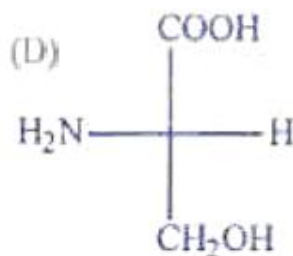
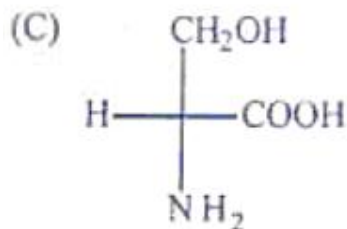
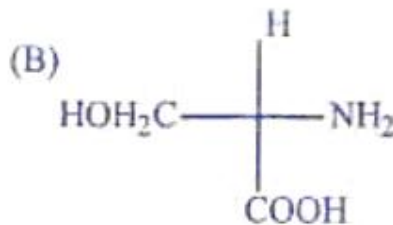
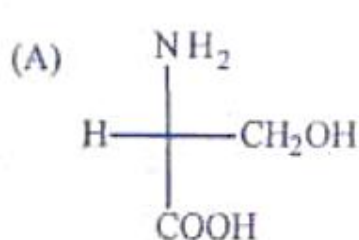


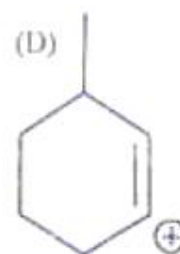
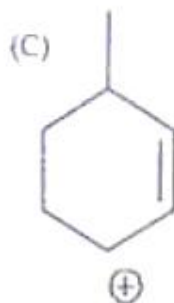
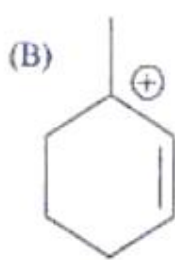
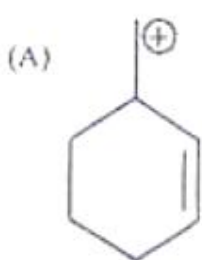
**INDIAN ASSOCIATION OF PHYSICS TEACHERS
NATIONAL STANDARD EXAMINATION IN CHEMISTRY 2014-15**

Q.P Code C – 244

1. Serine($\text{HOCH}_2\text{CH}(\text{NH}_2)\text{COOH}$) is an essential amino acid. The correct Fischer projection of serine is



2. The complex having zero crystal field stabilization energy is
 (A) $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$
 (C) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
3. Solubility products of silver chlorides and silver thiocyanate are 12×10^{-10} and 7.1×10^{-13} respectively. The equilibrium constant for the reaction
 $\text{AgCl}(\text{s}) + \text{CNS}^{-1}(\text{aq}) \ll \text{AgCNS}(\text{s}) + \text{Cl}^{-1}(\text{aq})$ is
 (A) 0.0625 (B) 169
 (C) 13 (D) 1.40×10^{-4}
4. I. $5\text{H}_2\text{O}_2 + 2\text{MnO}_4^- + 6\text{H}^+ \longrightarrow 2\text{Mn}^{2+} + 5\text{O}_2 + 8\text{H}_2\text{O}$
 II. $\text{H}_2\text{O}_2 + \text{Ag}_2\text{O} \longrightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2$
 The role of hydrogen peroxide in the above reaction is
 (A) oxidizing in I and reducing in II (B) reducing in I and oxidizing in II
 (C) reducing in I as well as in II (D) oxidizing in I as well as in II
5. The most stable carbocation is

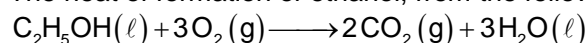


6. Helium can be singly ionized by losing one electron to become the He^+ cation. Which of the following statements is true concerning this helium cation?
- (A) The line spectrum of this helium cation will resemble the line spectrum of a hydrogen atom.
 (B) The line spectrum of this helium cation will resemble the line spectrum of a lithium cation.
 (C) The line spectrum of this helium cation will remain the same as for unionized helium.
 (D) The line spectrum of this helium cation will resemble the line spectrum of a hydrogen ion.

7. Of the following, the ion with the largest size is
- (A) O^{2-} (B) Na^+
 (C) F^- (D) Al^{3+}

8. The colourless salt that gives white precipitate with BaCl_2 in aqueous HCl is
- (A) K_2SO_4 (B) K_2SO_3
 (C) KNO_3 (D) KBr

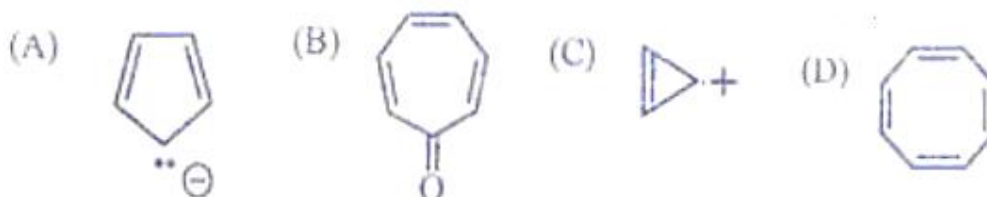
9. The heat of formation of ethanol, from the following data is



$$\Delta H_f \text{CO}_2(\text{g}) = -393.5 \text{ kJ/mol}; \quad \Delta H_f \text{H}_2\text{O}(\ell) = -286 \text{ kJ/mol}$$

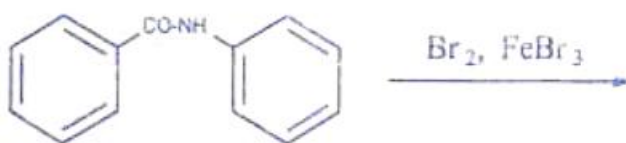
- (A) -277 kJ/mol (B) -1260.5 kJ/mol
 (C) -688.5 kJ/mol (D) -3013 kJ/mol
10. Osmotic pressure of a 2% w/v solution of glucose is same as 5% w/v solution of a nonvolatile non-electrolyte solute. The molar mass of the solute is
- (A) 180 (B) 450
 (C) 72 (D) 45
11. 50 g of sucrose is hydrolysed to a mixture of glucose and fructose. Sucrose is dextrorotary, however the mixture formed is laevorotary. This is because
- (A) more amount of β -D-fructose is formed than that of β -D-glucose
 (B) β -D-glucose undergoes inversion of configuration
 (C) β -D-fructose and β -D-glucose undergo inversion of their α -anomers
 (D) laevorotation of β -D-fructose is more than dextrorotation of β -D-glucose

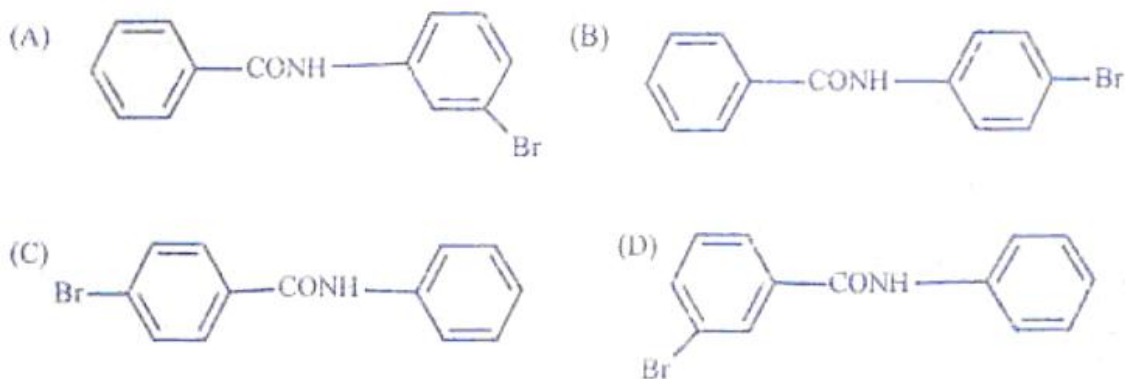
12. Among the following compounds that is not aromatic is

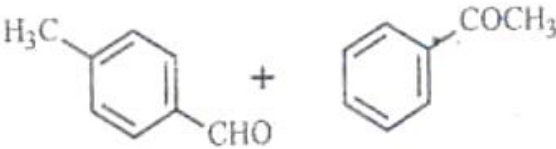
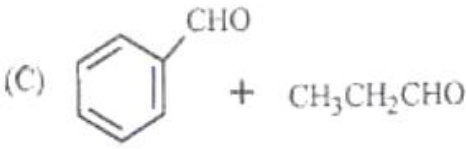


13. The magnetic moment of a divalent ion of an element with atomic number 24 in an aqueous solution is
- (A) 4.90 BM (B) 2.45 BM
 (C) 2.83 BM (D) 1.73 BM

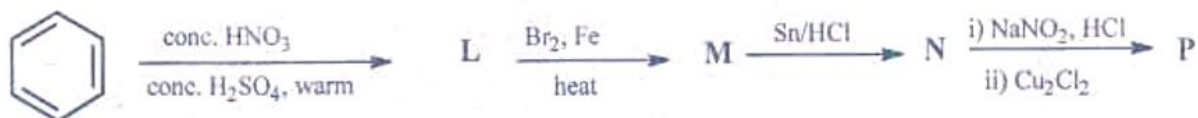
14. The major product of the following reaction is





15. The correct order of stability for the following species is
 (A) $\text{Li}_2 < \text{He}_2^+ < \text{O}_2^+ < \text{C}_2$ (B) $\text{C}_2 < \text{O}_2^+ < \text{Li}_2 < \text{He}_2^+$
 (C) $\text{He}_2^+ < \text{Li}_2 < \text{C}_2 < \text{O}_2^+$ (D) $\text{O}_2^+ < \text{C}_2 < \text{Li}_2 < \text{He}_2^+$
16. The colligative property used in the determination of molar mass of a polymer is
 (A) lowering of the vapour pressure (B) elevation in the boiling point
 (C) depression in the freezing point (D) osmotic pressure
17. From the following the species that are isoelectronic are
 (i) NH_3^+ (ii) CH_3^+ (iii) NH_2^- (iv) NH_4^+
 (A) I, II, III (B) II, III, IV
 (C) I, II, IV (D) I, III, IV
18. The pair of equimolar compounds that would give a single condensation product when treated with an alkali is
 (A) $\text{CH}_3\text{CHO} + \text{CH}_3\text{CH}_2\text{CHO}$ (B) 
 (C)  (D) $\text{CH}_3\text{CHO} + \text{HCHO}$
19. In electrophoresis
 (A) the colloidal particles migrate in an applied electric field
 (B) the medium migrates in an applied electric field
 (C) both colloidal particles and the medium migrate
 (D) neither the particles nor the medium migrate
20. When a person suffers from typhoid, the metabolic process stimulated in the body to fight against this disease is synthesis of
 (A) Lipid (B) Carbohydrate
 (C) Protein (D) DNA
21. If a weak base has the dissociation constant, K_b , then the value of the dissociation constant, K_a , of its conjugate acid is given by
 (A) $1/K_b$ (B) K_w/K_b
 (C) K_b/K_w (D) $K_w K_b$

22. The product P obtained through the following sequence of reactions is

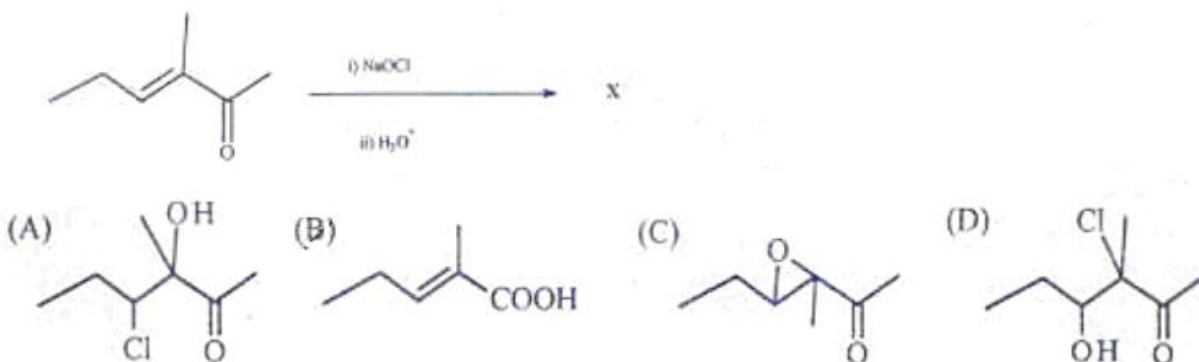


- (A) 3-chloroaniline (B) 4-bromochlorobenzene
(C) 3-bromochlorobenzene (D) 3-bromoaniline

23. Real gases behave ideally at
(A) low pressure and low temperature (B) high pressure and low temperature
(C) low pressure and high temperature (D) high pressure and high temperature

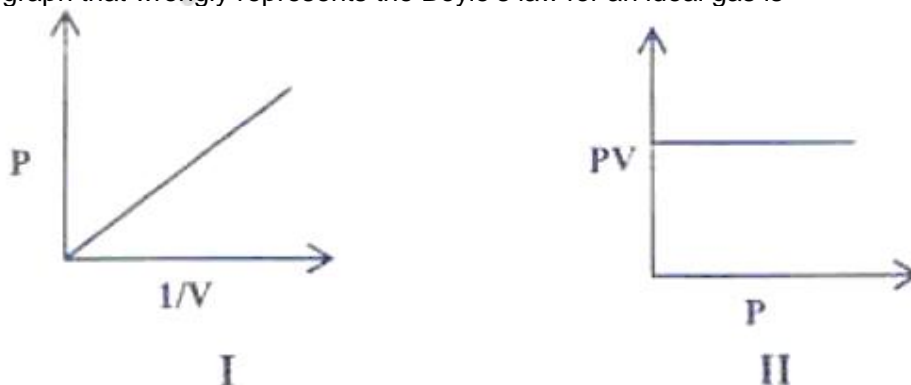
24. In the cyanide extraction process of silver from Argentite ore, the oxidizing and the reducing agents used as respectively
(A) O₂ and CO (B) O₂ and Zn dust
(C) HNO₃ and Zn dust (D) HNO₃ and CO

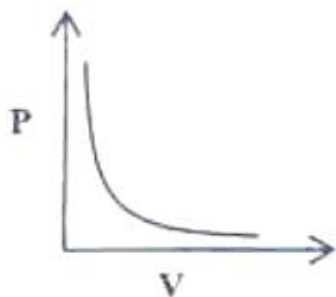
25. The main product X formed in the following reactions is



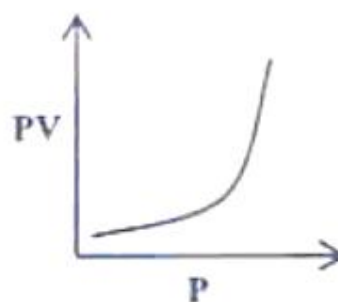
26. Out of the following metal extraction processes, those in which carbon-based reduction methods are not used are
(I) Sn from SnO₂ (II) Fe from Fe₂O₃
(III) Al from Al₂O₃ (IV) Mg from MgCO₃.CaCO₃
(A) I and IV (B) II and III
(C) III and IV (D) II and IV

27. The graph that wrongly represents the Boyle's law for an ideal gas is





III

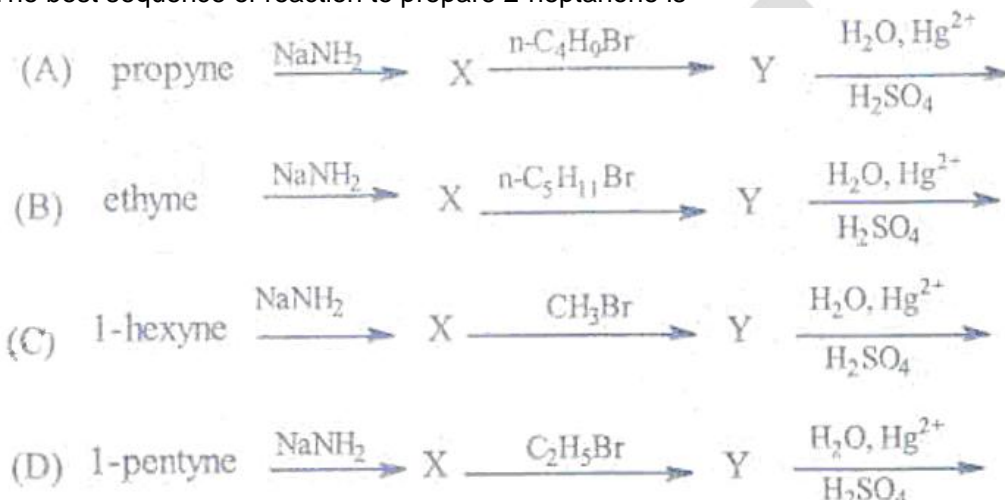


IV

- (A) II
(C) IV

- (B) I
(D) III

28. The best sequence of reaction to prepare 2-heptanone is



29. Approximate numbers of moles of hydrogen atoms is 1.006×10^{23} molecules of diethyl ether are
(A) 0.16 (B) 6
(C) 1.67 (D) 3
30. Upon long standing, concentrated HNO_3
(A) remains colourless, but gives out NO
(B) turns yellow brown due to formation of NO_2
(C) turns yellow brown due to the formation of N_2O_4
(D) remains colourless, but gives N_2O
31. The sugars that are produced on hydrolysis of DNA and RNA are
(A) epimers (B) two different sugars
(C) positional isomers (D) diastereomers
32. When a nucleophile attacks a carbonyl group to form an intermediate, the hybridization of the carbon atom changes from
(A) sp^3 to sp^2 (B) sp^2 to sp
(C) sp to sp^2 (D) sp^2 to sp^3
33. Aluminium carbide (Al_4C_3) liberates methane on treatment with water. The grams of aluminium carbide required to produce 11.2 L of methane under STP conditions is
[Given Al = 27]
(A) 48 (B) 72

(C) 144

(D) 24

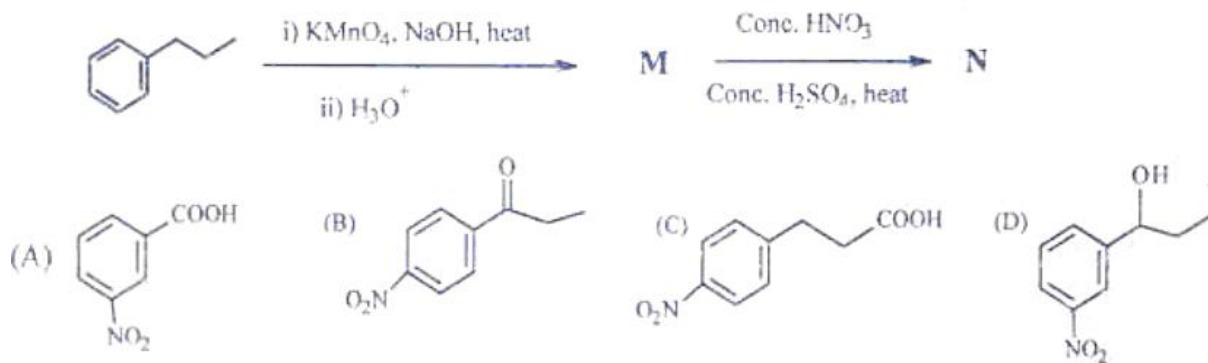
34. The correct statement for crystalline CsI_3 is
(A) it contains Cs^+ , I^- and molecular I_2 (B) it is a covalent compound
(C) it contains Cs^+ and I_3^- (D) it contains Cs^{3+} and I^-

35. The product X formed in the following reaction is
 $\text{C}_6\text{H}_5\text{MgBr} + \text{CH}_3\text{OH} \rightarrow \text{X}$
(A) benzene (B) methoxybenzene
(C) phenol (D) toluene

36. Ionic salt AX grows in face centered cubic lattice with cell length 'a'. The ratio $r_{\text{A}^+} / r_{\text{X}^-}$ for this salt will be :
(A) 0.155 (B) 0.225
(C) 0.414 (D) 0.732

37. The hybridization of boron in the stable borane having the lowest molecular weight is –
(A) sp^2 (B) sp^3
(C) sp (D) sp^3d

38. The product 'N' of the following reaction is



39. The specific gravity of a HNO_3 solution is 1.42 and it is 70% w/w. The molar concentration of HNO_3 is
(A) 15.8 (B) 31.6
(C) 11.1 (D) 14.2

40. Bleaching powder contains a salt of an oxoacid as one of its components. The anhydride of that acid is
(A) Cl_2O (B) Cl_2O_7
(C) ClO_2 (D) Cl_2O_6

41. $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{CH}_3)_2 + \text{CH}_3\text{COCl} \xrightarrow{\text{base}} \text{CH}_3\text{CH}_2\text{CH}(\text{OCOCH}_3)\text{CH}(\text{CH}_3)_2 + \text{HCl}$
In the above reaction, if the reactant alcohol is a pure R-isomer, the product would
(A) have configuration inverted at the chiral atom
(B) be a racemic mixture
(C) have the same configuration at the chiral atom
(D) be optically inactive

42. The unit cell of a compound made up of the three elements X, Y and Z is given below

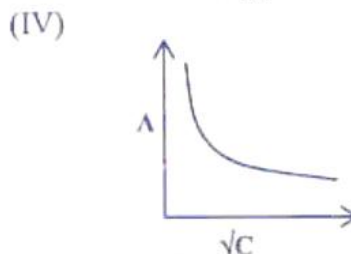
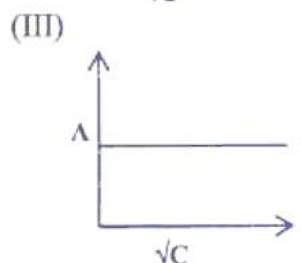
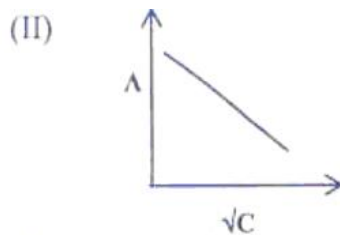
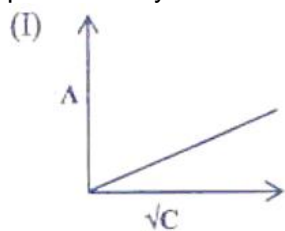


The formula of this compound is :

- (A) X_2YZ_3 (B) XY_3Z
 (C) XYZ_3 (D) X_3YZ_2
43. N_2 gas stored in a cylinder, fixed with a movable piston, undergoes adiabatic expansion. The statement that is true for the given situation is
 (A) $q = w$ (B) $\Delta U = w$
 (C) $\Delta U = 0$ (D) $\Delta U = q$
44. For the following cell at 25°C the E.M.F. is, (if $E_{M^{2+}/M}^\circ = 0.347\text{V}$)
 $M_{(s)} | M^{2+} (1M) || M^{2+} (0.01M) | M_{(s)}$
 (A) 0.089V (B) 0.598V
 (C) 0.251V (D) 0.764V
45. Which of the following hydrogen halides react with AgNO_3 to give a precipitate that dissolves in hypo solution?
 (I) HCl (II) HF (III) HI (IV) HBr
 (A) (III), (I), (II) (B) (I), (III), (IV)
 (C) (IV), (II), (I) (D) (II), (IV), (III)
46. The correct order of dipole moment for the following molecules is

 (A) $IV > I > III > II$ (B) $I > IV > III > II$
 (C) $III > I > II > IV$ (D) $II > III > IV > I$
47. The compound that is most reactive with alcoholic KOH is
 (A) $\text{CH}_2 = \text{CH}-\text{Br}$ (B) $\text{CH}_3\text{CH}_2\text{Br}$
 (C) $(\text{CH}_3)_2\text{CH}-\text{Br}$ (D) $\text{CH}_3\text{COCH}_2\text{CH}_2\text{Br}$
48. The enthalpy of vaporization of benzene is $+35.3 \text{ kJ/mol}$ at its boiling point of 80°C . The entropy change in the transition of vapour to liquid at its boiling point is
 (A) -100 (B) $+100$
 (C) $+342$ (D) -342

49. For a strong electrolyte, the change in the molar conductance with concentration is represented by

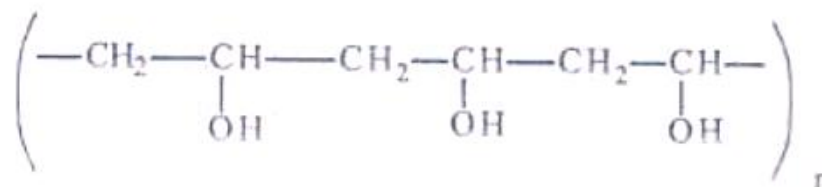


- (A) I
(C) III
- (B) II
(D) IV
50. The order of basicity is
(I) Ph-CONH₂ (II) Ph-NH₂ (III) Ph-CH₂-NH₂ (IV) p-OCH₃Ph-NH₂
(A) II > IV > I > III
(C) III > IV > II > I
- (B) III > II > IV > I
(D) I > II > IV > III

51. The specific conductance of 0.01M solution of the weak monobasic acid is $0.20 \times 10^{-3} \text{ S cm}^{-1}$. The dissociation constant of the acid is :
(Given: $\Lambda_0^{\text{HA}} = 400 \text{ S cm}^2 \text{ mol}^{-1}$)
(A) 5×10^{-2}
(C) 5×10^{-4}
- (B) 2.5×10^{-5}
(D) 2.5×10^{-11}

52. The set of quantum numbers that cannot be allotted to an electron in an atom is
(A) $n = 3, l = 2, m_l = +2, m_s = -1/2$
(C) $n = 1, l = 0, m_l = 0, m_s = +1/2$
- (B) $n = 2, l = 0, m_l = +1, m_s = +1/2$
(D) $n = 4, l = 3, m_l = 0, m_s = -1/2$

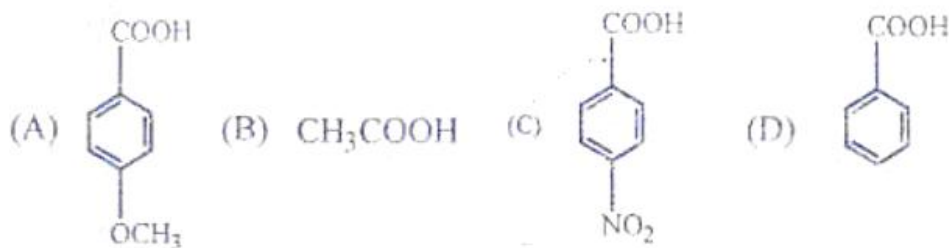
53. Polyvinyl alcohol is an important polymer. The structure is given below



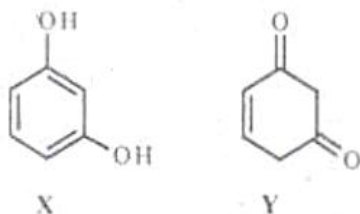
It is prepared by polymerization of

- (A) CH₂ = CH-OH
(C) CH₂ = CH-CN, followed by hydrolysis
- (B) CH₂ = CH-OCOCH₃, followed by hydrolysis
(D) CH₂ = CH-COOCH₃, followed by hydrolysis
54. For SF₄, the molecular geometry and hybridization of the central atom respectively are
(A) Square planar, sp²
(C) Seesaw, sp³d
- (B) Tetrahedral, sp³
(D) Square pyramid, sp³d
55. If the energy of an electron in the 1st and 2nd energy levels of an H atom are -13.6 eV and -3.4 eV, respectively, the energy required in eV to excite an electron from the 1st to the 2nd energy level is
(A) 17.0
(C) 10.2
- (B) -17.0
(D) -10.2

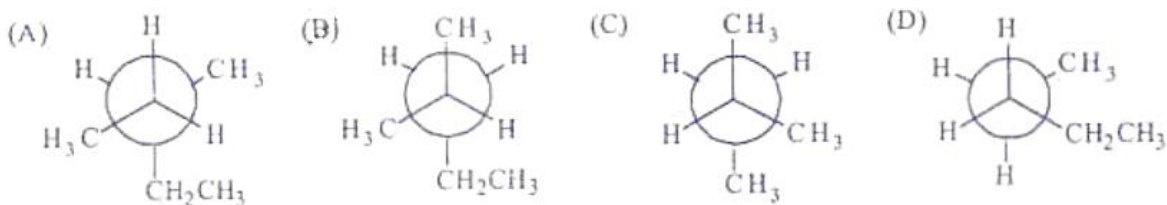
56. The pKa values of the acids A to D are found to be 4.19, 3.41, 4.46 and 4.76. The acid having pKa of 3.41 is



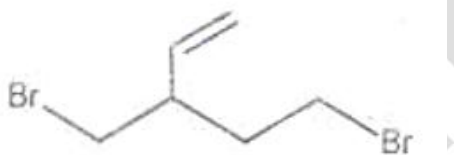
57. The reaction given below is the cell reaction in a galvanic cell.
 $\text{Cd(s)} + \text{Sn}^{2+}(\text{aq}) \rightarrow \text{Cd}^{2+}(\text{aq}) + \text{Sn(s)}$,
 Where, $[\text{Cd}^{2+}] = 0.1 \text{ M}$ and $[\text{Sn}^{2+}] = 0.025 \text{ M}$
 Given : $E_{\text{Cd}^{2+}/\text{Cd}}^0 = -0.403\text{V}$ $E_{\text{Sn}^{2+}/\text{Sn}}^0 = -0.136\text{V}$, $F = 96485 \text{ C mol}^{-1}$
 At 25°C , the free energy change for this reaction is
 (A) -48.05 KJ (B) -54.96 KJ
 (C) -100.58 KJ (D) -107.46 KJ
58. Triethylamine is reacted with a peracid to obtain X. The nitrogen atom in X has formal charge
 (A) 0 (B) +1
 (C) -1 (D) +2
59. The species that cannot exist is
 (A) SiF_6^{2-} (B) BF_6^{3-}
 (C) SF_6 (D) AlF_6^{3-}
60. The experimental observations for the following reaction are given below
 $\text{P} + \text{Q} \rightarrow \text{Product}$
- | [P] / M | [Q] / M | Initial Rate/mol s ⁻¹ |
|---------|---------|----------------------------------|
| 0.2 | 0.5 | 8×10^{-3} |
| 0.4 | 0.5 | 3.2×10^{-2} |
| 0.2 | 0.25 | 4×10^{-3} |
- The order of this reaction is
 (A) Zero (B) One
 (C) Two (D) Three
61. Absorbance of a chlorophyll solution measured at 660 nm at 25°C using a 1 cm cell was found to be 0.4. The same solution is heated up to 35°C and absorbance is measured once again under the same condition. The observed absorbance will be
 (A) 0.2 (B) 0.4
 (C) 0.6 (D) 0.8
62. The species which is unable to show disproportionation reaction is
 (A) ClO_3^- (B) ClO_4^-
 (C) ClO_2^- (D) ClO^-
63. At normal temperature, X and Y are



- (A) resonance structures (B) tautomers
 (C) functional isomers (D) positional isomers
64. The element X formed in the following nuclear reaction is
- $${}_{24}^{53}\text{Cr} + \frac{4}{2}\alpha \longrightarrow {}_0^1\text{n} + \text{X}$$
- (A) ${}_{26}^{56}\text{Fe}$ (B) ${}_{25}^{55}\text{Mn}$
 (C) ${}_{25}^{56}\text{Mn}$ (D) ${}_{26}^{55}\text{Fe}$
65. As a part of a diagnostic procedure for a thyroid disorder, a patient is given a certain amount of iodine-131. The half life of this radioactive iodine-131 is 8.0 days. The percent fraction of iodine-131 that will remain in the body after 32 days, if there is no elimination of iodine through the body is
- (A) 6.25 (B) 0.0625
 (C) 2.77 (D) 25
66. 1-Phenoxypropane is treated with excess of conc. HI at 0°C and the mixture of products is treated with thionyl chloride. The products formed are
- (A) n-propanol + Chlorobenzene (B) Phenol + n-propyl iodide
 (C) n-propyl chloride + Chlorobenzene (D) n-propyl chloride + Phenol
67. The compound which undergoes hydrolysis on just warming with water and forms the corresponding hydroxyl derivative is
- (A) 2, 4, 6-trinitrochlorobenzene (B) 2-chloro-1-butene
 (C) 2-chloro-2 methylbutane (D) 2, 4-dimethoxychlorobenzene
68. The pair of compounds that **will not** react with each other in an aqueous solution, at room temperature is
- (A) $\text{FeCl}_3, \text{SnCl}_2$ (B) $\text{HgCl}_2, \text{SnCl}_2$
 (C) $\text{FeCl}_2, \text{SnCl}_2$ (D) FeCl_3, KI
69. At 700 K, for the reaction $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \ll 2\text{SO}_3(\text{g})$ the K_P is 3.2×10^4 . At the same temperature the K_P for the reaction $\text{SO}_3(\text{g}) \ll \text{SO}_2(\text{g}) + 0.5\text{O}_2(\text{g})$ is
- (A) 3.125×10^{-5} (B) 5.59×10^{-3}
 (C) 1.79×10^4 (D) 1.79×10^{-2}
70. Amylose and cellulose are polymers of glucose in which glucose units are joined to each other respectively by linkages of the type
- (A) α, β (B) β, β
 (C) α, α (D) $\alpha\beta, \beta$
71. 2-methylpentan is



72. The molecule having the highest dipole moment is
 (A) CO_2 (B) CH_4
 (C) NH_3 (D) NF_3
73. Two samples A and B of an ideal gas, initially at same temperature and pressure, are compressed from V to $V/2$, isothermally for A and adiabatically for B. The final pressure of A will be
 (A) greater than that of B (B) less than that of B
 (C) twice that of B (D) equal to that at B
74. A nitrile X is treated with LiAlH_4 to obtain compound Y ($\text{C}_2\text{H}_7\text{N}$). In a separate reaction X is hydrolyzed in an acid medium to obtain Z. The product obtained after mixing Y and Z will be
 (A) $\text{CH}_3\text{CONHCH}_2\text{CH}_3$ (B) $\text{CH}_3\text{CH}_2\text{CONHCH}_2\text{CH}_3$
 (C) $(\text{CH}_3\text{COO}^-)(\text{CH}_3\text{CH}_2\text{NH}_3^+)$ (D) $(\text{CH}_3\text{CH}_2\text{COO}^-)(\text{CH}_3\text{NH}_3^+)$
75. pH of a saturated solution of magnesium hydroxide in water at 298 K is 10.5. The solubility of the hydroxide in water at 298 K is
 (A) $1.58 \times 10^{-4} \text{ mol L}^{-1}$ (B) $1.58 \times 10^{-11} \text{ mol L}^{-1}$
 (C) $3.16 \times 10^{-4} \text{ mol L}^{-1}$ (D) $9.98 \times 10^{-8} \text{ mol L}^{-1}$
76. The species which has triangular planar geometry is
 (A) NF_3 (B) NO_3^-
 (C) AlCl_3 (D) SbH_3
77. The order of acidity in aqueous solution for the following acids is
 (A) $\text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$ (B) $\text{H}_2\text{Se} < \text{H}_2\text{S} < \text{H}_2\text{Te}$
 (C) $\text{H}_2\text{Te} < \text{H}_2\text{S} < \text{H}_2\text{Se}$ (D) $\text{H}_2\text{Se} < \text{H}_2\text{Te} < \text{H}_2\text{S}$
78. The IUPAC name of the following compound is



- (A) 5-bromo-3-(bromomethyl)pent-1-ene (B) 3-(1-bromopropyl)-4-bromobut-1-ene
 (C) 1,4-dibromo-3-ethenylbutane (D) 1-bromo-3-(bromomethyl)but-4-ene
79. To a solution containing one mole $\text{MCl}_3 \cdot 4\text{NH}_3$, on addition of excess silver nitrate solution, it was found that two moles of AgCl are precipitated. This observation suggests that the secondary valence of M in this complex is
 (A) 3 (B) 5
 (C) 6 (D) 2
80. (i) chlorobenzene is mono-nitrated to M
 (ii) nitrobenzene is mono-chlorinated to N
 (iii) anisole is mono-nitrated to P
 (iv) 2-nitrochlorobenzene is mono-nitrated to Q
 Out of M, N, P and Q the compound that undergoes reaction with aq. NaOH fastest is
 (A) M (B) N
 (C) P (D) Q

**INDIAN ASSOCIATION OF PHYSICS TEACHERS
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Q.P Code C – 244**

ANSWERS

- | | | | |
|--|-------|-------|-------|
| 1. D | 2. B | 3. B | 4. C |
| 5. B | 6. A | 7. A | 8. A |
| 9. A | 10. B | 11. D | 12. D |
| 13. A | 14. B | 15. C | 16. D |
| 17. D | 18. D | 19. C | 20. C |
| 21. B | 22. C | 23. C | 24. B |
| 25. B | 26. C | 27. C | 28. C |
| 29. C | 30. B | 31. B | 32. D |
| 33. D | 34. C | 35. A | 36. C |
| 37. B | 38. A | 39. A | 40. A |
| 41. C | 42. C | 43. B | |
| 44. None of the given options is correct. Actual answer is -0.059 . | | | |
| 45. B | 46. B | 47. D | 48. B |
| 49. B | 50. C | 51. B | 52. B |
| 53. A | 54. C | 55. C | 56. C |
| 57. A | 58. B | 59. B | 60. D |
| 61. A | 62. B | 63. B | 64. A |
| 65. A | 66. B | 67. A | 68. C |
| 69. B | 70. A | 71. B | 72. C |
| 73. B | 74. C | 75. A | 76. B |
| 77. A | 78. A | 79. B | 80. D |