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Question Booklet No.

QUESTION BOOKLET

APPLIED SCIENCE (CHEMISTRY)

Roll No. | | | | | |

(Enter your Roll number in the above space)

Booklet Series

A

Time Allowed : 2 Hours **Maximum Marks : 100**

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3. This Question Booklet contains **100** questions. Each question is printed in **English** only. Each question comprises four responses (answers). You will select the response which you want to mark on the OMR Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question.
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6. Before you proceed to mark in the OMR Answer Sheet the response to various questions in the Question Booklet, you have to fill in some particulars in the OMR Answer Sheet as per instructions mentioned on the OMR Answer Sheet.
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8. Sheets for rough work are appended in the Question Booklet at the end.
9. **Penalty for wrong answers :**

   THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE AS UNDER.

   (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **0.25 mark** assigned to that question will be deducted as penalty.

   (ii) If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to that question.

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1. Which of the following molecules will ***not*** absorb infrared radiation?

[A] Cl_2

[B] $COCl_2$

[C] CO

[D] CO_2

2. If the presence of hydrogen gas is increased from 1 atm to 100 atm, keeping the hydrogen-ion concentration constant at 1M, the voltage of the hydrogen half-cell at 25 °C will be

[A] –0·029 V

[B] –0·059 V

[C] +0·118 V

[D] +0·059 V

3. The Joule–Thomson experiment is an example of which of the following processes?

[A] Isothermal process

[B] Isochoric process

[C] Isenthalpic process

[D] Isentropic process

4. At what temperature, both Celsius and Fahrenheit scale read the same value?

[A] 100°

[B] 130°

[C] –60°

[D] –40°

5. Variation of chemical potential with pressure results in

[A] partial molar entropy

[B] partial molar internal energy

[C] partial molar volume

[D] partial molar enthalpy

6. The overpotential

[A] increases with increasing current density

[B] is independent of current density

[C] decreases with increasing current density

[D] increases with decreasing current density

7. Which of the following expressions represents the criterion of spontaneity?

[A] $(dG)U,\ V < 0$

[B] $(dG)T,\ P < 0$

[C] $(dU)S,\ T < 0$

[D] $d(dH)T,\ P < 0$

8. The relation of free energy change with temperature and pressure is

[A] $dG = V\,dP$

[B] $dG = S\,dT$

[C] $dG = V\,dP - S\,dT$

[D] $dG = V\,dP + S\,dT$

9. 5 moles of an ideal gas expand reversibly from a volume of 8 dm^3 to 80 dm^3 at a temperature of 27 °C. Calculate the change in entropy.

[A] 95·73 JK^{-1}

[B] 85·05 JK^{-1}

[C] 89·17 JK^{-1}

[D] 107·01 JK^{-1}

10. The Gibbs phase rule is

[A] $F = P - C + 2$

[B] $F = C - P + 2$

[C] $P = F - C + 2$

[D] $P = F - C + 1$

11. The basic character of NMe_3, NH_3 and NF_3 follows which of the following orders?

[A] $NF_3 > NH_3 > NMe_3$

[B] $NMe_3 > NH_3 > NF_3$

[C] $NMe_3 > NF_3 > NH_3$

[D] $NH_3 > NF_3 > NMe_3$

12. The oxidation number of phosphorus in pyrophosphoric acid is

[A] + 3

[B] + 4

[C] + 5

[D] + 1

13. Jahn-Teller effect is ***not*** observed in high spin complexes of

[A] d^4

[B] d^9

[C] d^8

[D] d^7

14. Consider the following in respect of zero-order reaction :

1. $t_{1/2}$ is directly proportional to initial concentration.
2. Time taken for completion of reaction is twice its $t_{1/2}$.
3. Concentration of the reactants decreases linearly with time.

Which of the statements given above are ***correct***?

[A] 1 and 2 only

[B] 1 and 3 only

[C] 2 and 3 only

[D] 1, 2 and 3

15. Solid crystalline PCl_5 is

[A] trigonal bi-pyramidal

[B] octahedral

[C] square pyramidal

[D] pentagonal

16. The structure of Prussian blue is

[A] tetrahedral

[B] square pyramidal

[C] square planar

[D] simple cubic

17. Which of the following compounds has the greatest lattice energy?

[A] LiBr

[B] LiCl

[C] LiI

[D] LiF

18. The intense colour of $KMnO_4$ can be accounted by

[A] *d-d* transition

[B] intra-ligand charge transfer transition

[C] ligand to metal charge transfer transition

[D] metal to ligand charge transfer transition

19. The outer electronic configuration of palladium ($Z = 46$) is

[A] $4d^{10}$

[B] $4d^8 5s^2$

[C] $4d^9 5s^1$

[D] $4d^5 5s^2 5p^3$

20. The ground state term symbol for high spin Ni^{2+} is

[A] ^3F

[B] ^3P

[C] ^1D

[D] ^3D

21. The highest occupied molecular orbital of HF is

[A] antibonding

[B] non-bonding

[C] ionic bonding

[D] bonding

22. 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] Gd(III), Sm(III)

[D] Sm(III), Eu(III)

23. Polymerisation using Ziegler-Natta catalysis is advantageous over free radical polymerisation because it

[A] can lead to living polymers via anionic polymerisation

[B] permits step-reaction polymerisation resulting in a highly cross-linked polymer

[C] gives highly branched polymer with a high degree of crystallinity

[D] gives linear polymer permitting stereochemical control

24. The substitution of η^5–Cp group with nitric oxide is easiest for

[A] η^5–Cp_2Fe

[B] η^5–Cp_2CoCl

[C] η^5–Cp_2Ni

[D] η^5–Cp_2Co

25. A compound which has an M-M quadruple bond is

[A] $Mn_2(CO)_{10}$

[B] $Fe_2(CO)_9$

[C] $[Re_2Cl_8]^{2-}$

[D] $Cu_2(O_2CMe)_4 \cdot 2H_2O$

26. The correct set of the biological essential element is

[A] Fe, Mo, Cu, Zn

[B] Fe, Co, Cu, Ru

[C] Cu, Mn, Zn, Ag

[D] Fe, Ru, Zn, Mg

27. The oxidation state of iron in met-hemoglobin is

[A] three

[B] two

[C] four

[D] zero

28. Which of the following is the correct sequence for the movement of electrons during the light-dependent reactions of plants?

[A] Water, P_{700}, $NADP^+$, P_{680}

[B] $P_{680,}$ Water, P_{700}, $NADP^+$

[C] Water, P_{680}, P_{700}, $NADP^+$

[D] P_{700}, P_{680}, $NADP^+$, Water

29. If a stands for the edge length of the cubic systems — simple cubic, body-centred cubic and face-centred cubic, then the ratio of the radii of the spheres in these systems will be respectively

[A] $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$

[B] $\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a$

[C] $\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$

[D] $1a : \sqrt{3}a : \sqrt{2}a$

30. A crystal having unit cell dimensions $a \neq b \neq c$, $\alpha = \beta = \gamma = 90°$ is

[A] cubic

[B] orthorhombic

[C] monoclinic

[D] tetragonal

31. In a compound, atoms of element Y form ccp lattice and those of element X occupy $\frac{2}{3}$rd of tetrahedral voids. The formula of the compound will be

[A] X_3Y_4

[B] X_4Y_3

[C] X_2Y_3

[D] X_2Y

32. Flavones ***cannot*** be synthesized by which of the following methods?

[A] Kostanecki method

[B] Robinson method

[C] Chalcone method

[D] Woodward method

33. A reaction which gives 100% ee(enantiomeric excess) of a product is called

[A] enantiospecific

[B] enantioselective

[C] chemoselective

[D] regioselective

34. Silicates with continuous 3D framework are

[A] nesosilicates

[B] sorosilicates

[C] phyllosilicates

[D] tectosilicates

35. The correct order for the wavelength of absorption in the visible region is

[A] $[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$

[B] $[Ni(NO_2)_6]^{4-} < [Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+}$

[C] $[Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+} < [Ni(NO_2)_6]^{4-}$

[D] $[Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+} < [Ni(NO_2)_6]^{4-}$

36. The number of terminal carbonyl groups present in $Fe_2(CO)_9$ is

[A] 2

[B] 5

[C] 6

[D] 3

37. The possible isomer(s) for $C_2B_{10}H_{12}$ is/are

[A] 3

[B] 2

[C] 1

[D] 4

38. The radius of limiting sphere is

[A] $2/2\lambda$

[B] $4/\lambda$

[C] $2/\lambda$

[D] $3/\lambda$

39. During α-decay

[A] n/p ratio decreases

[B] n/p ratio increases

[C] n/p ratio is constant

[D] n/p ratio may increase or decrease

40. X-ray diffractometers are not used to identify the physical properties of which of the following?

[A] Metal

[B] Liquid

[C] Polymeric materials

[D] Solids

41. The decomposition of a gas on a surface follows the rate law : Rate $\propto \{KP/(1 + KP)\}$, where P is pressure and K is constant. The order of the reaction at high pressure is

[A] 0

[B] 1/2

[C] 1

[D] 2

42. For any NMR active nucleus, the magnitude of radiofrequency required for observing nuclear magnetic resonance phenomenon depends on

[A] strength of the magnetic field

[B] choice of the nucleus

[C] both strength of the magnetic field and choice of the nucleus

[D] the nuclear energy level

43. The orbital with two radial and two angular nodes is

[A] $3p$

[B] $5d$

[C] $5f$

[D] $8d$

44. In rotational Raman spectrum, the selection rule for Rayleigh line is

[A] $\Delta J = 1$

[B] $\Delta J = -1$

[C] $\Delta J = +2$

[D] $\Delta J = 0$

45. The wave number difference between successive rotational levels of a rigid diatomic molecule is

[A] $2BJ$

[B] $BJ\ (J+1)$

[C] $2BJ\ (J+1)$

[D] $2BJ\ (J-1)$

46. The lowest energy of a quantum mechanical harmonic oscillator is $\frac{1}{2}h\nu$. It is referred to as

[A] ground state energy

[B] zero-point energy

[C] vibrational energy

[D] first excited state

47. Total number of symmetry operations present in $CHCl_3$ molecule is

[A] 7

[B] 4

[C] 6

[D] 3

48. The molecule that possesses S_4 symmetry element, is

[A] ethylene

[B] allene

[C] benzene

[D] 1,3-butadiene

49. With increase in the size of the reactants, collision frequency increases. This is due to which of the following facts?

[A] Decrease in the speed of reactant

[B] Increase in collisional cross-section

[C] Decrease in the pressure of reaction mixture

[D] Increase in reduced mass

50. In which thermodynamic process, there is no flow of heat between the system and surroundings?

[A] Isobaric

[B] Isochoric

[C] Adiabatic

[D] Isothermal

51. The system for which energy (E) increases quadratically with the quantum number (n), is

[A] particle in a one-dimensional box

[B] hydrogen atom

[C] one-dimensional harmonic oscillator

[D] rigid rotor

52. The $2p_x$ hydrogenic orbital has the Φ part in its wave function of the form

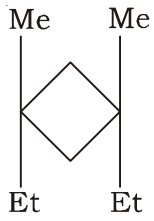
[A] $e^{-i\Phi}$

[B] $e^{i\Phi}$

[C] $\sin \Phi$

[D] $\cos \Phi$

53. The number of stereogenic centres in the following molecule is



[A] 1

[B] 2

[C] 3

[D] 4

54. Based on Hammond's postulate, the exothermic reaction will be

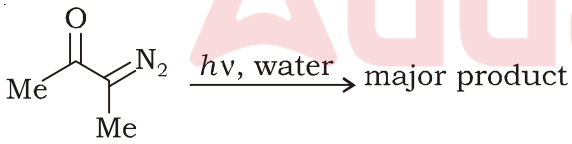
[A] an early transition state

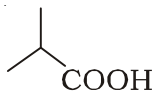
[B] a late transition state

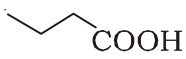
[C] a symmetric transition state

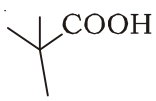
[D] no transition state

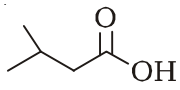
55. The major product in the following is



[A] 

[B] 

[C] 

[D] 

56. Which spectroscopic method is necessary to differentiate between singlet and triplet carbines?

[A] NMR

[B] IR

[C] GCMS

[D] ESR

57. What is the rate determining step in Beckmann rearrangement?

[A] Hydroxylation

[B] Migration of the anti-group with respect to the leaving group

[C] Ionisation step

[D] Addition of water to the carbocation

58. Which of the following ***does not*** involve migration of the alkyl group?

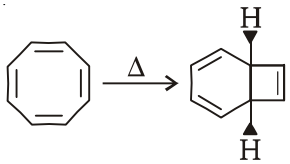
[A] Lossen

[B] Cope

[C] Curtius

[D] Hofmann

59. In the following concerted reaction, the product is formed by a



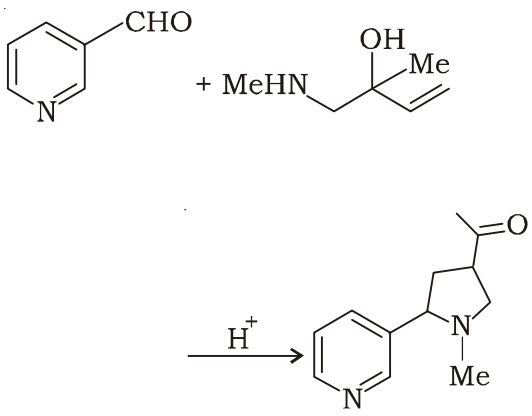
[A] 6π-disrotatoryelectrocyclization

[B] 4π-disrotatoryelectrocyclization

[C] 6π-conrotatoryelectrocyclization

[D] 4π-conrotatoryelectrocyclization

60. The following transformation involves



[A] an iminium ion, [3,3]-sigmatropic shift and Mannich reaction

[B] anitrenium ion, [3,3]-sigmatropic shift and Michael addition

[C] an iminium ion, [1,3]-sigmatropic shift and Mannich reaction

[D] anitrenium ion, [1,3]-sigmatropic shift and Michael addition

61. With respect to electrophilic aromatic substitution, reactivity order is

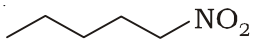
[A] indole > pyrrole > pyridine

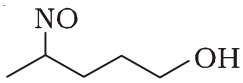
[B] pyrrole > pyridine > indole

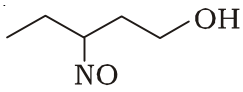
[C] pyrrole > indole > pyridine

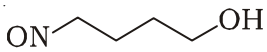
[D] indole > pyridine > pyrrole

62. The major product formed in the following photochemical reaction is

[A] 

[B] 

[C] 

[D] 

63. Which of the two compounds will be most readily separated by TLC (Thin Layer Chromatography)?

[A] Naphthalene and anthracene

[B] Naphthalene and acetophenone

[C] Acetophenone and 4-methyl acetophenone

[D] Benzoic acid and 3-toluic acid

64. The degree of degeneracy of the energy level of a particle in a cubical box will be

[A] 1

[B] 2

[C] 3

[D] 4

65. Which of the following forms of wave functions describes a molecular orbital in which an electron spends 80 percent of its time in an orbital ψ_A on A and 20 present in ψ_B on B in the molecule AB?

[A] $\psi = 0{\cdot}56\psi_A + 0{\cdot}14\psi_B$

[B] $\psi = 0{\cdot}64\psi_A + 0{\cdot}40\psi_B$

[C] $\psi = 0{\cdot}45\psi_A + 0{\cdot}14\psi_B$

[D] $\psi = 0{\cdot}89\psi_A + 0{\cdot}45\psi_B$

66. Which of the following species has the shortest bond length?

[A] NO^{2+}

[B] NO^{+}

[C] NO

[D] NO^{-}

67. Which of the following is the orbital angular momentum of the electron in 3*d*-orbital?

[A] $\sqrt{6}\frac{h}{2\pi}$

[B] $\sqrt{2}\frac{h}{2\pi}$

[C] $3\frac{h}{2\pi}$

[D] $\frac{h}{\pi}$

68. Which of the following is true when a carboxylic acid is formed from an aldehyde on replacing hydrogen atom by —OH group?

[A] The IR-absorption wave number increases

[B] The C=O IR-stretching absorption is increased in the acid

[C] The lone pair on oxygen of OH does not form conjugation with C=O group

[D] The C=O IR-stretching absorption is lowered in the acid

69. The maximum efficiency of a heat engine operating between 100 °C and 25 °C is

[A] 18%

[B] 22·2%

[C] 25·4%

[D] 28·2%

70. Which of the following is the possible number of distributions of 2 particles among 4 energy states when particles are distinguishable and there is no restriction on the occupancy of the energy state (according to Maxwell-Boltzmann)?

[A] 6

[B] 8

[C] 10

[D] 16

71. Which of the following sets of mol fractions is true for the entropy change to be maximum in a binary mixture for isothermal process?

[A] $x_1 = 0{\cdot}25$ and $x_2 = 0{\cdot}75$

[B] $x_1 = 0{\cdot}60$ and $x_2 = 0{\cdot}40$

[C] $x_1 = x_2 = 0{\cdot}50$

[D] $x_1 = 0{\cdot}80$ and $x_2 = 0{\cdot}20$

72. At a given temperature, forward rate constant (k_1) for the one-step reaction, $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, is $4 \times 10^{-7}\ M^{-1}\ s^{-1}$. Given that the equilibrium constant (K) for the reaction is 1×10^{-2}, which of the following is the reverse rate constant (k_{-1})?

[A] $4 \times 10^{-5}\ M^{-1}\ s^{-1}$

[B] $4 \times 10^{-7}\ M^{-1}\ s^{-1}$

[C] $2{\cdot}5 \times 10^{-4}\ M^{-1}\ s^{-1}$

[D] $4 \times 10^{-9}\ M^{-1}\ s^{-1}$

73. Which of the following is the expression for rate of formation of product P for the given reaction mechanism? (where R_1 and R_2 are reactants and I is the reactive intermediate)

$$R_1 + R_2 \underset{k_2}{\overset{k_1}{\rightleftharpoons}} I;\ I \xrightarrow{k_3} P$$

[A] $(k_1k_3)/(k_1 + k_2)$

[B] $(k_1k_2)/(k_1 + k_3)$

[C] $(k_1k_3)/(k_2 + k_3)$

[D] $(k_2 + k_3)/(k_1 + k_3)$

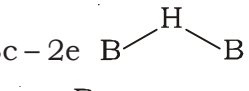
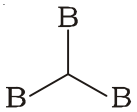
74. Which of the following conditions is required for the formation of micro-emulsions?

[A] When oil-water interfacial tension approaches zero

[B] When oil-water interfacial surface excess is zero

[C] When oil-water interfacial tension approaches 10

[D] When oil-water interfacial surface excess becomes unity

75. The numbers of 3c – 2e  bridge bonds and  triple bridge bonds present in B_5H_{11}, are respectively

[A] 3 and 2

[B] 3 and 1

[C] 1 and 2

[D] 2 and 338

76. In the following reaction

$$Fe(CO)_5 \xrightarrow{NaBH_4} ? \rightarrow ? + CO$$

products are

[A] $[Fe(CO)_4COH]^-$ and $[HFe(CO)_4]^-$

[B] $[Fe(CO)_4COH]^+$ and $[Fe(CO)_4]^-$

[C] $[Fe(CO)_5]^-$ and $[HFe(CO)_4]^-$

[D] $[Fe(CO)_4COOH]^-$ and $[HFe(CO)_4]^-$

77. Sodium chloride has fcc structure. How many Na^+ and Cl^- ions are there in the unit cell?

[A] $Na^+ = 8,\ Cl^- = 6$

[B] $Na^+ = 1,\ Cl^- = 2$

[C] $Na^+ = 4,\ Cl^- = 2$

[D] $Na^+ = 4,\ Cl^- = 4$

78. Which of the following is the correct order of decreasing carbonyl stretching frequency?

[A] $Ni(CO)_4 > [Co(CO)_4]^- > [Fe(CO)_4]^{2-}$

[B] $[Fe(CO)_4]^{2-} > Ni(CO)_4 > [Co(CO)_4]^-$

[C] $[Fe(CO)_4]^{2-} > [Co(CO)_4]^- > Ni(CO)_4$

[D] $Ni(CO)_4 > [Fe(CO)_4]^{2-} > [Co(CO)_4]^-$

79. Fe^{2+} and Li^+ respectively are

[A] soft acid and hard acid

[B] soft acid and borderline acid

[C] borderline acid and hard acid

[D] hard acid and borderline acid

80. For an octahedral Mn^{2+} complex, all electronic transitions are

[A] Laporte allowed

[B] spin allowed

[C] both Laporte and spin forbidden

[D] both Laporte and spin allowed

81. Which of the following enzymes ***does not*** contain metal molybdenum?

[A] Xanthine oxidase

[B] Aldehyde oxidase

[C] Carbonic anhydrase

[D] Nitrogenase

82. The Mossbauer isomer shift is most negative for

[A] Fe(I) S = 3/2

[B] Fe(II) S = 2

[C] Fe(III) S = 1/2

[D] Fe(VI) S = 1

83. Which of the following statements is ***not*** correct for polymeric sulphur nitride?

[A] It becomes superconductor at low temperatures

[B] S—N bond order is 1·5

[C] It has conductivity near that of mercury at room temperature

[D] It does not show any metallic properties

84. Which of the following reactions produces nitrogen gas and water?

[A] The reaction of N_2H_4 with oxygen

[B] The reaction of N_2H_4 with nitrous acid

[C] The reaction of N_2H_4 with sodium

[D] The reaction of N_2H_4 with sulphuric acid

85. Fluorescence is observed at _____ wavelength (λ) and _____ energy than absorption.

[A] higher, lower

[B] lower, higher

[C] higher, higher

[D] lower, lower

86. The number of *f* electrons in Cerium(IV) is

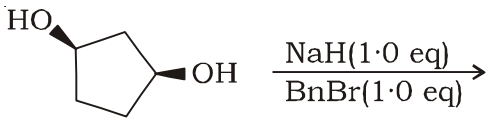
[A] one

[B] three

[C] zero

[D] four

87. Which of the following statements is ***true*** about given transformation?



[A] It gives only one mono-benzyl ether

[B] It gives two enantiomeric mono-benzyl ether

[C] It gives one di-benzyl ether

[D] No reaction

88. Which of the following represents the correct order of stability for conformations of cyclohexane (least stable to most stable)?

[A] Chair < twist-boat < boat < half-chair

[B] Chair < twist-boat < half-chair < boat

[C] Half-chair < boat < twist-boat < chair

[D] Chair < boat < twist-boat < half-chair

89. Carotenoids are

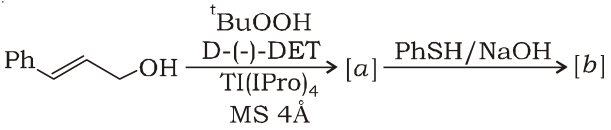
[A] monoterpenoids

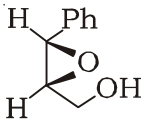
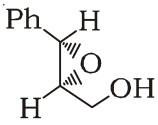
[B] diterpenoids

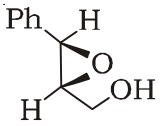
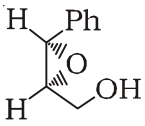
[C] triterpeniods

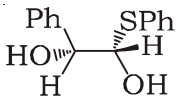
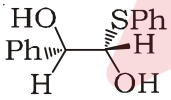
[D] tetraterpenoids

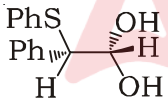
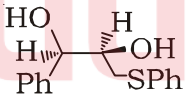
90. Choose major products *a* and *b* formed in the following sequence of reactions.



(a) *(i)*  *(ii)* 

(iii)  *(iv)* 

(b) *(i)*  *(ii)* 

(iii)  *(iv)* 

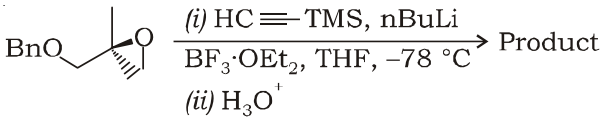
[A] *(a)* → *(iv)* and *(b)* → *(i)*, *(iii)*

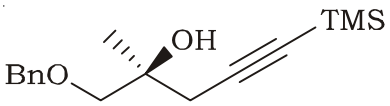
[B] *(a)* → *(ii)* and *(b)* → *(i)*, *(iv)*

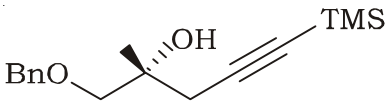
[C] *(a)* → *(iii)* and *(b)* → *(i)*, *(iv)*

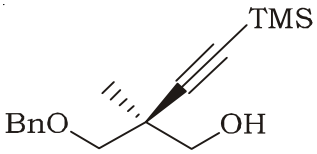
[D] *(a)* → *(i)* and *(b)* → *(i)*, *(ii)*

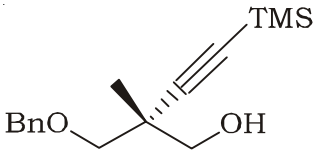
91. Which of the following products is formed under the given sets of conditions?



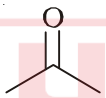
[A] 

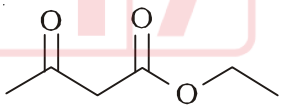
[B] 

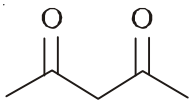
[C] 

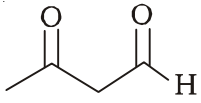
[D] 

92. What is the correct order of enol content at equilibrium for the following compounds?

I. 

II. 

III. 

IV. 

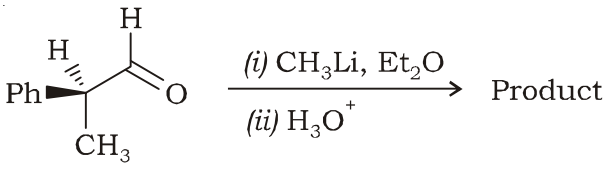
[A] III > IV > II > I

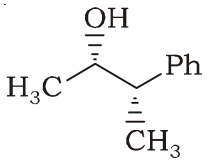
[B] IV > II > III > I

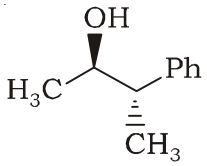
[C] I > IV > III > II

[D] I > II > III > IV

93. Predict the major product of the following addition reaction using Felkin-Ahn model.



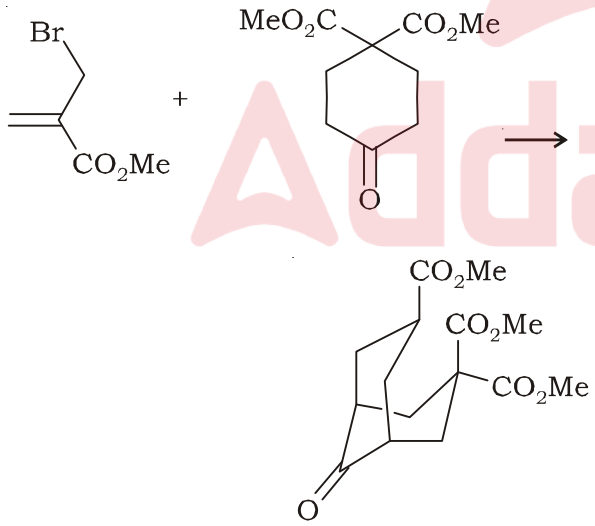
[A] 

[B] 

[C] Both products [A] and [B] in 1:1 ratio

[D] No reaction

94. The following transformation can be achieved by



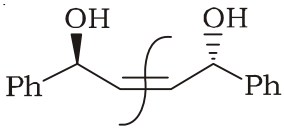
[A] exploration of enolate alkylation

[B] exploration of Michael reaction

[C] exploration of enolate alkylation and Michael reaction

[D] exploration of aldol reaction

95. For the synthesis of the given molecule, the retrosynthetic analysis shown below will disconnect the molecule into two



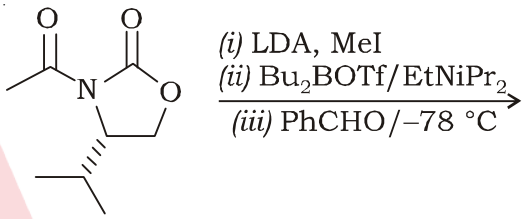
[A] heterochiral halves

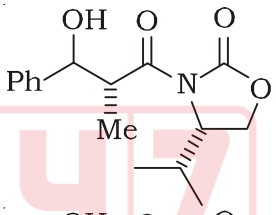
[B] homochiral halves as the molecule having plane of symmetry

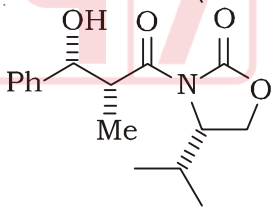
[C] homochiral halves as the molecule is C_2 symmetrical

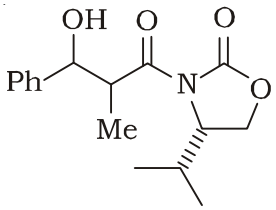
[D] achiral halves

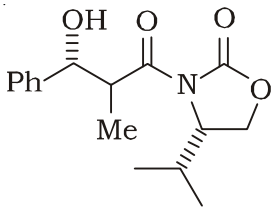
96. Which of the following major products is formed in the given reaction?



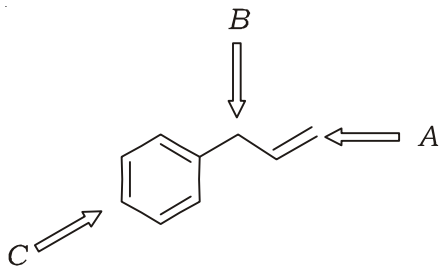
[A] 

[B] 

[C] 

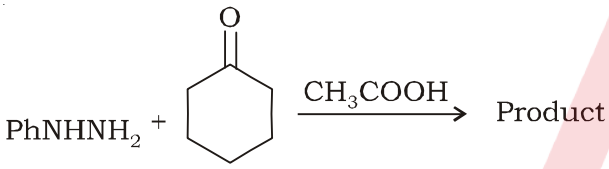
[D] 

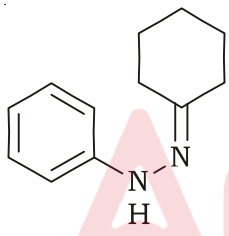
97. The ^{13}C NMR signals of the given compound are in the following order of chemical shift (δ value)

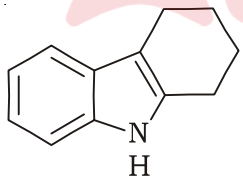


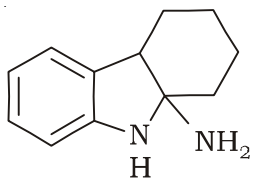
[A] $A > B = C$
[B] $A = C > B$
[C] $A > B > C$
[D] $A = B = C$

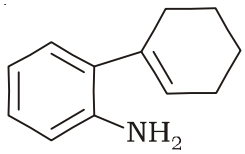
98. The correct structure of the product formed in the following reaction is



[A] 

[B] 

[C] 

[D] 

99. Which of the following steroids contains CH_3CO- group in its structure?

[A] Testosterone

[B] Progesterone

[C] Cortisone

[D] Cholesterol

100. A peak in a proton NMR spectrum is located at 2 ppm from the reference (TMS) on a 500 MHz NMR spectrometer. If the reference is set to 0 ppm, what is the separation of the peak from reference as calculated in Hz scale?

[A] 250

[B] 500

[C] 1000

[D] 2000

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