

Paper Code No: M26

Question Booklet No. ....

ENTRANCE EXAMINATION – 2021 – 22

SET – B

040202

Roll No.

M2604202

Signature of Invigilator

Time: 1 Hour 30 Minutes

Total Marks: 100

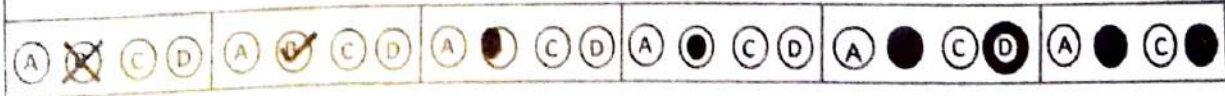
Instructions to Candidates

1. Do not write your name or put any other mark of identification anywhere in the OMR Response Sheet. IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR RESPONSE SHEET, the OMR sheet will be cancelled, and will not be evaluated.
2. This Question Booklet contains the cover page and a total of 100 Multiple Choice Questions of 1 mark each.
3. Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
4. There is negative marking in Multiple Choice Questions. For each wrong answer, 0.25 marks will be deducted.
5. USE/POSSESSION OF ELECTRONIC GADGETS LIKE MOBILE PHONE, iPhone, iPad, pager ETC. is strictly PROHIBITED.
6. Candidate should check the serial order of questions at the beginning of the test. If any question is found missing in the serial order, it should be immediately brought to the notice of the Invigilator. No pages should be torn out from this question booklet.
7. Answers must be marked in the OMR Response sheet which is provided separately. OMR Response sheet must be handed over to the invigilator before you leave the seat.
8. The OMR Response sheet should not be folded or wrinkled. The folded or wrinkled OMR/Response Sheet will not be evaluated.
9. Write your Roll Number in the appropriate space (above) and on the OMR Response Sheet. Any other details, if asked for, should be written only in the space provided.
10. There are four options to each question marked A, B, C and D. Select one of the most appropriate options and fill up the corresponding oval/circle in the OMR Response Sheet provided to you. The correct procedure for filling up the OMR Response Sheet is mentioned below.

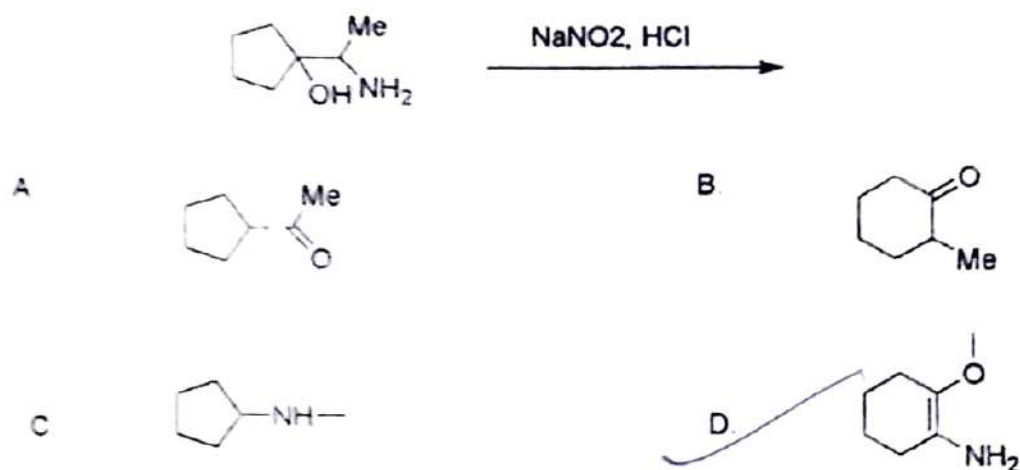
CORRECT METHOD



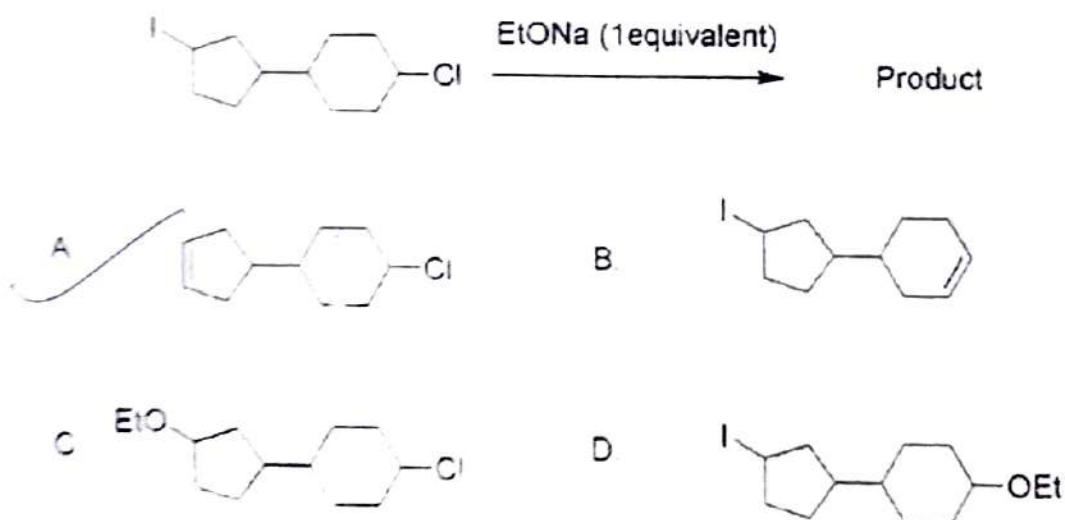
WRONG METHODS



1. Which is the main final product of the following diazotization of an amine?



2. Predict the predominant product of the following regioselective elimination reaction



**ROUGH PAGE**

Disclaimer

~~THE~~ MOST OF THE QUESTIONS  
ARE APPARENTED IN THESE QUESTION  
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3. Acetic acid in benzene solution forms dimer due to intermolecular H-bonding. For this case van't Hoff factor is:

(A)  $i = 1$  (B)  $i > 1$   
(C)  $i < 1$  (D) inclusive

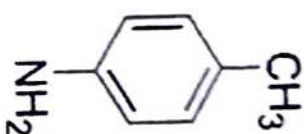
4. 90% of a first-order reaction completes in 90 minutes. 50% of the reaction will be over in approximately:

(A) 50 minutes (B) 54 minutes  
(C) 27 minutes (D) 62 minutes

5. The dark purple colour of  $\text{KMnO}_4$  is due to

(A) Charge transfer transition (B) d-d transition  
(C) f-f transition (D)  $\pi-\pi^*$  transition

6. What is the sequence of reagents that will accomplish the synthesis of the following aromatic amine from benzene?

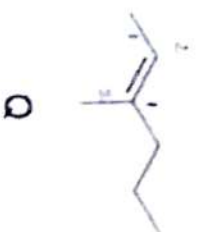
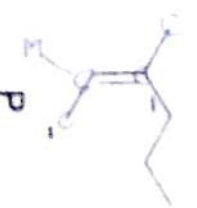


- (A)  $\text{CH}_3\text{Cl}$ ,  $\text{AlCl}_3$ ;  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ;  $\text{H}_2$   
(B)  $\text{CH}_3\text{Cl}$ ,  $\text{AlCl}_3$ ;  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ;  $\text{Fe}$ ,  $\text{HCl}$ ;  $\text{NaOH}$   
(C)  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ;  $\text{Fe}$ ,  $\text{HCl}$ ;  $\text{NaOH}$ ;  $\text{CH}_3\text{Cl}$ ,  $\text{AlCl}_3$   
(D)  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ;  $\text{CH}_3\text{Cl}$ ,  $\text{AlCl}_3$ ;  $\text{Fe}$ ,  $\text{HCl}$ ;  $\text{NaOH}$

7. Among the elements Zn, As, Ga and Ge, which has the highest first ionization energy?

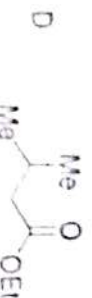
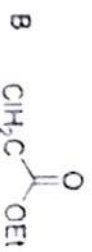
(A) Zn (B) As  
(C) Ga (D) Ge

8. Determine the double bond stereochemistry (E or Z) for the following molecules.



- (A) ~~P is Z and Q is E~~ (B) P is Z and Q is Z  
(C) P is E and Q is E (D) P is E and Q is Z

9. Which ester will not give a good yield of the Claisen condensation product with NaOEt in EtOH?



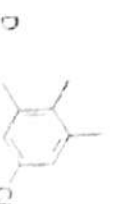
10. Time for completion of 75% of a reaction is thrice the time for completion of 50% of the same reaction. Hence, the order of the reaction is:

- (A) 0 (B) 1  
(C) 2 (D) 3

11. A cell reaction is spontaneous if:

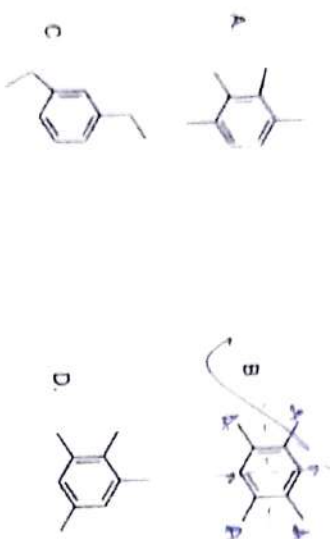
- (A)  $E_{\text{cell}} > 0$  (B)  $\Delta G < 0$   
(C)  $K > 1$  (D) ~~all of these~~

12. Which is the most reactive compound by the  $S_N2$  mechanism?





13. An organic compound having the molecular formulae  $C_{10}H_{14}$  exhibited two singlets in the  $^1H$  NMR spectrum and three signals in the  $^{13}C$  NMR. What is the compound?



14. Under which of the following conditions,  $H_2$  has the highest entropy per mole?

- (A)  $H_2$  at  $25^\circ C$  at 1 atm (B)  $H_2$  at STP  
(C)  $H_2$  at 100 K at 1 atm (D)  $H_2$  at 0 K at 1 atm

223+25  
223+25  
223+25

15. Heat of combustion of  $C_6H_6(l)$  is, if the heat of formation of  $C_6H_6(l)$ ,  $H_2O(l)$  and  $CO_2(g)$  are  $-X_1$ ,  $-X_2$  and  $-X_3$  calories respectively:

- (A)  $X_1 - X_2 - X_3$  (B)  $X_1 - 6X_2 - 3X_3$   
(C)  $X_1 + X_2 + X_3$  (D)  $X_1 - 3X_2 - 6X_3$

[3]

16. 'x' moles of lead acetate and 0.1 mole of acetic acid were taken in 1 litre solution to make a solution of  $pH = 5.04$ . The value of 'x' will be if  $pK_a$  of  $CH_3COOH$  is 4.74:

- (A) 0.2 mole (B) 0.05 mole  
(C) 0.1 mole (D) 0.02 mole

$$\frac{x}{1} = \frac{1}{1}$$

17. Which element is used in the synthesis of pesticides?

- (A) N (B) As  
(C) Bi (D) Sb

18. Which of the following compounds does NOT undergo mutarotation?

- (A) Glucose (B) Maltose  
(C) Sucrose (D) Fructose



[9]

19. Which of the following is NOT an example of secondary structure found in proteins?

- (A) Alpha helix (B) Beta pleated sheet  
(C) Hydrophobic folding (D) Random coil

20.  $E^{\circ}_{\text{red}}$  (standard reduction electrode potentials) of different half-cells are given:

$$E^{\circ} \text{Cu}^{2+}/\text{Cu} = 0.34 \text{ V}; E^{\circ} \text{Zn}^{2+}/\text{Zn} = -0.76 \text{ V}$$

$$E^{\circ} \text{Ag}^{+}/\text{Ag} = 0.80 \text{ V}; E^{\circ} \text{Mg}^{2+}/\text{Mg} = -2.37 \text{ V}$$

In which cell is  $\Delta G^{\circ}$  is most negative?

- (A)  $\text{Zn} | \text{Zn}^{2+} (1\text{M}) || \text{Mg}^{2+} (1\text{M}) | \text{Mg}$   
(B)  $\text{Zn} | \text{Zn}^{2+} (1\text{M}) || \text{Ag}^{+} (1\text{M}) | \text{Ag}$   
(C)  $\text{Cu} | \text{Cu}^{2+} (1\text{M}) || \text{Ag}^{+} (1\text{M}) | \text{Ag}$   
(D)  $\text{Ag} | \text{Ag}^{2+} (1\text{M}) || \text{Mg}^{2+} (1\text{M}) | \text{Mg}$

21. Which of the following can act as a protective colloid?

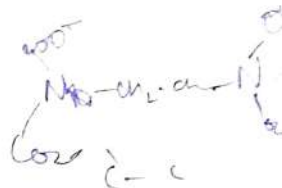
- (A) Silica gel (B) Gelatin  
(C) oil-in-water emulsion (D) all of these

22. A catalyst accelerates the rate of reaction by:

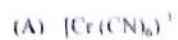
- (A) decreasing energy of activation  
(B) increasing Arrhenius constant  
(C) increasing both energy of activation and Arrhenius constant  
(D) decreasing both energy of activation and Arrhenius constant

23. In calcium complex of  $\text{EDTA}^{2-}$ , the numbers of donor atoms are

- (A) Two (B) Four  
(C) Five (D) Six



24. The following complex obeys EAN and 18 rules:



25. Lanthanide contraction is caused due to

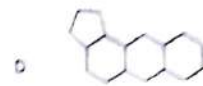
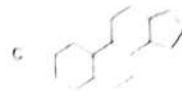
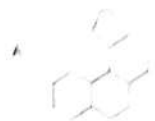
(A) The appreciable shielding on outer electrons by 4f electrons from the nuclear charge

(B) The appreciable shielding on outer electrons by 5d electrons from the nuclear charge

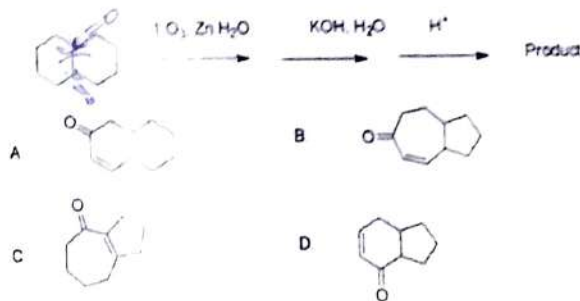
(C) The same effective nuclear charge from Ce to Lu

(D) The imperfect shielding on outer electrons by 4f electrons from the nuclear charge

26. Which of the following tetracyclic compounds corresponds to the typical 17-carbon steroid nucleus?



27. What is the predominant product of the following sequence of reactions?





28. Class of voids that can exist in any close-packed structures are:

- (A) Trigonal, tetrahedral (B) Trigonal, octahedral  
(C) ~~Tetrahedral~~, octahedral (D) Only octahedral

29. An electron trapped in an anion vacancy within the crystal is called:

- (A) n-type conductor (B) p-type conductor  
(C) Insulator (D) ~~F-centre~~

30. The ratio between the root mean square speeds of  $H_2$  at 50 K and  $O_2$  at 800 K is:

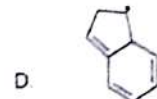
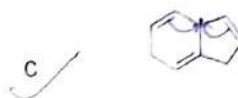
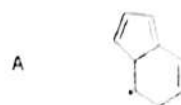
- (A)  $\frac{1}{4}$  (B) 1  
(C) 2 (D) 4

31. Conjugate base of hydrazoic acid is

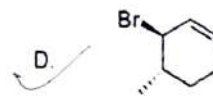
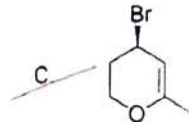
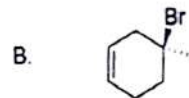
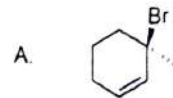
- (A)  $NH_3$  (B)  ~~$N_3^-$~~   
(C)  $N_3^-$  (D)  $NH_2^-$



32. Most stable carbon free radical among the following would be



33. Which is the most reactive compound by the  $S_N1$  mechanism?



34. Which of the following complex exhibits Jahn-Teller Distortion?

- (A)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$  (B)  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$   
(C)  $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$  (D)  $[\text{Co}(\text{NH}_3)_6]^{3+}$

35. The r.m.s. velocity of hydrogen is  $\sqrt{7}$  times the r.m.s. velocity of nitrogen. If  $T$  is the temperature of the gas:

- (A)  $T(\text{H}_2) = T(\text{N}_2)$  (B)  $T(\text{H}_2) > T(\text{N}_2)$   
(C)  $T(\text{H}_2) < T(\text{N}_2)$  (D)  $T(\text{H}_2) = \sqrt{7} T(\text{N}_2)$

36. The reason for normalizing a wave function  $\psi$  is:

- (A) to guarantee that  $\psi$  is square-integrable.  
(B) to make  $\psi^* \psi$  equal to the probability distribution function for the particle.  
(C) to make  $\psi$  an Eigen function for the Hamiltonian operator.  
(D) to make  $\psi$  satisfy the boundary conditions for the problem.

37. Which of the following atomic orbitals can overlap with an atomic orbital of the same type on an adjacent atom (both atoms lie on the x axis) to give a  $\pi$  bond?

- (A)  $2p_x$  (B)  $3d_{xy}$   
(C)  $2s$  (D)  $3p_x$

38. Crystal field splitting energy value of octahedral ( $O_h$ ) and tetrahedral ( $t_h$ )

- (A)  $\Delta_o = 4/9 \Delta_t$  (B)  $\Delta_o = 9/4 \Delta_t$   
(C)  $\Delta_t = 9/4 \Delta_o$  (D)  $\Delta_t = 3/4 \Delta_o$

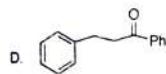
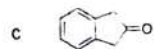
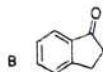
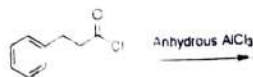
39. The oxidation number of iodine in  $\text{K}[\text{I}_3]$  is

- (A) Zero (B)  $-1/3$   
(C)  $-1$  (D)  $-3$

40. In which of the following molecules are all the bonds not equal

- (A)  $\text{ClF}_3$  (B)  $\text{BF}_3$   
(C)  $\text{AlF}_3$  (D)  $\text{NF}_3$

41. Which is the most probable main product of the following reaction?



42. In the emission spectrum of hydrogen, which series of emission lines falls in the visible region?

(A) Lyman

(B) Paschen

(C) ~~Balmer~~

(D) Pfund

43. For which of the following elements is the process of attaching the first electron the most exothermic?

(A) O

(B) ~~H~~

(C) ~~I~~

(D) Na

1.58 eV for O

Handwritten scribble

44. The coordination numbers of Ti (IV) and  $O^{2-}$  in rutile are, respectively:

(A) 6 and 3

(B) 3 and 6

(C) ~~2 and 4~~

(D) 4 and 2

45.  $B_2H_6$  reacts with  $H_2O$  and  $O_2$  to give

(A)  ~~$H_3BO_3 + H_2$  and  $B_2O_3 + H_2O$  respectively~~

(B)  $H_3BO_3 + H_2O$  and  $B_2O_3 + H_2O$  respectively

(C)  $H_3BO_3 + H_2O$  and  $B_2O_3 + H_2$  respectively

(D)  $H_3BO_3 + H_2$  and  $B_2O_3 + H_2$  respectively

46. Non-Aromatic compounds among the following is are:



(A) Q, S, T and U

(B) T and U

(C) R and T

(D) Q, T and U

47. The geometrical structure of  $[\text{PCl}_4]^+$  and  $[\text{PCl}_6]^-$  ions are

(A) Both octahedral

(B) Tetrahedral and octahedral respectively

(C) Octahedral and tetrahedral respectively

(D) Both tetrahedral



48. Which of the following statements is incorrect about oxalic acid

( $\text{H}_2\text{C}_2\text{O}_4$ ) for which  $K_{a(1)} = 5.9 \times 10^{-2} \text{ M}$  and  $K_{a(2)} = 6.4 \times 10^{-5} \text{ M}$ ?

(A) The observation that  $K_{a(1)} > K_{a(2)}$  is general for dibasic acids

(B) Both  $\text{H}_2\text{C}_2\text{O}_4$  and its conjugate base behave as weak acids

(C)  $\text{p}K_{a(1)} > \text{p}K_{a(2)}$

(D) Oxalic acid forms salts including  $\text{Na}_2\text{C}_2\text{O}_4$ ,  $\text{MgC}_2\text{O}_4$  and  $\text{KHC}_2\text{O}_4$

49. In neutral aqueous solution,  $E^\circ$  for the  $\text{Mn}^{3+}/\text{Mn}^{2+}$  couple is +1.54 V.

At pH 14,  $E^\circ$  for the  $\text{Mn}(\text{OH})_3/\text{Mn}(\text{OH})_2$  couple is +0.15V. Which of the following statements is incorrect?

(A) At pH 14,  $\text{Mn(II)}$  and  $\text{Mn(III)}$  both precipitate from aqueous solution as hydroxides

(B)  $\text{Mn(III)}$  is less stable with respect to reduction to  $\text{Mn(II)}$  at pH 14 than at pH 7

(C) The  $\text{Mn}(\text{OH})_3/\text{Mn}(\text{OH})_2$  couple refers to an equilibrium involving  $\text{Mn(III)}$  and  $\text{Mn(II)}$

(D) At pH 7,  $\text{Mn}^{3+}(\text{aq})$  is a relatively strong oxidizing agent

# Disclaimer

~~ALL~~ MOST OF THE QUESTIONS  
ARE ATTEMPTED IN THIS QUESTION  
PAPER ARE WRONG.  
SO, DON'T FOLLOW THESE  
ANSWERS.



50. Which one of the following is the correct formula for the lowest-energy Eigen function for a particle in a one-dimensional box having infinite barriers at

$$x = -L/2 \text{ and } L/2?$$

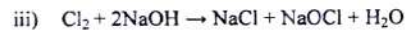
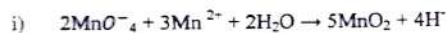
(A)  $\sqrt{\frac{2}{L}} \sin\left(\frac{\pi x}{L}\right)$

(B)  $\sqrt{\frac{2}{L}} \cos\left(\frac{\pi x}{L}\right)$

(C)  $\sqrt{\frac{2}{L}} \exp\left(\frac{i\pi x}{L}\right)$

(D)  $\sqrt{\frac{2}{L}} \exp\left(\frac{-i\pi x}{L}\right)$

51. Which of the following reactions are disproportionation reactions?



(A) i & ii

(B) ii & iii

(C) ii only

(D) iii only

52. The IUPAC name of  $\text{Na}_3[\text{Fe}(\text{CN})_5\text{NO}]$  is

(A) Sodium pentacyanonitrosyl iron(II)

(B) Sodium nitrosylpentacyanoiron(II)

(C) Sodium pentacyanonitrososulfate(I)

(D) Sodium nitrosylpentacyanonitrate(I)

53. Which of the following sets of quantum numbers is correct for an electron in 5d orbital?

(A)  $n = 5, l = 3, m_l = +1, m_s = +\frac{1}{2}$

(B)  $n = 5, l = 1, m_l = -1, m_s = +\frac{1}{2}$

(C)  $n = 5, l = 2, m_l = +2, m_s = +\frac{1}{2}$

(D)  $n = 5, l = 4, m_l = -3, m_s = -\frac{1}{2}$

54. The copper in toxic proportion in the animals and plants will be removed by the following

(A) D-penicillamine

(B) Glycine

(C) Desferrioxime

(D) Oxaplatin

55. Which among the following is not an ambident nucleophile?

- (A)  $\text{CN}^-$  (B)  $\text{NO}_2^-$   
(C)  $\text{PhO}^-$  (D)  $\text{CH}_3\text{CH}_2^-$

56. Which reagent will react irreversibly with a carbonyl compounds?

- (A)  $\text{EtOH}$  (B)  $\text{HCN}$   
(C)  $\text{HCl}$  (D)  $\text{LiAlH}_4$

57. A molecule in a gas undergoes about  $1.0 \times 10^9$  collisions in each second. Suppose that one collision in 10 is effective in deactivating the molecule rotationally. The width (in hertz) of rotational transitions in the molecule will be:

- (A) 1.59 MHz (B) 15.9 MHz  
(C) 159 MHz (D) None of the above

58. The rotational structure in the Raman spectrum of carbon dioxide ( $\text{CO}_2$ ), is offset from the wavenumber of the incident radiation by 2.3622  $\text{cm}^{-1}$ , 5.5118  $\text{cm}^{-1}$ ,

8.6614  $\text{cm}^{-1}$ . The rotational constant of carbon dioxide is:

- (A) 0.3937  $\text{cm}^{-1}$  (B) 0.5906  $\text{cm}^{-1}$   
(C) 1.1811  $\text{cm}^{-1}$  (D) 2.3622  $\text{cm}^{-1}$

59.  $\Delta H_{\text{vap}} = 30 \text{ kJ mol}^{-1}$  and  $\Delta S_{\text{vap}} = 75 \text{ J mol}^{-1} \text{K}^{-1}$ . Find temperature of vapour, at one atmosphere:

- (A) 250 K (B) 298 K  
(C) 350 K (D) 400 K

$$S = \frac{\Delta H}{T}$$

$$75 \times 1000 = \frac{30 \times 1000}{T}$$

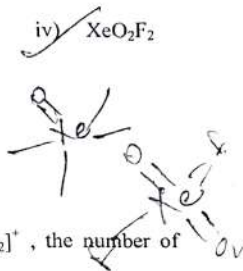
$$T = \frac{30 \times 1000}{75} = 400$$

60. In a given cell, solution I transmits 42.0 per cent and solution II 85.0 per cent of radiation having a certain wavelength. What is the transmittance at the same wavelength of a solution made by mixing 35.0  $\text{cm}^3$  of solution I and 55.0  $\text{cm}^3$  of solution II, if no reaction occurs?

- (A) 64.6 % (B) 68.3 %  
(C) 35.7 % (D) 44.7 %

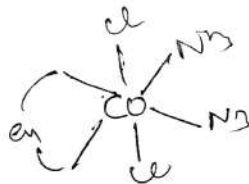
61. The molecules having the same hybridization, shape and number of lone pairs of electrons are

- i)  $\text{XeF}_4$     ii)  $\text{SF}_4$     iii)  $\text{XeOF}_4$     iv)  $\text{XeO}_2\text{F}_2$   
 (A) ii & iii    (B) ii & iii  
 (C) iii & iv    (D) ii & iv



62. For the octahedral complex ion  $[\text{Co}(\text{en})(\text{NH}_3)_2\text{Cl}_2]^+$ , the number of possible isomers are, (en = ethylenediamine)

- (A) 2    (B) 4  
 (C) 6    (D) 8



63. The formula of Caro's acid, Marshall's acid and oleum, respectively is

- (A)  $\text{H}_2\text{SO}_4$ ,  $\text{H}_2\text{SO}_5$  and  $\text{H}_2\text{S}_4\text{O}_6$   
 (B)  $\text{H}_2\text{SO}_5$ ,  $\text{H}_2\text{S}_2\text{O}_6$  and  $\text{H}_2\text{S}_2\text{O}_7$  -  
 (C)  $\text{H}_2\text{SO}_5$ ,  $\text{H}_2\text{S}_2\text{O}_7$  and  $\text{H}_2\text{S}_2\text{O}_8$   
 (D)  $\text{H}_2\text{S}_2\text{O}_7$ ,  $\text{H}_2\text{S}_2\text{O}_6$  and  $\text{H}_2\text{S}_2\text{O}_7$  -



64. The correct order for the rates of electrophilic aromatic substitution of the following compound is



- (A)  $P < Q < R < S$

- (C)  $R < S < Q < P$

- (B)  $S < R < Q < P$

- (D)  $Q < R < S < P$

65. 0.1 mole of  $\text{CH}_3\text{NH}_2$  ( $K_b = 5 \times 10^{-4} \text{ M}$ ) is mixed with 0.08 mole of  $\text{HCl}$  and diluted to one litre. What will be the  $\text{H}^+$  concentration in the solution?

- (A)  $8 \times 10^{-2} \text{ M}$

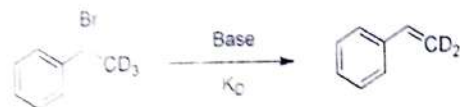
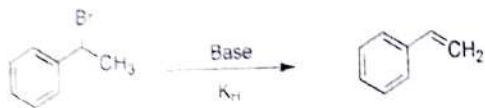
- (C)  $1.6 \times 10^{-11} \text{ M}$

- (B)  $8 \times 10^{-11} \text{ M}$

- (D)  $8 \times 10^{-5} \text{ M}$

$$\frac{0.08 + 0.1}{2}$$

66. Assuming both the reactions as E1, where will the expected ratios between  $K_H/K_D$  lies between?



67. The pH of a salt of weak acid with weak base is given by the expression if  $K_a$ ,  $K_b$  and  $K_w$  are the dissociation constants of water, weak acid and weak base respectively :

(A)  $\text{pH} = \frac{1}{2} (\text{p}K_a + \text{p}K_b + \text{p}K_w)$

(B)  $\text{pH} = \frac{1}{2} (\text{p}K_a - \text{p}K_b - \text{p}K_w)$

(C)  $\text{pH} = \frac{1}{2} (\text{p}K_a + \text{p}K_b - \text{p}K_w)$

(D)  $\text{pH} = \frac{1}{2} (\text{p}K_b + \text{p}K_w - \text{p}K_a)$

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68. Nicotinic acid ( $K_a = 1.4 \times 10^{-5} \text{ M}$ ) is represented by HNic. The % dissociation in a solution will be if it contained 0.1 mole of nicotinic acid per litre of solution:

(A) 1.673

(B) 4

(C) 6.673

(D) 10

69. Molar heat capacity of water in equilibrium with ice at constant pressure is

(A) 0

(B)  $\infty$

(C)  $40.45 \text{ kJ K}^{-1} \text{ mol}^{-1}$

(D)  $75.48 \text{ kJ K}^{-1} \text{ mol}^{-1}$  ans B

70. Spontaneous adsorption of a gas on solid surface is an exothermic process because

(A)  $\Delta H$  increases for system

(B)  $\Delta S$  increases for gas

(C)  $\Delta S$  decreases for gas

(D)  $\Delta G$  increases for gas

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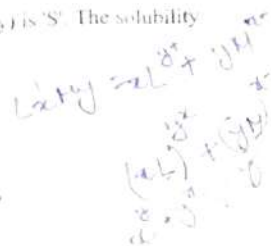
71. The solubility of the sparingly soluble salt ( $XY_2$ ) is ' $S$ '. The solubility product ( $K_{sp}$ ) of this salt is

(A)  $S^{1/2}$

(B)  $S^{1/3}$

(C)  $X^{1/2}Y^2S^{3/2}$

(D)  $X^{1/2}Y^2S^{3/2}$



72. Identify the correct statements regarding reaction I and reaction II



- (A) I and II are regioselective reactions.  
 (B) I and II are stereoselective reactions.  
 (C) I is regioselective and II is stereoselective.  
 (D) Only I is stereoselective reaction.

73. Which of the following reaction involve ylide intermediate?

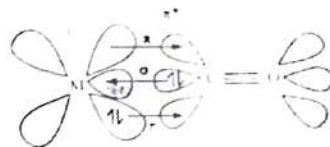
(A) Wittig reaction

(B) Aldol reaction

(C) Cannizzaro reaction

(D) Perkin reaction

74. Consider the following figure, which type of bond formed between metal and ligand



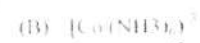
(A)  $\pi$ -bond

(B)  $\sigma$ -bond

(C) Synergic bond

(D)  $\delta$ -bond

75. The complex ion which has highest magnetic moment of the following





# Disclaimer

~~ALL~~ MOST OF THE QUESTIONS  
ARE ATTEMPTED IN THIS QUESTION  
PAPER ARE WRONG.  
SO, DON'T FOLLOW THESE  
ANSWERS.

76. Which of the following interstitial hydride is

(A) ~~NaH~~

(B)  $\text{NH}_3$

(C)  $\text{CaH}_2$

(D)  $\text{LaH}$

77. Which metal complex has maximum crystal field stabilization energy

(CFSE)

(A)  $[\text{CoCl}_4]^{2-}$

(B)  $[\text{CoF}_6]^{3-}$

(C)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

(D)  $[\text{Co}(\text{NH}_3)_6]^{3+}$



78. Carbonic anhydrase, metalloenzyme catalysis

(A) ~~Hydration of  $\text{CO}_2$~~

(B) Hydration of CO

(C) Hydration of proteins

(D) Dehydration of proteins

79. An azeotropic mixture is a:

(A) constant vapour pressure mixture

(B) constant volume mixture

(C) constant temperature mixture

(D) ~~constant boiling mixture~~

80. Starting from propanoic acid, the following reactions were carried out.

what is the compound Z?



(A) Propyl amine

(B) ~~Ethyl amine~~

(C) Propenamide

(D) Butanoic acid

81. The percentage of p-character in the orbitals forming P-P bonds in  $\text{P}_4$  is

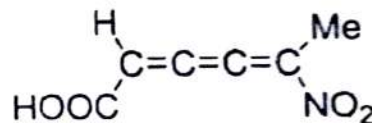
(A) 25

(B) 33

(C) 75

(D) 50

82. The following molecule has



(A) Plane of symmetry

(B) Centre of symmetry

(C) Chiral axis

(D) Chiral centre



83. In the Lassaigne's test for detection of nitrogen element in an organic compound, the Prussian blue colour is obtained due to the formation of

- (A)  $K_3[Fe(CN)_6]$  (B)  $Fe_2[Fe(CN)_6]$   
(C)  $Fe_4[Fe(CN)_6]_3$  (D)  $Fe_3[Fe(CN)_6]_4$

84. Which of the following compounds has the smallest bond angle?

- (A)  $H_2O$  (B)  $H_2S$   
(C)  $NH_3$  (D)  $SO_2$



85. The bond order for the following molecules/ion(s) is 3

- (A)  $N_2^+$ , CO and  $NO^-$  (B)  $O_2$ , CO and  $NO^+$   
(C)  $N_2$ , CO and NO (D)  $N_2$ , CO and  $NO^+$

86. Molecular formula of Zeise's salt

- (A)  $K [Pt(\eta^2-C_2H_4) Cl_3] \cdot H_2O$   
(B)  $K_2 [Pt(\eta^2-C_2H_4) Cl_3] \cdot H_2O$   
(C)  $K_2 [Pt(\eta^1-C_2H_4) Cl_3] \cdot H_2O$   
(D)  $K [Pt(\eta^1-C_2H_4) Cl_3] \cdot H_2O$

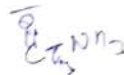
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87. Which type of amine is produced by reaction of ketones with primary amines, followed by reduction?

- (A) Chiral amines (B) N-substituted amines

(C) ~~N, N-di substituted amines~~ (D) Primary amines



88. The ionic mobility of alkali metal ions in aqueous solution is maximum for

- (A)  $K^+$  (B)  $Rb^+$   
(C)  $Li^+$  (D)  $Na^+$

89. Number of ions produced  $[Co(NH_3)_6]Cl_3$  in solution are

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

90. The compound formed by vigorously hydrolysis of  $ZrCl_4$  is

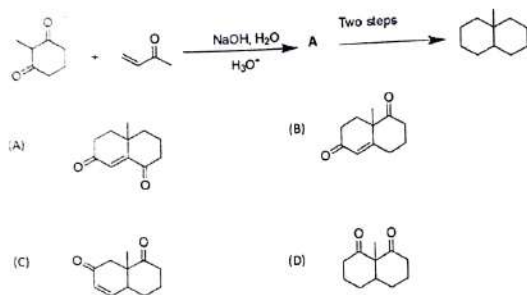
- (A)  $ZrO(OH)_2$  (B)  $Zr(Or)_3$   
(C)  $ZrOCl_2$  (D)  $ZrO_2$

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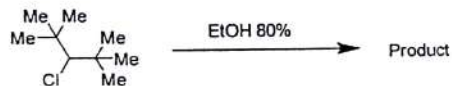
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91. The intermediate compound A in the following transformation is



92. What is not true about below reaction?



- (A) Major product is given by  $S_N1$  reaction
- (B) Major product is given by  $S_N2$  reaction
- (C) The predominant product formation also involve rearrangement
- (D) Major product is given by E2 reaction

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93. Which of the following is not chelating agent

- (A) Glycinato
- (B) Oxalato
- (C) Thiosulphato
- (D) Ethylenediamine

94. Following reaction is an example of



- (A) Pummerer rearrangement
- (B) Favorskii rearrangement
- (C) Shapiro reaction
- (D) Curtius rearrangement

95. Among the following, the correct statement is

- (A) Boiling point,  $PH_3 < AsH_3 < NH_3 < SbH_3$
- (B) Acidic strength,  $HOCl > HOClO > HOClO_2 > HOClO_3$
- (C) Ionic character,  $HI > HBr > HCl > HF$
- (D) Ionic size,  $Na^+ > Mg^{2+} > F^- > Al^{3+}$

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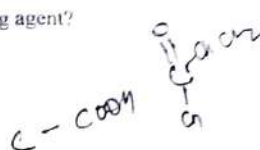
96. Which of the following has tendency to act as oxidising agent?

(A)  $\text{Lu}^{3+}$

(B)  $\text{Gd}^{3+}$

(C)  $\text{Ce}^{4+}$

(D)  $\text{Sm}^{2+}$



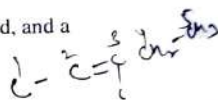
97. Compound X reacts with HI. The product of this reaction, when treated with KOH in ethanol, gives Y (an isomer of X). Ozonolysis of Y ( $\text{H}_2\text{O}_2$  workup) produces two compounds: a two carbon carboxylic acid, and a four carbon ketone. What is X?

(A) 2-methyl-2-pentene

(B) 4-methyl-1-pentene

(C) 2,3-dimethyl-2-butene

(D) 3-methyl-1-pentene



98. Which reagent(s) would best accomplish the following transformation?



(A)  $\text{H}_2\text{O}^+$  & heat

(B) (i)  $\text{HgSO}_4$  in  $\text{H}_2\text{O}$  (ii)  $\text{NaBH}_4$

(C) (i)  $\text{B}_2\text{H}_6$  in ether (ii)  $\text{H}_2\text{O}_2$  and base

(D) (i)  $\text{HOBr}$  (ii)  $\text{Mg}$  in ether

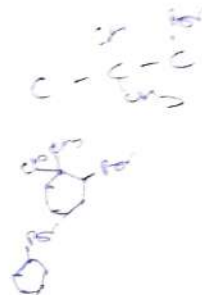
99. Which of the following organic halides will undergo an E2 elimination on heating with KOH in alcohol?

(A) 2,2-dimethyl-1-bromopropane

(B) 2,2-dimethyl-1-bromocyclohexane

(C) Benzyl chloride

(D) 2,5-dimethyl-1-bromobenzene



100. Peptides are composed of amino acids joined by amide bonds. Which of the following statements is not correct?

(A) Amide groups are more resistant to hydrolysis than are similar ester groups.

(B) p- $\pi$  resonance stabilizes the amide bond.

(C) Stable conformations of peptides are restricted to those having planar amide groups.

(D) Amide groups do not participate in hydrogen bonding interactions.