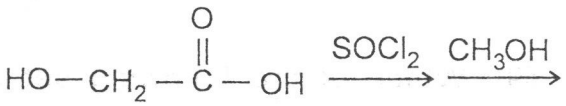
(A) III, II, I, IV

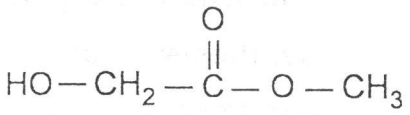
(B) IV, II, I, III

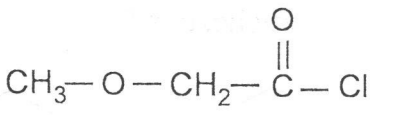
(C) III, I, II, IV

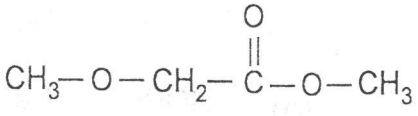
(D) I, II, III, IV

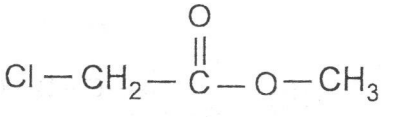
57. What is the major product of the following reaction sequence ?



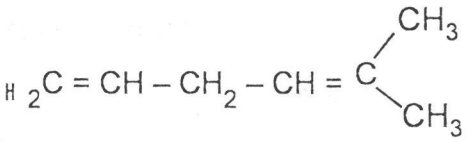
(A) 

(B) 

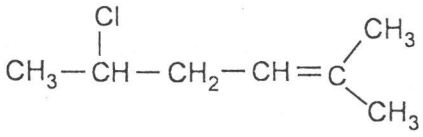
(C) 

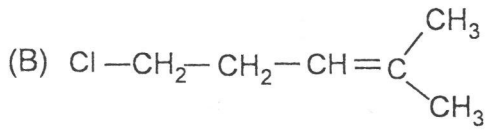
(D) 

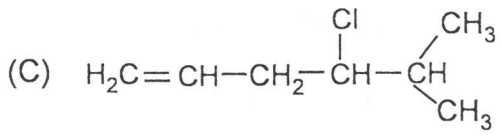
58. What is the major product obtained from the following reaction ?

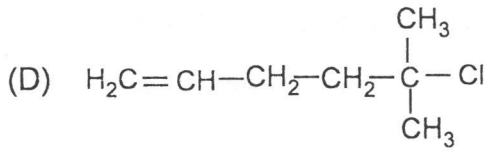


$\xrightarrow[\text{one mole}]{HCl}$

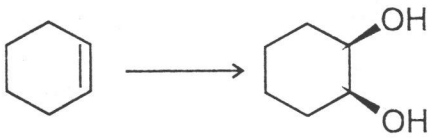
(A) 

(B) 

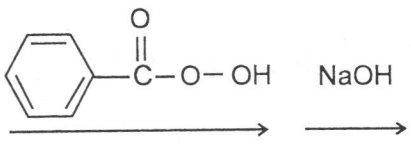
(C) 

(D) 

59. Which of the following set of reactions would provide the best synthesis of cis-1, 2-dihydroxycyclohexane starting with cyclohexene ?



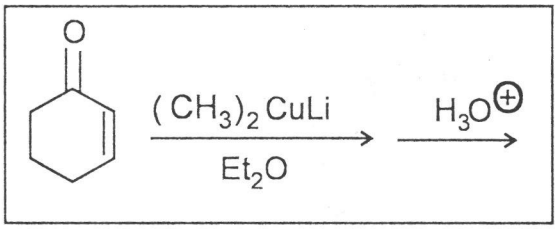
(A) $\xrightarrow{HOBr}$ $\xrightarrow{NaOH}$

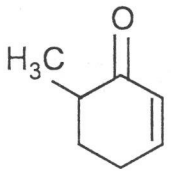
(B) 

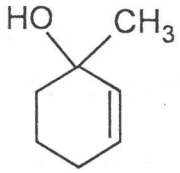
(C) $\xrightarrow{OsO_4}$ $\xrightarrow[H_2O]{KOH}$

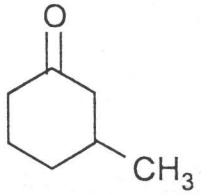
(D) $\xrightarrow{O_3}$ $\xrightarrow[HCl]{Zn}$

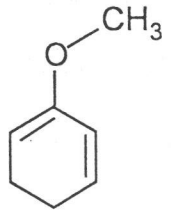
60. What is the major product obtained from the following reaction ?



(A) 

(B) 

(C) 

(D) 

61. ^{31}P NMR for PF_3 molecule ($\ell p = \frac{1}{2}$) gives :

(A) 3 peaks

(B) 4 peaks

(C) 6 peaks

(D) 9 peaks

62. Oxygen has nuclear spin of 5/2. The NMR of oxygen gives :

(A) 2 lines

(B) 3 lines

(C) 4 lines

(D) 6 lines

63. The NMR spectrum of acetyl acetone was taken at 43°C. The band observed at δ 5.52 is due to olefinic hydrogen of enol form and band observed at δ 3.66 is attributed to keto methylene group. If the areas under the two curves are in the ratio of 37 : 19.5, what will be the percentage of enol form in acetyl acetone ?

(A) 20.9%

(B) 100%

(C) 79.1%

(D) 82.2%

64. The stretching vibration frequencies of C = N (alkyl cyanide) is in region of (in cm^{-1}) :

(A) 1400 to 1250

(B) 2260 to 2240

(C) 2950 to 2650

(D) 3590 to 4420

65. In spectroscopy cm^{-1} is also known as :

(A) Lumen

(B) Candela

(C) Kayser

(D) Lux

66. In the infrared spectrum of ICl_2^- ion, the number of experimentally observed normal modes of vibrations is :

(A) 2

(B) 3

(C) 4

(D) 6

67. An IR spectrum of a hydrocarbon containing 10 percent hydrogen gave two bands (i) 3295 cm^{-1} and (ii) 625 cm^{-1} along with a weak absorption band near 2130 cm^{-1}. What is the probable structure of the compound ?

(A) $CH_3 - CH = CH_2$

(B) $CH_3 - C \equiv CH$

(C) $C_6H_5CH_2OH$

(D) $CH_3 - CH_2 - CHO$

68. The deeper the glass, the darker the blend, the smaller the amount of light at the end, which law explains the above phrase ?

(A) Nernst law

(B) Lambert's law

(C) Ilkovic law

(D) Beer's law

69. Aniline absorbs at 280 nm (ε_{max} 8600), however in acidic solution the main absorption band is seen at :

(A) 280 nm

(B) 260 nm

(C) 225 nm

(D) 203 nm

70. According to the Woodward rules for the UV spectra of 1, 3-butadienes, each alkyl substituent causes the λ_{max} to shift by :

(A) + 10 mμ

(B) + 5 mμ

(C) – 5 mμ

(D) – 10 mμ

71. The largest peak of a mass spectra is always the :

(A) Molecular ion (parent peak)

(B) First-fragmented ion peak

(C) Base peak

(D) McLafferty rearranged ion peak

72. The expected apparent mass of the metastable ion produced when m/z 77 decomposes by loss of CH ≡ CH to m/z 51 will be :

(A) 43.4

(B) 33.8

(C) 66.8

(D) 51.0

73. The compound whose mass spectrum shows m/e values at 156 (M^+, base peak), 127 and 29 is :

(A) C_2H_5Br

(B) CH_3I

(C) CH_3Br

(D) C_2H_5I

74. State which of the following statement is **not** true :

(A) Alcohols generally fail to give a visible molecular ion peak

(B) The loss of an alkene fragment by a cyclic rearrangement of a carbonyl compound with γ-hydrogens is known as McLafferty rearrangement

(C) The molecular ion peak is generally the peak of highest mass number, except for the isotope peak

(D) Fragment ion peak is never a base peak or parent peak

75. In gas chromatography, if two solutes with short retention time co-elute (i.e. are not resolved), what is the simplest way to attempt to resolve the peaks ?

(A) Use a longer column

(B) Use a higher column temperature

(C) Use a lower column temperature

(D) Use a more polar solvent

76. An analyst loaded a mixture of two compounds, X and Y, onto C18 column. After 20 min run, only 1 peak appeared in chromatogram. What are possible causes of this outcome ?

(A) One of the compounds, X or Y, is markedly non-polar and has not been eluted yet

(B) Both compounds, X and Y, happen to elute at the same time

(C) One among them, X or Y, does not absorb at the wavelength λ used for detection

(D) All of the above

77. The following statement describes which type of GC detector :

The elute is burned in mixture of hydrogen and air and compounds that contain carbon and hydrogen produce CH radicals that react with O atoms to produce electrons. The electrons flow to the cathode and the current measured is proportional the amount of analyte :

(A) TCD

(B) FID

(C) MS

(D) ECD

78. The percentages of a constituent A in a compound AB were found to be 48.32, 48.36, 48.23, 48.11 and 48.38 percent. What is the mean deviation in it ?

(A) 0.09

(B) 1.9

(C) 0.9

(D) 9

79. In nephelometry, the scattered light is normally measured at an angle of :

(A) 45°C

(B) 90°C

(C) 135°C

(D) 180°C

80. Absorbed wavelengths in atomic absorption spectrum appear as :

(A) Dark background

(B) Dark lines

(C) Light background

(D) Light lines

81. **Minamata** disease associated with the following metal :

(A) Zn

(B) Cu

(C) As

(D) Hg

82. Winkler's method is used for determination of which water quality parameter :

(A) DO

(B) BOD

(C) COD

(D) TSS

83. Minimum concentration (ppm) of DO required for higher life forms to survive is :

(A) 1.0

(B) 2.0

(C) 3.0

(D) 4.0

84. Dichromate titration is used for determination of :

(A) DO

(B) BOD

(C) COD

(D) TSS

85. Pesticides can be determined by :

(A) AAS

(B) Chromatography

(C) UV is spectrophotometer

(D) TSS

86. Which of the following affects the adsorption of a gas on solid ?

(A) TC (Critical Temperature)

(B) Temperature of gas

(C) Pressure of gas

(D) All of them

87. At the Critical Micelle Concentration (CMC) the surfactant molecules :

(A) Decompose

(B) Dissociate

(C) Associate

(D) Become complete soluble

88. Which gas will be adsorbed on a solid to greater extent ?

(A) A gas having non-polar molecules

(B) A gas having highest critical temperature

(C) A gas having lowest critical temperature

(D) A gas having highest critical pressure

89. The density of liquid methane is $0.466*10^3$ kg/m^3. The approximate cross-section area of a methane molecules is :

(A) $17.8 * 10^{-20}$ m^2

(B) $14.8 * 10^{-20}$ m^2

(C) $16.7 * 10^{-25}$ m^2

(D) $10.2 * 10^{-20}$ m^2

90. Adsorption of gases on solid surface is generally exothermic beacuse :

(A) Enthalpy is positive

(B) Entropy decrease

(C) Entropy increase

(D) Free energy increase

91. The lowering of the surface tension of a solvent by the surface film can be expressed in terms of surface film pressure which is :

(A) The negative of the surface tension

(B) The negative of the change in surface tension

(C) The negative of the change surface area of solvent

(D) None of these

92. Which of the following refer to the oxidation state of Iron and number of oxygen molecule carrier capacity of haemoglobin and myoglobin molecules :

(A) Fe^{+3}, 4, 1

(B) Fe^{+2}, 2, 1

(C) Fe^{+2}, 4, 1

(D) Fe^{+3}, 1, 4

93. Which is the function of Carbonic Anhydrase ?

Conversion of CO_2 into HCO_3^-

(B) Conversion of HCO_3^- into CO_2

(C) Deprotonation of water by lowering the pKa of water

(D) All of the above

94. How much ATP molecules are required in each N_2 molecule fixation by molybdenum nitragenase ?

(A) 14

(B) 12

(C) 16

(D) 18

95. In which step photolysis of water occurs during photosynthesis ?

(A) Before photo system I

(B) During photo system II

(C) After photo system II

(D) During photo system II

96. In photochemical decomposition of ethylene iodide :

$C_2H_4I_2 + I_2 \rightarrow C_2H_4 + I_2$

By radiation of 424 nm, the iodine formed after 20 min required 41.14 cm^3 of 0.0025 mol dm^{-3} solution of $Na_2S_2O_3$. The intensity of the light source was 9.15×10^{-4} Js^{-1}. Assuming complete absorption of energy, quantum yield of the reaction will be :

(A) 22.225

(B) 13.225

(C) 31.225

(D) 21.225

97. Chemical actinometer and thermopile are used to :

(A) Determine temperature of the photochemical reaction

(B) Determine the number of photons absorbed

(C) Determine the number of decomposed light absorbing molecules

(D) Determine the number of undecomposed molecules

98. The light of the firefly is an example of :

(A) Chemiluminiscence

(B) Phosphorescence

(C) Fluorescence

(D) Photosensitization

99. At 460 nm, blue filter transmits 72.7% of the light and a yellow filter transmits 40.7% of the light. If the two filters are combined, what will be the % transmittance ?

(A) 26.9

(B) 29.6

(C) 69.2

(D) 56.7

100. Calculate the life time of an excited state if the natural width of the spectral line arising from the transition between this state and the ground state is 0.053 cm^{-1} :

(A) 25 ps

(B) 50 ps

(C) 75 ps

(D) 100 ps

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