M.Sc. Chemistry I

Set No. 1          Question Booklet No. :    C-482

# 14P/2014(i)

*(To be filled up by the candidate by blue/black ball-point pen)*

Roll No.

Roll No. (Write the digits in words) ........................................................................................................

Serial No. of OMR Answer Sheet .............................................................

                                      ...................................................

Day and Date ......................................................       ( Signature of Invigilator )

## INSTRUCTIONS TO CANDIDATES

*(Use only blue/black ball-point pen in the space above and on both sides of the Answer Sheet)*

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.

2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*

3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*

4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space prvided above.

5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*

6. *No overwriting is allowed in the entries of Roll No., Question Booklet no. and Set no. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Queston Booklet.*

7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfairmeans.*

8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.*

9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.

10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*

11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.

12. Deposit only OMR *Answer Sheet* at the end of the Test.

13. You are not permitted to leave the Examination Hall until ~~...~~

14. ~~...~~ attempts to use any form of unfair means, he/she ~~...~~ such punishment as the University may determine and impose on him/her.

**Total No. of Printed Pages : 48**     [उपर्युक्त नि ~~...~~ आरक्षण पृष्ठ पर दिये गए हैं।]

ROUGH WORK
रफ़ कार्य

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Time : $2\frac{1}{2}$ Hours

Full Marks : 450

समय : $2\frac{1}{2}$ घण्टे

पूर्णांक : 450

**Note :** (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. **One mark will be deducted for each incorrect answer. Zero** mark will be awarded for each unattempted question.

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न 3 (तीन) अंकों का है। *प्रत्येक गलत उत्तर के लिए एक अंक काटा जायेगा।* प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक *शून्य* होगा।

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

01. Oxine compound can better be estimated by :

　(1) gravimetric method

　(2) conductometric method

　(3) potentiometric method

　(4) bromate- bromide reaction mtohod

02. the indicator Eriochrome black-T can only be used in the complexometric titrations of metal ion at pH :

　(1) 7.0 　　　(2) 5.0 　　　(3) 10.0 　　　(4) 12.0

**P.T.O.**

**03.** The disodium salt of EDTA is always used metal analysis because :

(1) it severely imparts alkanity to the test solution

(2) it moderately imparts acidity to the test solution

(3) it severely imparts acidity to the test solution

(4) it moderately imparts alkanity to the test solution :

**04.** The stability constant for the metal-EDTA complex should be

(1) smallar than that for metal-Eriochrome-T complex

(2) equal to the stability constant of metal-Eriochrome-T complex

(3) greater than that for metal-Eriochrome-T complex

(4) the half of the stability constant of metal-Eriochrome-T complex

**05.** The quadrivalent cerium is used for the titration of reductants only in :

(1) Strong basic medium      (2) Weak basic medium

(3) Strong acidic medium      (4) Weak acidic medium

**06.** Which one is widely used as a primary standard in redox titrimetry ?

(1) Iodine      (2) Arsenic (III) oxide

(3) Sulfanilamide      (4) 8-hydroxy quinoline

**07.** In isotope dilution method for the determination of iron, $W_0$ g of iron as $^{59}FeCl_3$, that has a specific activity $A_0$, was mixed so that $^{59}Fe$ is equally distributed throughout the sample. A portion of the total iron is then isolated in a pure weighable form that has the specific activity $A_1$. If the original sample contained $W_1$ g of iron, then the fraction of initial activity found in this portion can be expressed as :

(1) $W_1 = W_0 \left( \dfrac{A_0}{A_1} - 1 \right)$

(2) $W_1 = W_0 \left( 1 - \dfrac{A_0}{A_1} \right)$

(3) $W_0 = W_1 \left( \dfrac{A_0}{A_1} - 1 \right)$
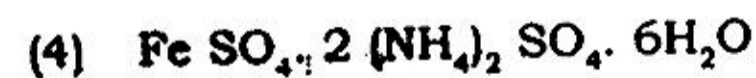
(4) $W_0 = W_1 \left( 1 - \dfrac{A_0}{A_1} \right)$

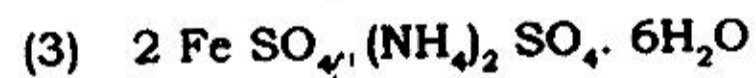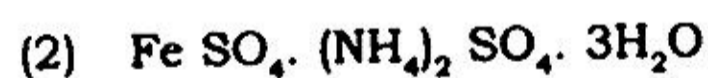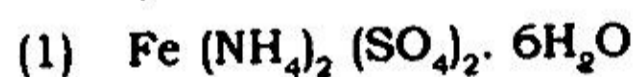**08.** The equivalence point potential for the titration of Ce (IV) with standard Fe (II) is :

(1) 0.76 V

(2) 1.06 V

(3) 2.12 V

(4) 1.44 V

[ given : $E^0\ Ce^{4+}/Ce^{3+} = 1.44V$, $E^0\ Fe^{3+}/Fe^{2+} = 0.68$ ]

**09.** The Mohr's salt is :

(1) $Fe (NH_4)_2 (SO_4)_2 . 6H_2O$

(2) $Fe SO_4 . (NH_4)_2 SO_4 . 3H_2O$

(3) $2\ Fe SO_4 . (NH_4)_2 SO_4 . 6H_2O$

(4) $Fe SO_4 . 2 (NH_4)_2 SO_4 . 6H_2O$

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10. The bromiate- bromide reaction is :

$$B_rO_3^- + 5B_r^- + 6H^+ \rightarrow 3\,Br_2 + 3\,H_2O$$

The librated $Br_2$ is titrated with standard sodium thiosulfate solution. The one mol potassium bromate can thus be equated to :

(1)   1 mol $S_2O_3^{2-}$

(2)   3 mol $S_2O_3^{2-}$

(3)   6mol $S_2O_3^{2-}$

(4)   9 mol $S_2O_3^{2-}$

11. A 50.0 mL aliquot of 0.05 m ammonia is titrated with 0.10 m acetic acid. What would be the nature of the solution at the equivalence point ?

(1)   slightly acidic

(2)   slightly basic

(3)   turbid

(4)   neutral

12. The pH values of $10^{-9}$ MHCl, 1.0 M HCl, and $10^{-2}$ M NaOH could respectively be obtained as :

(1)   9.0, 1.0, 2.0

(2)   6.9, 0.0, 12.0

(3)   7.0, 0.1, 2.1

(4)   9.1, 6.9, 12.1

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13. The H⁺ ion has abnormally high mobility in comparison to other monovalent ions since :

(1) H⁺ ion is smallest in size

(2) H⁺ ion is largest in size

(3) H⁺ ion follows hopping mechanism in solution

(4) H⁺ ion concentration mechanism high

14. The methyl orange indicator in strong acid vs strong base :

(1) cannot be used

(2) can be used

(3) can be used with insignificant

(4) can be used with large titration error

15. The conductometry titration curve given below :
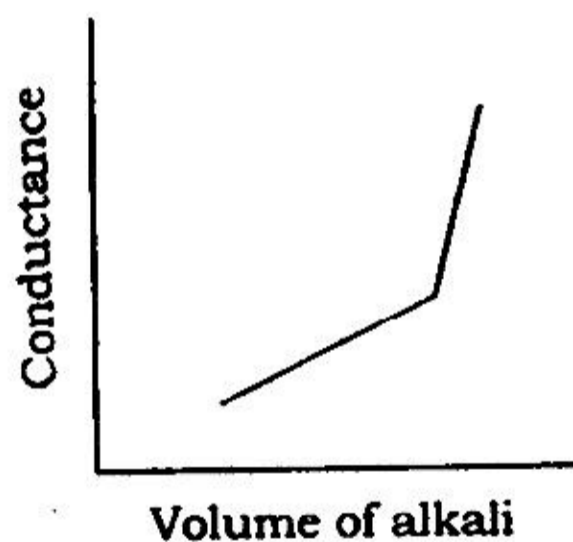


represents a titration involving :

(1) Strong acid VS strong base

(2) Weak acid VS strong base

(3) Strong acid VS weak base

(4) Weak acid VS weak base

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**P.T.O.**

**16.** A common expression for the distribution coefficient (K) in ion-exchange resin is :

(1) K = amount of ion/mL of solution

(2) K = amount of ion/1000 mL of solution

(3) $K \dfrac{\text{amount of ion/g of dry resin}}{\text{amount of ion/1000 g of dry resin}}$

(4) $K = \dfrac{\text{amount of ion/g of dry resin}}{\text{amount of ion/mL g of solution}}$

**17.** Which ones are strong cation and strong anion exchange resins ?

(A) Sulfonated polystyrene

(B) Condensed acrylic acid

(C) Polystyrene with $- CH_2N\, Me_3Cl$

(D) Polystyrene with sec- amine

Answer Codes :

(1) A and C

(2) B and D

(3) A and D

(4) C and D

**18.** The height equivalent to a theoretical plate (HETP) can be expressed in terms of the column length (L), retention ($t_R$), and the peak-width (W) as :

(1) $HETP = \dfrac{L}{16}\left(\dfrac{W}{\epsilon\, t_R}\right)^2$

(2) $HETP = \dfrac{16}{L}\left(\dfrac{t_R}{W}\right)^2$

(3) $HETP = 16\left(\dfrac{L \times t_R}{W}\right)^2$

(4) $HETP = 16\left(\dfrac{t_R}{W}\right)^2$

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**19.** The best procedure to improve resolution between two chromatographic peak is :

(1) increasing column-length, decreasing band-width

(2) decreasing column-length, increasing band-width

(3) increasing column-length, increasing band-width

(4) decreasing column-length, decreasing band-width

**20.** The Van Deemter equation in terms of coefficient of multiple-path effect (A), coefficient of longitudinal diffusion (B), coefficient of mass-transfer (C), and linear velocity of mobile phase (u) can be represented as :

(1) $H = A + B/u + Cu$

(2) $H = B + A/u + Cu$

(3) $H = A + B/u + C/u$

(4) $H = A/u + B/u + Cu^2$

**21.** The isocratic elution in chromatography can be defined as

(1) elution under conditions of constant temperature and pressure

(2) elution under conditions of variable temperature and pressure

(3) elution under conditions of constant mobile-phase composition

(4) elution under conditions of varying mobile-phase compositions

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**P.T.O.**

**22.** Which one could **not** be an ideal detector in gas chromatography ?

    (1)    Photo-multiplier tube

    (2)    Flame-ionization detector

    (3)    Thermal-conductivity detector

    (4)    Electron-capture detector

**23.** In reversed-phase chromatography, which statement is **correct** ?

    (1)    The least polar component is eluted first and increasing the polarity of the mobile – phese decreases the elution time

    (2)    The most polar component elutes first and increasing the mobile-phase polarity increases the elution time

    (3)    A non-polar component is eluted first without having any effect of the polarity of the mobile-phese

    (4)    There is no effect of polarity either of the component or the mobile-phase

**24.** For non-polar analytes having molecular mass greater than 10,000, one of the best HPLC technique would be :

    (1)    ion-exchange chromatography

    (2)    liquid-liquid partition chromatography

    (3)    liquid-bonded phase partition chromatography

    (4)    gel permeation chromatography

25. Two sets of the percentage iron in a sample resulted in the following data (true value = 36.32) :

$\bar{X} + S_x = 36.27 \pm 0.16 \quad N_x = 5$

$\bar{Y} + S_y = 36.34 \pm 0.22 \quad N_y = 8$

Which set of data is more accurate ?

(1)  X - set

(2)  Y - set

(3)  both sets

(4)  No - sets

26. If 'X' is an acid (HA), the pictorial representation of solvent extraction of 'X' can be depicted as :
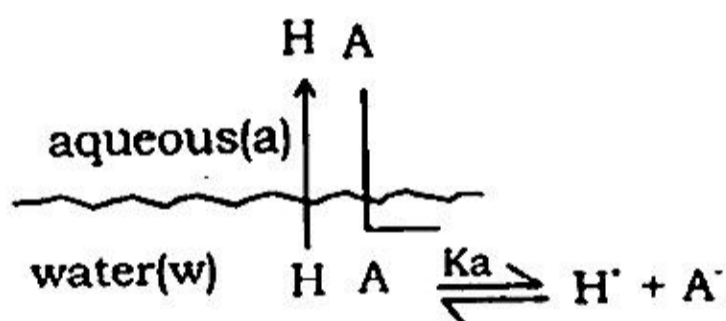


The relationship between distribution ratio (D) and distribution coefficient ($K_D$) can be obtained as :

(1) $D = \dfrac{K_D}{1 + K_a/[H^+]_w}$

(2) $K_D = \dfrac{D}{1 + [H^+]_w/K_a}$

(3) $D = \dfrac{1 + K_a/[H^+]w}{K_D}$

(4) $K_D = \dfrac{1 + K_a/[H^+]_w}{D}$

27. Employing Nernst's distribution law, V mL of solution containing W g of solute is repeatedly extracted with v mL of another solvent which is immiscible with first one. In $n^{th}$ operation mass of solute $(W_n)$ that reman extracted will be :

(1) $W_n = W\left(\dfrac{K_D V}{K_D V + v}\right)^n$

(2) $W_n = W\left(\dfrac{K_D V + v}{K_D V}\right)^n$

(3) $W_n = W\left(\dfrac{K_D v}{K_D V + v}\right)^n$

(4) $W_n = W\left(\dfrac{K_D V + V}{K_D v + V}\right)^n$

28. A solution containing n independently absorbing species, the total absorbamce is represented in terms of molar absorptivity $(\epsilon)$, analyte concentration (c) and path length (b) as :

(1) $A = [\epsilon_1 c_1 + \epsilon_2 c_2 + \ldots\ldots\ldots \epsilon_n c_n]\, b$

(2) $A = [\epsilon_1 c_1^2 + \epsilon_2 c_2^2 + \ldots\ldots\ldots \epsilon_n c_n^2]\, b$

(3) $A = [\epsilon_1 c_1^n + \epsilon_2 c_2^n + \ldots\ldots\ldots \epsilon_n c_n^n]\, b$

(4) $A = [\epsilon_1 c_1 + \epsilon_2 c_2 + \ldots\ldots\ldots \epsilon_n c_n]\, b/n$

29. Beer's law governs the behaviour of :

(1) dilute solutions ($\leq 0.1$ M) only

(2) concentrated solutions ($\geq 0.1$ M) only

(3) dilute solutions ($\leq 0.01$ M) only

(4) concentrated solutions ($\geq 1.0$ M) only

**30.** The units of absobance (A) and molar absorptivity are, respectively :

    (1)   no unit and $dm^3 \, mol^{-1} \, cm^{-1}$

    (2)   $dm^3 \, mol^{-1} \, cm^{-1}$ and no unit

    (3)   $mol. \, cm^{-1}$ and $dm^3 \, mol^{-1} \, cm^{-1}$

    (4)   both have no unit

**31.** The Beer's law is not obeyed if :

    (1)   monochromatic light is not used

    (2)   monochromatic light is used

    (3)   polychromatic light is not used

    (4)   polychromatic light is used

**32.** Iron (III) can quantitatively be extracted from hydrochloric acid medium into diethyl ether. The extracted species is :

    (1)   Fe (III) $[(C_2H_5)_2O]^-_2$

    (2)   $Fe \, Cl_3 . \, H_2O . \, (C_2H_5)_2 \, O$

    (3)   $FeCl_4 : H^+[(C_2H_5)_2O]^-_2$

    (4)   $(C_2H_5)_2O : H, Fe \, Cl_4 \, [(C_2H_5)_2O]^-_2$

**33.** Marble wall may be affected with atmospheric sulfuric acid as :

    (1)   receptor              (2)   precipitator

    (3)   sink                  (4)   neutralizer

**P.T.O.**

34. Which is called as 'killer' species in the environment ?

    (1) NO          (2) $NO_2$          (3) CO          (4) $CO_2$

35. The dissolved oxygen in water can be estimated by :

    (1) the Volhard method          (2) the Fajans method

    (3) the Mohr method          (4) the Winkler's method

36. The altitude of troposphere is :

    (1) 0-11 km          (2) 11-50 km

    (3) 50-85 km          (4) 85-500 km

37. Which one is **not** a primary air pollutant ?

    (1) $CO_2$          (2) CO          (3) $NO_2$          (4) $SO_2$

38. The domestic waste water involves the following sequence of treatments :

    (1) Screening, Sedimentation, aerobic digestion, incineration

    (2) Sedimentation, aerobic digestion, screening, incineration

    (3) Aerobic digestion, Screening, sedimentation, incineration

    (4) Incineration, aerobic digestion, screening, sedimentation

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39. For which of the following ions is the colour in aqueous solution **not** caused by any $d$-$d$ transition ?

(1) $MnO_4^-$     (2) $VO^{2+}$     (3) $MnO_4^{2-}$     (4) $Mn^{3+}$

40. Which salt upon heating produces oxygen ?

(1) potassium oxide       (2) potassium chlorate

(3) potassium chloride       (4) potassium carbonate

41. Which of the following isotopes is useful for archaeological dating purposes ?

(1) $^{11}C$     (2) $^{12}C$     (3) $^{13}C$     (4) $^{14}C$

42. From each pair given below identify the ion which is larger in size :

$[Co^{2+}, Co^{3+}]$ $[Fe^{2+}, Zn^{2+}]$ $[Na^+, F^-]$ $[O^{2-}, S^{2-}]$

(1) $Co^{2+}, Zn^{2+}, F^-, S^{2-}$       (2) $Co^{3+}, Fe^{2+}, Na^+, S^{2-}$

(3) $Co^{2+}, Fe^{2+}, F^-, S^{2-}$       (4) $Co^{3+}, Zn^{2+}, Na^+, O^{2-}$

43. Which one, among the given atoms, has the highest number of unpaired electrons in its ground state ?

(1) B     (2) C     (3) N     (4) O

    **P.T.O.**

**44.** Which halide of silver is soluble in water ?

    (1)  AgF        (2)  AgCl       (3)  AgBr       (4)  AgI

**45.** How many moles of water will react with one mole of $P_4O_{10}$ ?

    (1)  1 mole    (2)  2 moles   (3)  4 moles   (4)  6 moles

**46.** A compound, $A_2B_3$ is prepared by reacting 1 mole of A with 2 moles of $B_2$. If 0.25 mole of $A_2B_3$ is obtained in the preparation, what is the percentage yield ?

    (1)  25%     (2)  50%     (3)  75%     (4)  100%

**47.** 10 ml of 0.10 N sodium hydroxide is added to 20 ml 0.10 N sulphuric acid and the resultant solution is titrated against 0.10 N sodium hydroxide. What will be the titre value at the end point ?

    (1)  5 ml     (2)  10 ml    (3)  20 ml    (4)  30 ml

**48.** An aqueous solution of a substance gives a white precipitate when a few drops of sodium hydroxide are added. The precipitate dissolves when excess of sodium hydroxide is added. The substance may be :

    (1)  aluminium sulphate      (2)  silver nitrate

    (3)  cadmium chloride        (4)  mercuric chloride

49. Which reagent may be used to test for sulphate ions in solution ?

   (1) hydrochloric acid      (2) nitric acid

   (3) magnesium chloride      (4) barium chloride

50. An element crystallizes in a FCC lattice. How many atoms are there per unit cell ?

   (1) 1      (2) 2      (3) 3      (4) 4

51. What is the oxidation state of iron in $Na_2[Fe(CO)_4]$ ?

   (1) –2      (2) –1      (3) 0      (4) 2

52. What is the molality of a 0.001 M solution of $CaCl_2$ in water (M. W. of $CaCl_2$=111 g) ?

   (1) 1 m      (2) 0.001 m

   (3) 0.111 m      (4) 111 m

53. What is the charge (n) on the silicate ion $Si_2O_7^n$ ?

   (1) –2      (2) –4      (3) –6      (4) –7

P.T.O.

54. Silver is extracted from the crude metal by leaching with a solution of NaCN in the presence of air. The role of NaCN is to :

    (1) oxidize Ag to $Ag^{.}$

    (2) form the complex $[Ag(CN)_4]^{3-}$

    (3) form the complex, $[Ag(CN)_4]^{2-}$

    (4) form the complex $[Ag(CN)_2]^{-}$

55. $CoCL_4^{2-}$ and $Co(H_2O)_6^{2+}$ have different colours. This is because :

    (1) they have Co in different oxidation states

    (2) $CoCl_4^{2-}$ is tetrahedral while $Co(H_2O)_6^{2+}$ is octahedral

    (3) they have different number of unpaired electrons

    (4) $CoCl_4^{2-}$ is square planar while $Co(H_2O)_6^{2+}$ is octahedral

56. Dimethylglyoxime reagent is used to test for :

    (1) $Ca^{2+}$      (2) $Ni^{2+}$      (3) $Fe^{3+}$      (4) $Al^{3+}$

57. Which molecule has zero bond order ?

    (1) $H_2^{.}$      (2) $H_2$      (3) HeH      (4) $He_2$

58. What is the bond order in NO molecule ?

    (1) 2.5      (2) 2      (3) 1.5      (4) 1

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59. Which of the following is an example of a non-planar molecule (or ion) ?

    (1) carbonate

    (2) perchlorate

    (3) xenon tetrafluoride

    (4) boron trifluoride

60. $CuI_2$ is unstable because, it readily decomposes to :

    (1) Cu and $I^-$

    (2) Cu and $I_2$

    (3) CuI and $I_2$

    (4) CuI and $I^-$

61. Which one among the chlorides, $ZnCl_2$, $HgCl_2$, $BaCl_2$, $AlCl_3$, is dissociated to the least extent in aqueous solutions ?

    (1) $ZnCl_2$　　(2) $HgCl_2$　　(3) $CaCl_2$　　(4) $AlCl_3$

62. Which one among the given ions, has the highest polarizing power ?

    (1) $Na^+$　　(2) $Ca^{2+}$　　(3) $Mn^{3+}$　　(4) $Al^{3+}$

63. Which compound can act as a Lewis acid as well as a Lewis base ?

    (1) $H_2O$　　(2) $SnCl_2$　　(3) $NH_3$　　(4) $BF_3$

64. Perovskite is the mineral $CaTiO_3$. The perovskite crystal structure is adopted by several oxides as well as some fluorides. Which one, among the given formulae, most likely represents a known fluoride having the perovskite struture ?

   (1) $CaTiF_3$    (2) $KMnF_3$    (3) $NaMnF_4$    (4) $CaFeF_3$

65. Upon heating to about 500°C CsCl crystal changes its structure to rock salt structure. What happens to the coordination number of Cs ?

   (1) changes from 6 to 12    (2) changes from 8 to 12

   (3) changes from 8 to 6    (4) does not change

66. The bond angles in ammonia molecule are....................

   (1) 90 degres    (2) exactly tetrahedral

   (3) larger than tetrahedral    (4) less than tetrahedral

67. Which one of the following set contains one element each from s-block, p-bock and d-block ?

   (1) Na, K, Fe    (2) Rb, Ru, Sb

   (3) B, Cl, Sr    (4) Sc, Pt, Se

68. Which ligand can lead to linkage isomers ?

    (1) azide

    (2) cyanate

    (3) oxalate

    (4) nitrate

69. If you were to prepare $[Mn(en)_2(OH)_2]_2^{2+}$ ion (en = 1,2- diaminoethane), how many isomers, including geometrical and optical, can you expect to get ?

    (1) only one    (2) two    (3) three    (4) four

70. Which of the following molecules/ions exhibit isomerism ? (1) $Pt(NH_3)_2Cl_2$; (2) $Ni(NH_3)_2Cl_2$; (3) $Cu(H_2O)_3Cl_3$; (4) $[Cr(oxalate)_3]^{3-}$; (5) $[Fe(H_2O)_5Cl]^{2+}$

    (1) compounds (1), (3) and (5)

    (2) compounds (1), (2) and (3)

    (3) compounds (2), (3) and (4)

    (4) compounds (1), (3) and (4)

71. What is the change in oxidation state of cobalt in the following reaction ?

    $[Co(NH_3)_4Cl_2]^+ + H_2O \rightarrow [Co(NH_3)_4(H_2O)Cl]^{2+} + Cl^-$

    (1) increases from +2 to +3

    (2) decreases from +3 to +2

    (3) increases from +1 to +2

    (4) does not change

72. Identify the acids in the following two reactions :

$$NOF + ClF_3 = NO + ClF_4^-$$
$$XeO_3 + OH^- = HXeO_4^-$$
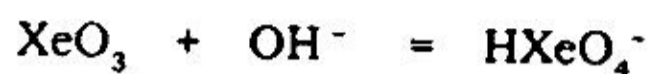
(1) $ClF_3$ and $XeO_3$      (2) $ClF_3$ and $OH^-$

(3) $NOF$ and $OH^-$      (4) $NOF$ and $XeO_3$

73. Which is the most common oxidation state observed for the lanthanide elements in their compounds ?

(1) $-1$     (2) $+2$     (3) $+3$     (4) $+4$

74. The magnetic moment of $[Co(H_2O)]^{3+}$ is zero and that of $Mn(CN)_6]^{3-}$ is 2.9 B.M. From this it may be concluded that :

(1) both ions are high spin

(2) both ions are low spin

(3) $Co(H_2O)_6^{3+}$ is low spin, $Mn(CN)_6^{3-}$ is high spin

(4) $Co(H_2O)_6^{3+}$ is diamagnetic, $Mn(CN)_6^{3-}$ is high spin

75. Which set contains two diamagnetic compounds ?

(1) $[K_2CoCl_4, Cu(SCN), Na_2PdCl_4]$

(2) $[CuCl_2, CuI, Cr(NH_3)_4Cl_2]$

(3) $[Na_2NiCl_4, GdCl_3, Ag_2S]$

(4) $[NiO, Fe_3O_4, Ru(NH_3)Cl_3]$

76. Which one of the following reagents is a nucleophile ?

    (1) $BF_3$     (2) $SO_3$     (3) $\ddot{C}Cl_2$     (4) $NH_3$

77. Which reactive intermediate is belived to be part of the reaction shown ?

    $RCH = CH_2 \xrightarrow{\text{HBr, ROOR}} RCH_2 CH_2BR$
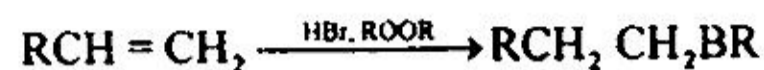
    (1) Free radical                (2) Carbocation

    (3) Bromonium ion               (4) Oxacyclopropane

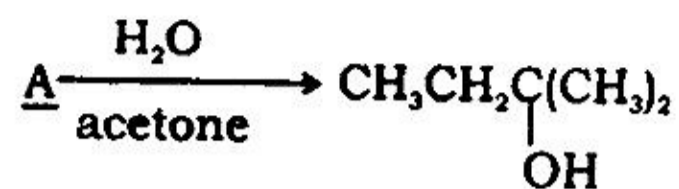78. Rank the following alcohols in order of increasing acidity :
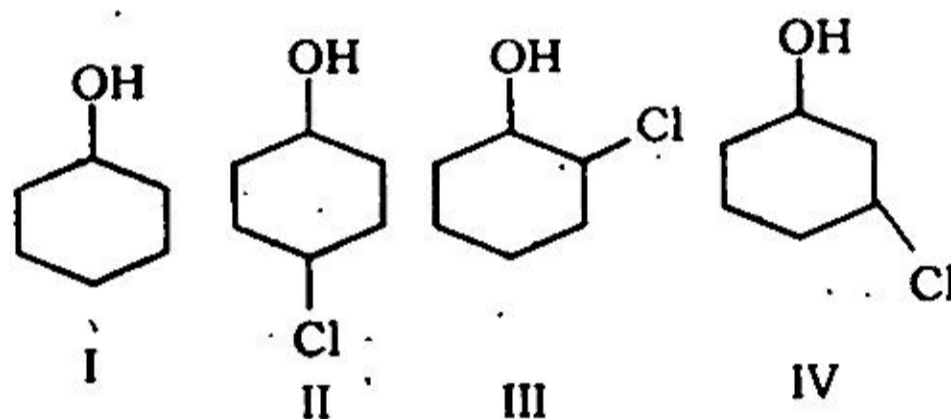


    Answer Codes :
    (1) I < II < III < IV            (2) I < II < IV < III
    (3) I < III < IV < II            (4) IV < I < III < II

79. The mechanism of chlorination of methane does **not** actually involve one of the following steps :

    (1) $Cl_2 \xrightarrow{h\nu} 2Cl\cdot$

    (2) $Cl\cdot + CH_4 \rightarrow HCl + CH_3\cdot$

    (3) $Cl\cdot + CH_4 \rightarrow CH_3Cl + H\cdot$

    (4) $CH_3\cdot + Cl_2 \rightarrow CH_3Cl + Cl\cdot$

**80.** In this transformation :

$$A \xrightarrow[\text{acetone}]{H_2O} CH_3CH_2\underset{\underset{OH}{|}}{C}(CH_3)_2$$

What is the best structure for **A** ?

(1)   $Br\ CH_2\ CH_2\ CH(CH_3)_2$

(2)   $CH_3\ CH_2\ \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}\ Br$

(3)   $CH_3\ CH_2\ \underset{\underset{CH_2Br}{|}}{CH}\ CH_3$

(4)   $CH_3\ \underset{\underset{Br}{|}}{CH}CH(CH_3)_2$

**81.** When methyl bromide is hydrolyzed using hydroxide ions, methanol and bromide ions are produced. What will be the rate of reaction if the concentration of methyl bromide is tripled and that of hydroxide ions is doubled ?

(1)   No change is reaction rate

(2)   Reaction rate is tripled

(3)   Reaction rate is doubled

(4)   Reaction rate is increased six-fold.

**82.** The major product in the reaction given below is :

$$CH_3CH_2{-}\underset{\underset{\oplus N(CH_3)I^{\ominus}}{|}}{CH}{-}CH_3 \xrightarrow[\triangle]{Ag_2O} (CH_3)_3N + \ ?$$
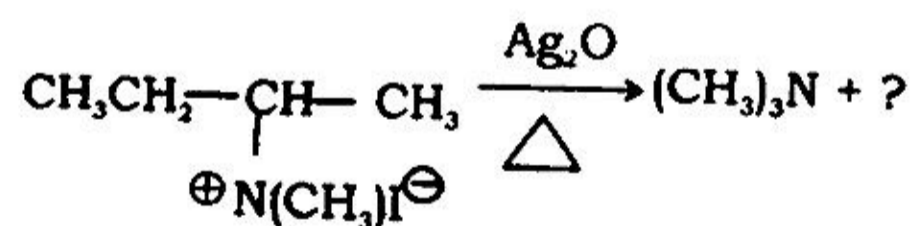
(1)   *trans* -2-butene

(2)   *cis*-2-butene

(3)   1-butene

(4)   2- Iodobutane

24

83. The number of isomeric olefins that result from the treatment of 2- bromopentane with NaOEt is :

(1) one            (2) two

(3) three        (4) four

84. Pyrrole is a much weaker base than pyrrolidine (azacyclopentane) for which of the following reasons :

(1) Pyrrole is aromatic

(2) Pyrrole is a Lewis acid

(3) The nitrogen in pyrrole is more electropositive than that in pyrrolidine.

(4) Pyrrolidine can give up the proton on the nitrogen atom more readily than can pyrrole

85. D-Glucose on tresatment with excess of phenyl-hydrazine followed by hydrolysis of the product with aqueous HCl gives :

(1) D- Gluco sazone       (2) D – Glucosamine

(3) D – Glutaric acid       (4) D – Glucosone

86. Quinoline is obtained by heating a mixture of aniline, nitrobenzene, glycerol, conc. Sulphuric acid and ferrous sulphate. One of the steps in the reaction involves oxidation. What is the oxidizing agent here ?

(1) $H_2SO_4$           (2) $C_6H_8NO_2$

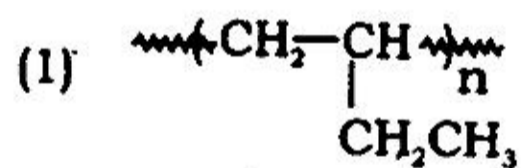(3) $FeSO_4$            (4) Glycerol

**87.** Epimers are a pair of diastereomeric aldoses that differ only in :

    (1)   configuration at C-1      (2)   configuration at C-2

    (3)   configuration at C-3      (4)   None of the above

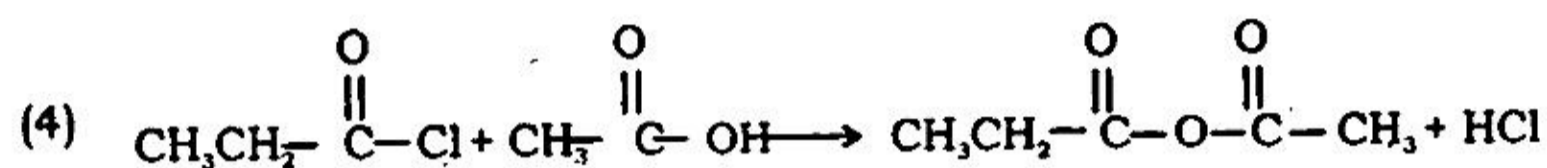**88.** Bakelite is formed by the condensation of :
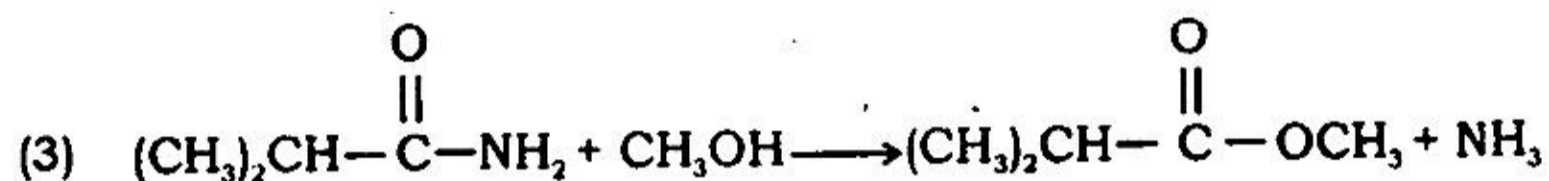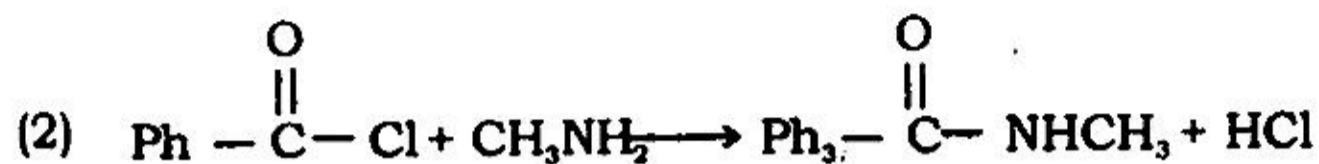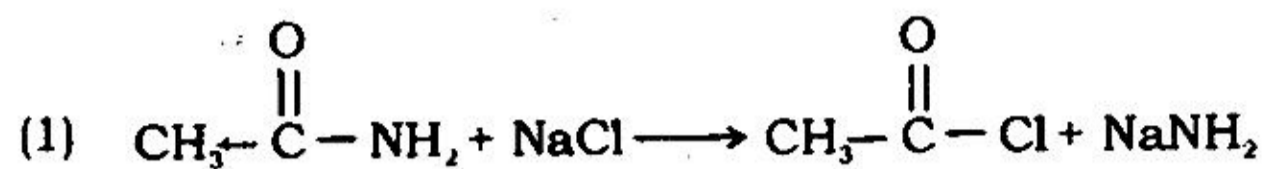
    (1)   Phenol and formaldehyde

    (2)   Phenol and acetaldehyde

    (3)   Urea and formaldehyde

    (4)   Formaldehyde and acetaldehyde

**89.** Like other oxygen-containing compounds, *n*-butyl *tert*-butyl ether dissolves in cold conc. $H_2SO_4$. On standing , an acid- insoluble layer, made up of high-boiling hydrocarbon material slowly separates from the solution. What this material is likely to be ?

    (1)   $\sim\!\!\left(\!CH_2\!\!-\!\!\underset{\underset{CH_2CH_3}{|}}{CH}\!\right)_n\!\!\sim$      (2)   $\sim\!\!\left(\!\underset{\underset{CH_3}{|}}{CH}\!\!-\!\!\underset{\underset{CH_3}{|}}{CH}\!\right)_n\!\!\sim$
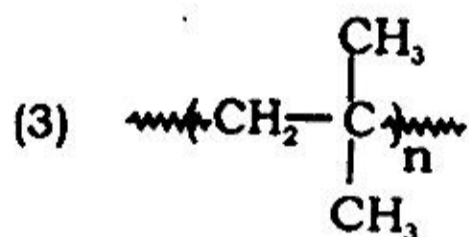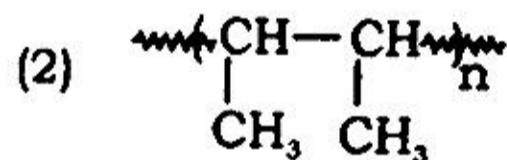
    (3)   $\sim\!\!\left(\!CH_2\!\!-\!\!\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}\!\right)_n\!\!\sim$      (4)   All of the above

90. Which of the following proposed reactions would take place quickly under mild conditions ?

(1) $CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - NH_2 + NaCl \longrightarrow CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - Cl + NaNH_2$

(2) $Ph - \overset{\displaystyle O}{\overset{\|}{C}} - Cl + CH_3NH_2 \longrightarrow Ph_3 - \overset{\displaystyle O}{\overset{\|}{C}} - NHCH_3 + HCl$

(3) $(CH_3)_2CH - \overset{\displaystyle O}{\overset{\|}{C}} - NH_2 + CH_3OH \longrightarrow (CH_3)_2CH - \overset{\displaystyle O}{\overset{\|}{C}} - OCH_3 + NH_3$

(4) $CH_3CH_2 - \overset{\displaystyle O}{\overset{\|}{C}} - Cl + CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - OH \longrightarrow CH_3CH_2 - \overset{\displaystyle O}{\overset{\|}{C}} - O - \overset{\displaystyle O}{\overset{\|}{C}} - CH_3 + HCl$

91. The reagent required to convert 3- hexyne into *trans*-3- hexene is :

(1) $H_2/Pt$

(2) $H_2$, Pd/BaSO$_4$, quinoline

(3) NaBH$_4$

(4) Na, NH$_3$(liquid)

92. Among the following statements about the nitration of aromatic compounds, the **false** one is :

(1) Nitration is an electrophilic substitution

(2) The rate of nitration of benzene is almost the same as that of hexadeuterobenzene

(3) The nitration of benzene is very much faster than that of hexadeuterobenzene

(4) The rate of nitration of toluene is greater than that of benzene.

**P.T.O.**

93. Which of the following has the most stable conjugate acid ?

(1) $(CH_3)_2NH$

(2) $(CH_3)_3N$

(3) $C_6H_5NH_2$

(4) $C_6H_5NHCH_3$

94. The conversion of ethyl methyl ketoxime to N-methyl propanamide represents an example of the following reaction :

(1) Beckmann rearrangement

(2) Hofmann rearrangement
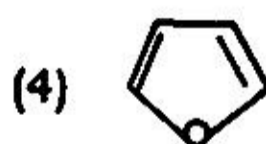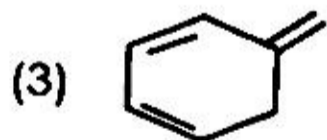
(3) Baeyer- Villiger oxidation

(4) Wolff rearrangement

95. How many moles of periodic acid are needed for the complete cleavage of one mole of Glucose into formaldehyde and formic acid ?

(1) three     (2) four     (3) five     (4) six

96. Which of the following compounds would **not** react with a dienophile in Diels- Alder reaction ?
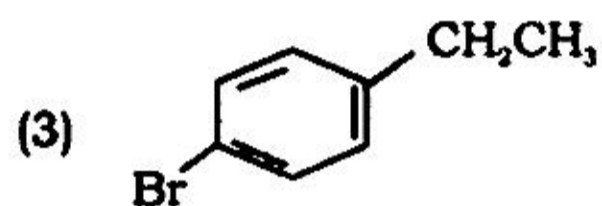
(1) Anthracene

(2) Phenanthrene

(3)

(4)

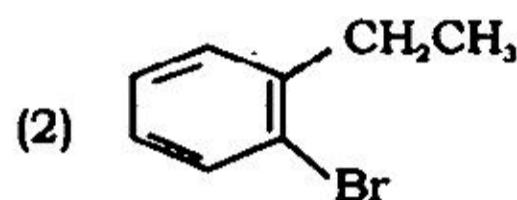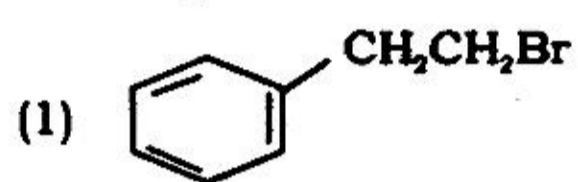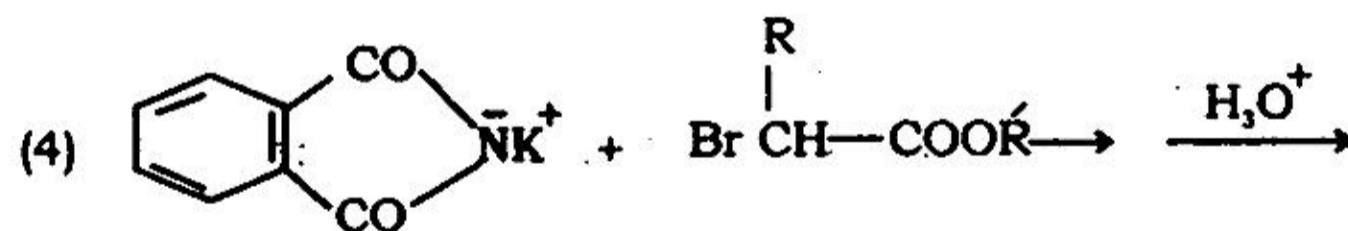28
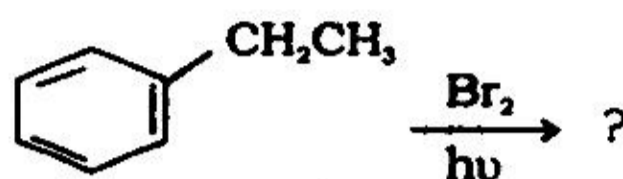
**97.** In the reaction :



The major product obtained is :

(1)  $CH_2CH_2Br$

(2)  $CH_2CH_3$, $Br$

(3)  $CH_2CH_3$, $Br$

(4)  $CHBrCH_3$
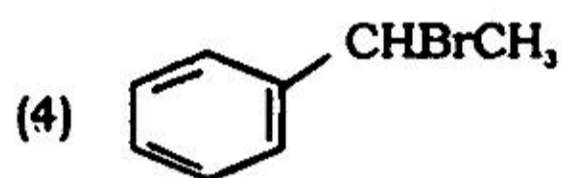
**98.** Which of the following reaction sequence represents the Strecker synthesis of an $\alpha$-aminoacid ?

(1) $RCH_2COOH \xrightarrow{Br_2/P} \xrightarrow{NH_3}$

(2) $R-\underset{\underset{O}{\|}}{C}-COOH \xrightarrow[H_2/Pt]{NH_3}$

(3) $RCHO \xrightarrow[NH_3]{CN^{\ominus}} \xrightarrow{H_3O^+}$

(4)  $\overset{-}{N}K^+$ + $Br\underset{\underset{}{}}{\overset{R}{C}}H-COOR \longrightarrow \xrightarrow{H_3O^+}$
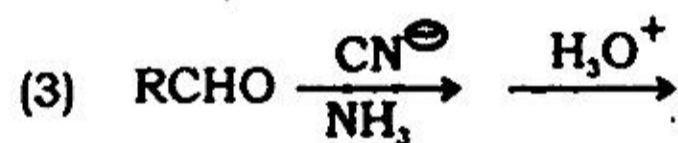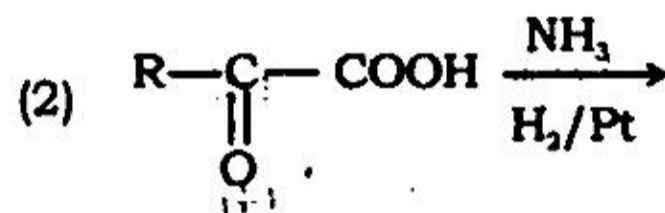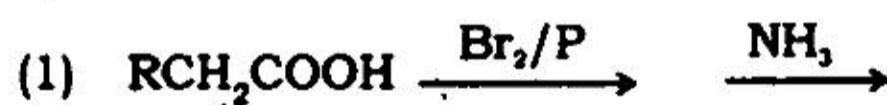
99. In the reaction : Glucose $\xrightarrow[{[O]}]{HNO_3}$ Q, the product Q is :

   (1) Glucuronic acid
   (2) Glucaric acid
   (3) Gluconic acid
   (4) Glyceric acid

100. For electrophilic substitution in benzene derivatives, which one of the following types of substituents is unknown ?

   (1) Activating and *m*-directing

   (2) Deactivating and *m*-directing

   (3) Activating and *o,p*-directing

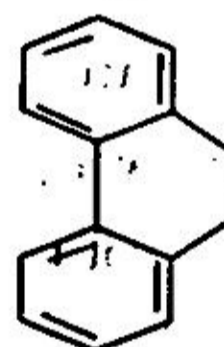   (4) Deactivating and *o,p*- directing

101. Arrange the following compounds in decreasing order of reactivity towards electrophiles :
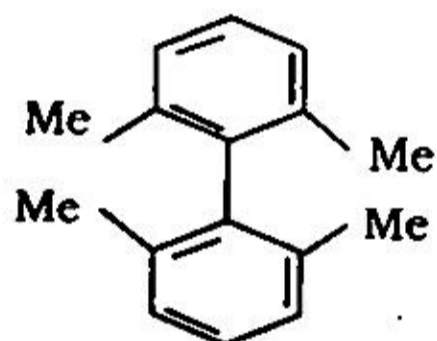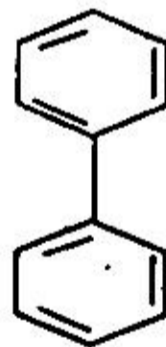


A        B        C

Answer codes :

   (1) A > B > C
   (2) B > A > C
   (3) B > C > A
   (4) C > B > A

30

102. Arrange the following compounds in order of decreasing ease of nucleophilic substitution reactions :

(I) 4- Nitrochlorobenzene

(II) 2,4 – Dinitrochlorobenzene

(III) 2,4,6- Trinitrochlorobenzene

(IV) Benzyl chooride

Answer codes :

(1) IV > III > II > I

(2) I > II > III > IV

(3) III > II > I > IV

(4) III > IV > II > I

103. Which of the following statements does **not** fit in the criteria of E2 reactions ?

(1) follow second order kinetics

(2) are accompanied by rearrangements

(3) show a large deuterium isotope effect

(4) do not undergo hydrogen deuterium exchange

104. Pyridine undergoes electrophilic substitution with fuming $H_2SO_4$ at elevated temperature to give :

(1) Pyridine -2- sulphonic acid

(2) Pyridine -4- sulphonic acid

(3) Pyridine -3- sulphonic acid

(4) All of the above

**P.T.O.**

105. Which one of the following would clearly prove the configuration of cis-3-hexene from trans-3-hexene ?

    (1)   Boiling point         (2)   Rate of hydrogenation

    (3)   Infrared spectrum      (4)   Dipole moment

106. The reagent used in N-terminal analysis of peptides by Sanger's method is :

    (1)   Phenyl isothiocyanate    (2)   Benzyl chloroformate

    (3)   2, 4-Dinitrofluorobenzene   (4)   Ninhydrin

107. Teflon is obtained by polymerization of the monomer :

    (1)   $CH_2 = CF_2$         (2)   $H_2C = C(CH_3) COOMe$

    (3)   $CH_2 = CHF$         (4)   $CF_2 = CF_2$

108. Which one of the following statements is **true** about the $\beta D(t)$ glucopyranose conformer ?

    (1)   One OH group is axial but all remaining substituents are equatorial

    (2)   The $CH_2OH$ group is axial but all remaining substituents are equatorial

    (3)   All groups are axial

    (4)   ALl groups are equatorial

109. But-2- ene reacts with $CHCl_3$ in the presence of potassium tert-butoxide to give :

(1) 1,1- dichloro -2, 3- dimethylcyclopropane

(2) 2, 3-dichlorobutane

(3) 2-Chlorobutane

(4) 1-Chlorobutane

110. Consider the following statements about conformational isomers :

(I) They are interconverted by rotation about single bond

(II) The energy barrier separating them is less than 15 K cal/mole

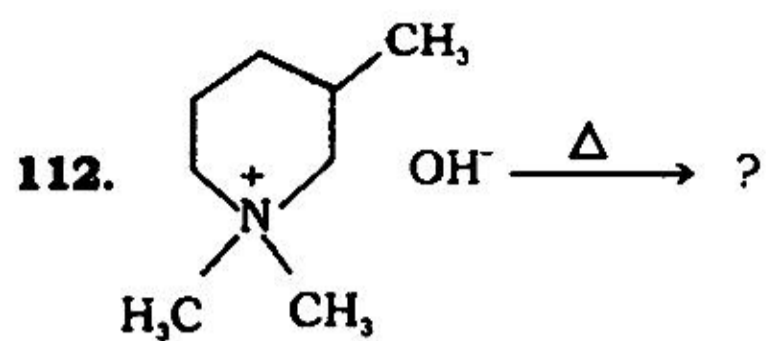(III) They are best represented by means of Fisher projection formulae.

Of these statements :

(1) I, II and III are correct

(2) I and II are correct

(3) II and III are correct

(4) I and III are correct

111. Which one of the following on reaction with phthalic anhydride in the presence of conc. $H_2SO_4$ gives Fluorescein ?

(1) Catechol

(2) Phenol

(3) Resorcinol

(4) Hydroquinone

P.T.O.

**112.**



The major product in the above reaction will be :

(1) 

(2) 

(3) 

(4) 
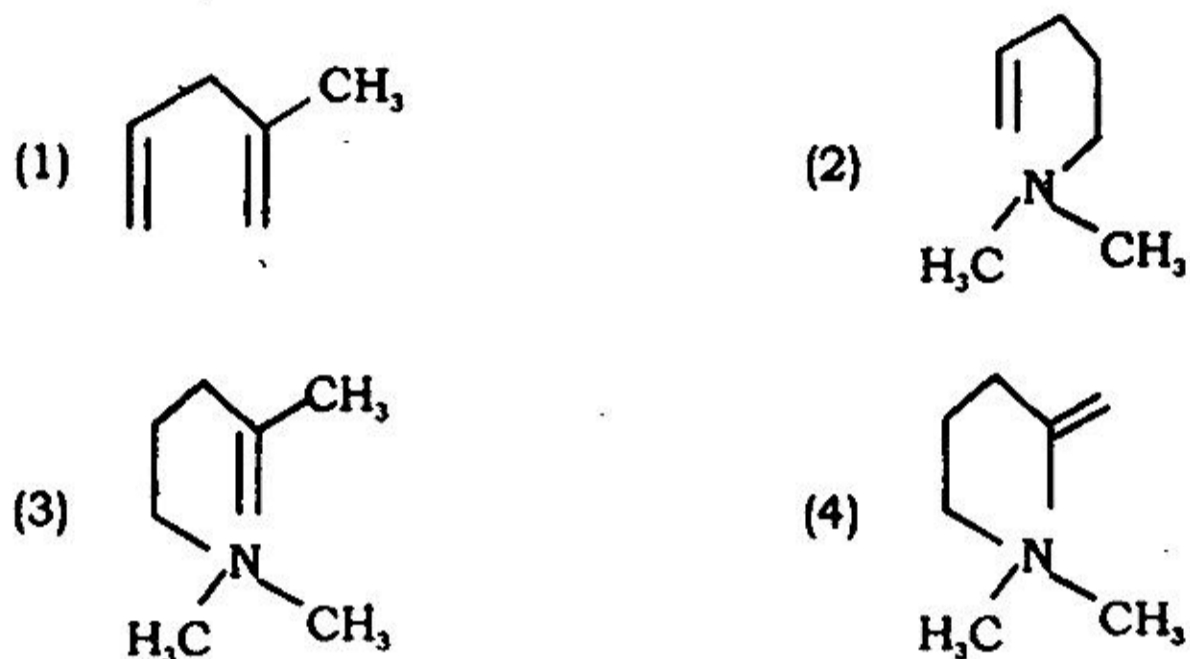
**113.** Disproportionation of benzaldehyde in the presence of concentrated aqueous alkali gives benzoate anion and benzyl alcohol. The reaction involves a :

(1) proton transfer from water

(2) hydride transfer from water

(3) proton transfer from aldehyde

(4) hydride transfer from aldehyde

114. The probability of finding a molecule with a speed between C and $(C+1)$ m.s$^{-1}$ at high values of C :

    (1)   falls off as C$^{-1}$

    (2)   falls off as -Log C

    (3)   falls off as exp $(-C^2)$

    (4)   rises as C$^2$

115. Liquid He boils at about $-269°C$ and liquid H$_2$ boils at about $-253°C$ The efficiency of a reversible engine operating between heat reservoirs at these temperatures :

    (1)  20%    (2)  80%    (3)  10%    (4)  90%

116. For Ne, HF, H$_2$O, maximum entropy is lprepossessed by :

    (1)  Ne               (2)  HF

    (3)  H$_2$O           (4)  H$_2$O and Ne

117. The condition of equilibrium for a transformation at constant temperature is :

    (1)  $\Delta S = 0$             (2)  $\Delta A + W = 0$

    (3)  $\Delta A = 0$            (4)  $\Delta G + W = 0$

**P.T.O.**

118. The chemical potential of a component, $\mu_i$ in a given mixture is :

(1) $\left(\dfrac{\partial G}{\partial n_i}\right)_{T, V, n_j}$

(2) $\left(\dfrac{\partial G}{\partial n_i}\right)_{T, P, n_j}$

(3) $\left(\dfrac{\partial G}{\partial n_i}\right)_{T, P, n_j}$

(4) $\left(\dfrac{\partial G}{n_i}\right)$

119. For an ideal solution, the osmotic pressure is proportional to :

(1) $-\ln x_1$ (solvent mole fraction )

(2) $\ln x_2$ (solute mole fraction)

(3) $x_2$

(4) c (solute concentration)

120. The Debye – Hickel limiting law relates :

(1) $\gamma_\pm$ with I

(2) $\gamma_\pm$ with $\sqrt{I}$

(3) $\ln \gamma_\pm$ with I

(4) $\ln \gamma_\pm$ with $\sqrt{I}$

121. The potential of the $Ag^+ \mid Ag$ electrode ($E^\circ = 0.799V$) in a saturated solution of AgI ($K_{sp} = 10^{-16}$ :

(1) 1.279 V

(2) 0.319 V

(3) −1.279 V

(4) −0.319 V

36

122. The ratio of $\Delta G°$ to $\Delta H°$ for reactions in lead acid cell is 1.36.

The extra 36% is the energy that :

    (1) flows as $P\Delta V$ into the system

    (2) flows in as $T\Delta S°$ from the surrounding

    (3) flows as $T\Delta S°$ from the system

    (4) flows out as Qrev into the surrounding

123. $N_2$ is adsorbed on iron at –190°C, but not at room temperature. How ever at ~500°C, again it adsorbs . The observation on two adsorbtions may be ascrubed to :

    (1) absorption and adsorption

    (2) chemisorptions and physisorption

    (3) physisorption and chemisorption

    (4) both same types of adsorption

124. The energy of repulsion for molecules varies with distance as $r^{-n}$. The commonest value of n is :

    (1) 12        (2) 6        (3) 2        (4) 1

P.T.O.

125. The coefficient of diffusion does not proportional to :

(1) mean free path  (2) mean velocity

(3) $(MW)^{-1}$  (4) $(MW)^{-1/2}$

126. The molar conductance of an 1 : 1 electrolyte at concentration below as $10^{-2}$ and lower :

(1) increases with concentration as C

(2) decreases with concentration as C

(3) remain constant

(4) falls off as $\sqrt{C}$

127. Consider an electron in a box of the size of an atom, $10^{-10}$ m. By what factor its ground state energy would change, if the particle gets confined in a box of the size of a nucleus, $10^{-14}$ m ?

(1) $10^4$  (2) $10^{-4}$  (3) $10^8$  (4) $10^{-8}$

128. The function $f(x) = 3x^2 - 1$ is an eigen function of the operation, $-(1-x^2)\left(\dfrac{d^2}{dx^2}\right) + 2x\left(\dfrac{d}{dx}\right)$.

The eigen value is :

(1) 2  (2) 6  (3) –6  (4) –2

38

129. For a system described by $\hat{H}\psi_n = E_n\psi_n$, the value of the $\int_{-\infty}^{\infty}\psi_{10}^*\psi_{12}\,\partial T$ is

   (1)  $\infty$

   (2)  any finite number

   (3)  1

   (4)  zero

130. A substance decomposes with a half life of 150000s when its initial concentration 0.01 mol. $L^{-1}$ but with a half life of 29000s when the initial concentration is 0.05 mol.$L^{-1}$

   The order of the reaction is :

   (1)  Zero     (2)  3/2     (3)  2     (4)  3

131. From the overpotential ($\eta$) vs log $|i|$ (current density), one can evaluate at high enough $\eta$ for a given electrodic process :

   (1)  $\alpha$

   (2)  $i_o$ only

   (3)  $\alpha$ and $i_o$ both

   (4)  Z only

132. For the particle in a cubic box, the degree of degeneracy of the energy levels with the value of $\dfrac{8ma^2 E}{4^2}$ as 14 is :

   (1)  2     (2)  3     (3)  6     (4)  18

**P.T.O.**

133. The IR absorption spectrum of HCl has its strongest band at 86.5 THz. The frequency of the strongest IR band of DCl will be :

(1) 86.5 THz

(2) 62.0 THz

(3) 43.3 THz

(4) 121.1 THz

134. For which hydrogen atom state, $\psi$ is zero at the nucleus ?

(1) 2s

(2) 2p

(3) 3p

(4) 3d

135. The third lowest microwave absorption frequency for $^{13}C\ ^{16}O$ is 330567 MHz. The second lowest absorption frequency for $^{12}C\ ^{16}O$ should be at :

(1) 22 0378 MHz

(2) 230542 MHz

(3) 345813 MHz

(4) 205032 MHz

136. NMR experiment can not be done with :

(1) $^2H_1$　　　(2) $^1n_0$　　　(3) $^3He_2$　　　(4) $^4H_2$

40

137. The land distance in $D_2$ can be determined using :

(1) rovibronic spectroscopy      (2) rovibrational spectroscopy

(3) pure rotation spectroscopy      (4) nmr spectroscopy

138. The Duhem- Margules equation for a liquid solution is applicable when :

(1) the solution is strictly ideal

(2) the vapour is ideal only

(3) the solution and the vapour are both ideal only

(4) the solution and the vapour need not be ideal

139. Among the following electrolytes, which one at $5 \times 10^{-3}$ M concentration would have the lowest activity coefficient ?

(1) Na Br      (2) Ca Cl$_2$      (3) KI      (4) HCl

140. The ratio of translational partition function of $D_2$ to that of $H_2$ is

(1) 2 : 1      (2) 2.8 : 1

(3) 1.4 : 1      (4) 4 : 1

141. Which one among the following diatomic molecules has the highest characteristic rotational temperature ?

(1) $H_2$       (2)  HCl       (3)  HBr       (4)  HI

142. The equation, $d\mu_2 = -\dfrac{n_1}{n_2} d\mu_1$ is known as :

(1)  Duhem- Margules equation       (2)  Gibbs-Duhem equation

(3)  Gibbs equation                 (4)  Maxwell's equation

143. Which one is **not** the criterion for spontaneous change ?

(1)  $dG_{P,T} < 0$                (2)  $dA_{V,T} < 0$

(3)  $dS > 0$                      (4)  $\sum dS > 0$

144. The equation that correlates adsorption with variation of surface tension with concentraction :

(1)  Langmuir's adsorption isotherm

(2)  Freundlich adsorption isotherm

(3)  Gibbs adsorption isotherm

(4)  Hinshelwood  adsorption isotherm

145. Which of the following is **not** the characteristic of an ideal solution ?

    (1)    $\bar{H}_i = \bar{H}_i^0$

    (2)    $\bar{V}_i = \bar{V}_i^0$

    (3)    $\bar{G}_i = \bar{G}_i^0 + RT \ln N_i$

    (4)    $\bar{S}_i = \bar{S}_i^0 + R \ln N_i$

146. How many years would be required for the activity of Zn-65 (half life, 245 days ) to reduce to 5% of its initial value ?

    (1)    13.4 years              (2)   2.7 years

    (3)    3.6 years               (4)   2.9 years

147. If the activation energy for $H_2 + I_2 \rightarrow 2HI$ is 167 kJ and enthalpy of the reaction is –8 kJ, what is the activation energy for the decomposition of HI ?
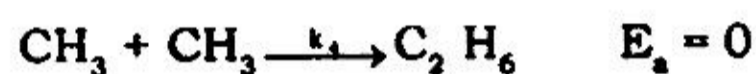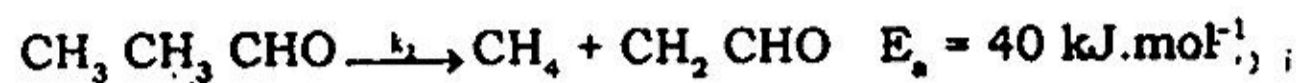
    (1)    159 kJ                 (2)   175 kJ

    (3)    167 kJ                 (4)   179 kJ

148. Consider the following mechanism for the thermal decomposition of acetaldehyde :

$$CH_3 CHO \xrightarrow{k_1} CH_3 + CHO \quad E_a = 320 \text{ kJ.mol}^{-1}$$

$$CH_3 CH_3 CHO \xrightarrow{k_2} CH_4 + CH_2 CHO \quad E_a = 40 \text{ kJ.mol}^{-1}$$

$$CH_2 CHO \xrightarrow{k_3} CO + CH_3 \quad E_a = 75 \text{ kJ.mol}^{-1}$$

$$CH_3 + CH_3 \xrightarrow{k_4} C_2 H_6 \quad E_a = 0$$

The overall rate constant for the formation of $CH_4$ is given by $k = k_2 \left(\dfrac{k_1}{k_2}\right)^{1/2}$ .

The overall activation energy :

(1)   435 kJ.mol$^{-1}$

(2)   320 kJ.mol$^{-1}$

(3)   0

(4)   200 kJ.mol$^{-1}$

149. In course of a chemical reaction, its free energy changes as :

(1)   $dG = - SdT + Vdp$

(2)   $dG = - SdT + Vdp + \sum_i \mu_i\, dn_i$

(3)   $dG = - SdT + Vdp + \sum_i n_i\, d\mu_i$

(4)   $dG = -SdT - pdV + \sum_i \mu_i\, dn_i$

**150.** Langmuir adsorption isotherm does **not** apply when :

(1)   adsorption is chemisorption

(2)   adsorption layer is monolayer

(3)   heat of adsorption is independent of surface coverage

(4)   heat of adsorption decreases with surface coverage

ROUGH WORK
रफ़ कार्य

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ROUGH WORK

रफ़ कार्य

# अभ्यर्थियों के लिए निर्देश

*(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर*
*केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)*

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।

2. परीक्षा भवन में *लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,* लिखा या सादा कोई भी खुला कागज साथ में न लायें।

3. *उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जाबेगा।*

4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।

5. *उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।*

6. *ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।*

7. *उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा वह एक अनुचित साधन का प्रयोग माना जायेगा।*

8. *प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।*

9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।

10. *ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।*

11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।

12. परीक्षा के उपरान्त केवल *ओ एम आर उत्तर-पत्र* परीक्षा भवन में जमा कर दें।

13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।

14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।