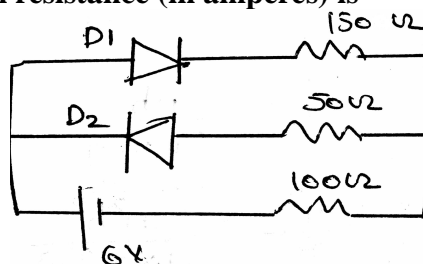
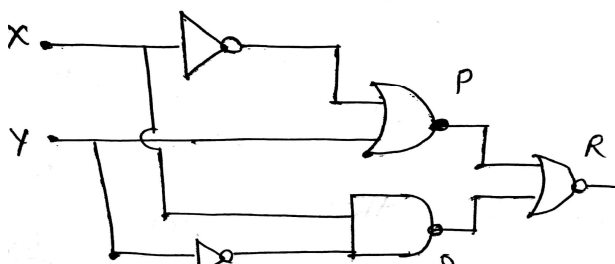


44. The circuit shown in following figure contains two diode  $D_1$  and  $D_2$  each with a forward resistance of 50 ohm and with infinite backward resistance. If the battery voltage is 6 V, the current through the 100 ohm resistance (in amperes) is



- 1) zero                      2) 0.020                      3) 0.03                      4) 0.036
45. Figure gives a system of logic gates. From the study of truth table it can be found that to produce a high output (1) at R, we must have



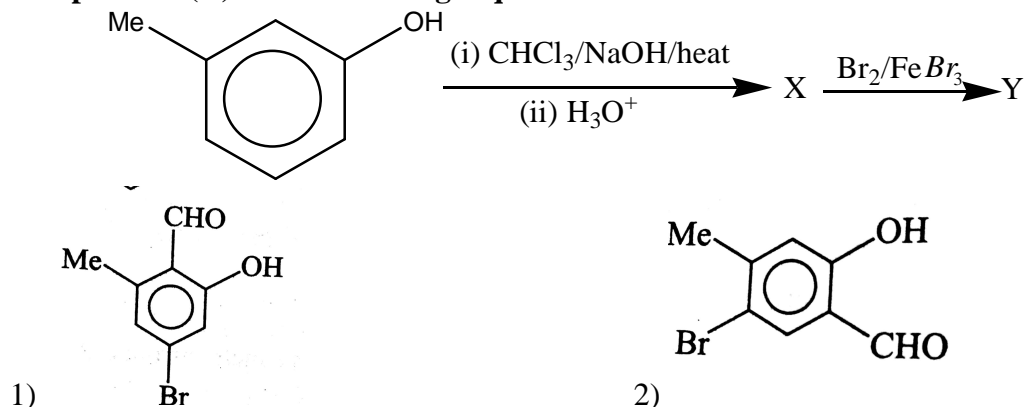
- 1)  $x=0; y=1$                       2)  $x=1; y=1$                       3)  $x=1; y=0$                       4)  $x=0; y=0$

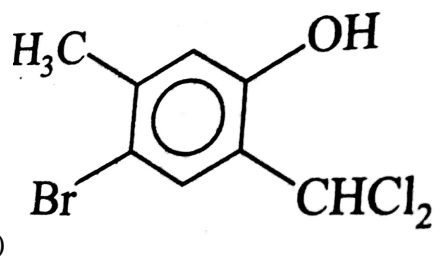
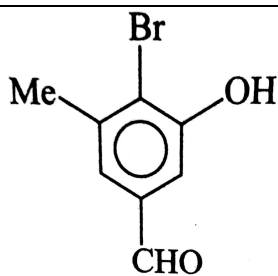
### CHEMISTRY

46. The strength of bond formed by overlapping of atomic orbitals is in order
- 1)  $s-s < s-p < p-p$                       2)  $s-s < p-p < s-p$   
 3)  $s-p < s-s < p-p$                       4)  $p-p < s-s < s-p$
47. The molecule which possess both  $sp^3$  and  $sp^3d^2$  hybridisation is
- 1) solid  $PCl_5$                       2) gaseous  $PCl_5$                       3)  $PCl_4$                       4)  $PCl_6$
48. Which of the following orders is correct for the bond dissociation energy of  $O_2, O_2^+, O_2^-$  and  $O_2^{2-}$ ?
- 1)  $O_2^+ > O_2 > O_2^- > O_2^{2-}$                       2)  $O_2^+ > O_2 < O_2^- < O_2^{2-}$   
 3)  $O_2^+ < O_2 < O_2^- < O_2^{2-}$                       4)  $O_2^+ > O_2 > O_2^- < O_2^{2-}$
49. Ethers are more volatile than alcohols having same molecular formula. This is due to
- 1) Intermolecular H-bonding in ethers                      2) Intermolecular H-bonding in alcohols  
 3) Dipolar character of ethers                      4) Resonance structure in alcohols
50. A co-ordination complex compound of cobalt has the molecular formulae containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution and on reacting with excess of  $AgNO_3$ ,  $AgCl$  precipitate. The ionic formula for this complex would be
- 1)  $[Co(NH_3)_5(NO_2)]Cl_2$                       2)  $[Co(NH_3)_5Cl][Cl(NO_2)]$   
 3)  $[Co(NH_3)_4(NO_2)Cl_2]Cl$                       4)  $[Co(NH_3)_5][(NO_2)_2Cl_2]$
51. Amongst  $TiF_6^{2-}, CoF_6^{3-}, Cu_2Cl_2$  and  $NiCl_4^{2-}$  (atomic number  $Ti=22, Co=27, Cu=29, Ni=28$ ). The colourless species are
- 1)  $CoF_6^{3-}$  and  $NiCl_4^{2-}$                       2)  $TiF_6^{2-}$  and  $CoF_6^{3-}$   
 3)  $Cu_2Cl_2$  and  $NiCl_4^{2-}$                       4)  $TiF_6^{2-}$  and  $Cu_2Cl_2$

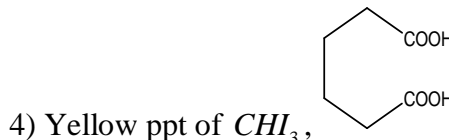
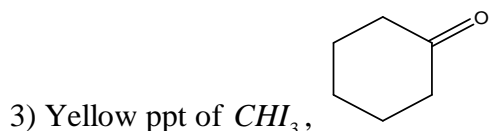
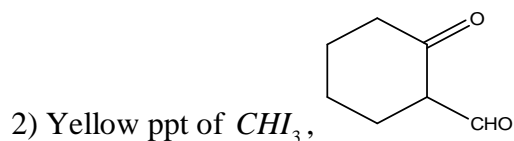
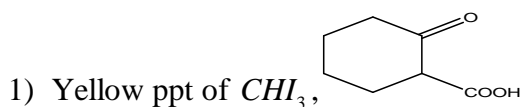
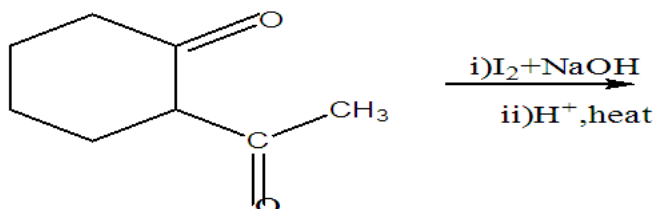
52. A sample of water containing some dissolved table sugar and common salt is passed through organic ion exchange resins. The resulting water will be  
 1) tasteless                      2) Sweet                      3) Salty                      4) none of these
53. The function of fluorspar in the electrolytic reduction of alumina dissolved in fused cryolite ( $Na_3AlF_6$ ) is  
 1) as a catalyst  
 2) to lower the fusion temperature of the Alumina  
 3) to decrease the rate of oxidation of carbon at the anode  
 4) to decrease the rate of oxidation of carbon at the cathode
54. Which of the following metals behave different than that of others when react with very dilute Nitric acid?  
 1) Iron                      2) Copper                      3) Zinc                      4) Tin
55. A green coloured solution of some salt changes its colour to light pink on passing ozone through it. Which of the following species represent pink and green colour respectively?  
 1)  $Mn^{2+}$  and  $MnO_2$                       2)  $MnO_4^{2-}$  and  $MnO_4^-$                       3)  $MnO_4^-$  and  $MnO_4^{2-}$                       4)  $Cu^+$  and  $Cu^{2+}$
56. When chlorine reacts with cold and dilute solution of sodium hydroxide, the products obtained are  
 1)  $Cl^- + ClO^-$                       2)  $Cl^- + ClO_2^-$                       3)  $Cl^- + ClO_3^-$                       4)  $Cl^- + ClO_4^-$
57. Match the shape to the formula. Which pairing is incorrect?  
 1)  $XeO_3$  = trigonal planar                      2)  $XeO_2F_2$  = see - saw  
 3)  $[XeF_3]^+$  = T shape                      4)  $[XeF_5]^-$  = distorted pentagonal bipyramidal
58. The elements which occupy the peaks of ionization energy curve are  
 1)  $Na, K, Rb, Cs$                       2)  $Na, Mg, Cl, I$                       3)  $Cl, Br, I, F$                       4)  $He, Ne, Ar, Kr$
59. When sodium metal is dissolved in liquid ammonia, blue colour solution is formed. The blue colour is due to  
 1) Solvated  $Na^+$  ions                      2) Solvated electrons  
 3) Solavated  $NH_2^-$  ions                      4) Solvated protons
60. An organic compound A ( $C_4H_9Cl$ ) on reaction with Na/diethyl ether gives a hydrocarbon, which on monochlorination gives only one chloro derivative. A is  
 1) t-butyl chloride                      2) s- butyl chloride  
 3) Iso butyl chloride                      4) n- butyl chloride

61. The product (Y) of the following sequence of the reactions would be





62. End product of the following sequence of reaction is



63. Which one of the following reacts with HCN and Tollens reagent, but is not oxidised by Fehling's solution?

- 1) Methanal                      2) Ethanal                      3) Benzaldehyde                      4) Acetone

64. The correct order of basicity of amines in water is

- 1)  $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$                       2)  $CH_3NH_2 > (CH_3)_3N > (CH_3)_2NH$   
 3)  $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$                       4)  $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$

65. Epimers are pair of diastereoisomeric compounds. D-glucose and D-mannose are epimers which differ in configuration at position

- 1)  $C_5$                       2)  $C_2$                       3)  $C_4$                       4)  $C_3$

66. The  $p^{Ka}_1$  and  $p^{Ka}_2$  of an amino acid are 2.3 and 9.7 respectively. The isoelectric point of the amino acid is

- 1) 6.0                      2) 3.7                      3) 12.0                      4) 7.4

67. Lung diseases are four times more in urban areas than in rural areas. This is due to the presence of

- 1)  $CO_2$                       2)  $N_2$                       3) CFC                      4)  $SO_2$

68. Streptomycin, a well-known antibiotic, is a derivative of

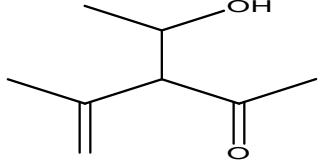
- 1) peptides                      2) carbohydrates                      3) purines                      4) Terpenes

69.  $CH \equiv CH \xrightarrow[\text{Quinoline}]{H_2/Pd-BaSO_4} A \xrightarrow{Cl_2/H_2O} B$  'B' is

- 1)  $C_2H_4Cl_2$                       2)  $C_2H_5Cl$                       3)  $CHCl_3$                       4)  $Cl-CH_2-CH_2-OH$

70.  $B(\text{mix}) \xleftarrow[2\text{ moles}]{\text{Conc. HI}} (CH_3)_3C-O-CH_3 \xrightarrow[1\text{ mole}]{\text{anhydrous HI}} A(\text{mix})$

- 1) A and B are identical mixture of  $CH_3I$  and  $(CH_3)_3C-OH$   
 2) A and B are identical mixture of  $CH_3OH$  and  $(CH_3)_3C-I$   
 3) A is a mixture of  $CH_3I$  and  $(CH_3)_3C-OH$     B is a mixture of  $CH_3OH$  and  $(CH_3)_3C-I$   
 4) none of these

71. Which one of the following species is most stable
- 1)  $p-O_2N-C_6H_4-CH_2^+$
  - 2)  $p-CH_3O-C_6H_4-CH_2^+$
  - 3)  $p-Cl-C_6H_4-CH_2^+$
  - 4)  $C_6H_5-CH_2^+$
72. Copper matte is a molten mixture of
- 1)  $Cu_2O + \text{Little } FeS$
  - 2)  $Cu_2S + \text{Little } FeO$
  - 3)  $Cu_2O + \text{Little } FeO$
  - 4)  $Cu_2S + \text{Little } FeS$
73. The correct IUPAC name of the compound is
- 
- 1) 3-(1-Methylethenyl)-4-hydroxypentan-2-one
  - 2) 3-(1-Hydroxyethyl)-4-methylpentan-2-one
  - 3) 3-(1-Hydroxymethyl)-4-methylenepentan-2-one
  - 4) 3-(1-Oxoethyl)-4-methylpentan-2-ol
74. Which of the compounds with molecular formula  $C_5H_{10}$  yields acetone as one of the product on ozonolysis?
- 1) 3-methyl-1-butene
  - 2) cyclopentane
  - 3) 2-methyl-1-butene
  - 4) 2-methyl-2-butene
75. The maximum number of stereoisomers possible for 2-hydroxy-2-methylbutanoic acid is
- 1) 1
  - 2) 2
  - 3) 3
  - 4) 4
76. Which one of the following is used to make 'non-stick' cookware?
- 1) PVC
  - 2) Polystyrene
  - 3) Polyethylene terephthalate
  - 4) Polytetrafluoroethylene
77. The speed of a photon is one-hundredth of the speed of light in vacuum. What is the de Broglie wavelength? Assume that one mole of photons has a mass equal to one gram [ $h=6.626 \times 10^{-27}$  erg .sec]
- 1)  $3.31 \times 10^{-3} \text{ \AA}^0$
  - 2)  $1.33 \times 10^{-3} \text{ \AA}^0$
  - 3)  $3.13 \times 10^{-2} \text{ \AA}^0$
  - 4)  $1.31 \times 10^{-2} \text{ \AA}^0$
78. Two gaseous equilibria  $SO_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons SO_{3(g)}$  and  $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$  have equilibrium constants  $K_1$  and  $K_2$  respectively at 298 K. which of the following relationships between  $K_1$  and  $K_2$  is correct?
- 1)  $K_1 = K_2$
  - 2)  $K_2 = K_1^2$
  - 3)  $K_2 = \frac{1}{K_1^2}$
  - 4)  $K_2 = \frac{1}{K_1}$
79. The rate constant of the reaction  $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$  is  $3 \times 10^{-3} \text{ min}^{-1}$ . At what concentration of  $H_2O_2$ , the rate of the reaction will be  $2 \times 10^{-4} \text{ Ms}^{-1}$ ?
- 1)  $6.67 \times 10^{-2} \text{ (M)}$
  - 2) 2 (M)
  - 3) 4 (M)
  - 4) 0.08 (M)
80. For the non-stoichiometric reaction,  $2A+B \rightarrow C+D$ , the following kinetic data were obtained in three separate experiments, all at 298 K

| Initial concentration (A) | Initial concentration (B) | Initial rate of formation of C (C) |
|---------------------------|---------------------------|------------------------------------|
| 0.1 M                     | 0.1 M                     | $1.2 \times 10^{-3}$               |
| 0.1 M                     | 0.2 M                     | $1.2 \times 10^{-3}$               |
| 0.2 M                     | 0.1 M                     | $2.4 \times 10^{-3}$               |

The rate law for the formation of C is

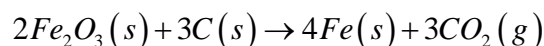
- 1)  $\frac{dc}{dt} = k[A][B]$
- 2)  $\frac{dc}{dt} = k[A]^2[B]$
- 3)  $\frac{dc}{dt} = k[A][B]^2$
- 4)  $\frac{dc}{dt} = k[A]$

81. The standard reduction potential for  $Cu^{2+} / Cu$  is +0.34 V. The reduction potential at pH = 14 for  $Cu^{+2} + 2e^{-} \longrightarrow Cu$  is  $\left[ K_{sp} [Cu(OH)_2] = 1.0 \times 10^{-20} \right]$
- 1) - 0.25 V                      2) + 0.25 V                      3) -0.34 V                      4) +0.34 V
82. The behavior of a real gas is usually depicted by plotting compressibility factor Z versus P at a constant temperature. At high temperature and high pressure, Z is usually more than one. This fact can be explained by vander Waals equation when
- 1) the constant 'a' is negligible and not 'b'                      2) the constant 'b' is negligible and not 'a'
- 3) both constants 'a' and 'b' are negligible                      4) both the constants 'a' and 'b' are not negligible
83. The  $pK_a$  of a weak acid (HA) is 4.5 . The pOH of an aqueous buffered solution of HA in which 50% of the acid is ionized is
- 1) 4.5                                      2) 2.5                                      3) 9.5                                      4) 7.0
84. An element crystallizes in fcc lattice having edge length 350 pm. Maximum radius of the atom which can be placed in the interstitial site without distorting the structure is
- 1) 58.55 pm                      2) 117 pm                      3) 51.23 pm                      4) 83 pm
85. The tetrahedral voids formed by ccp arrangement of  $Cl^{-}$  ions in rock salt structure are
- 1) occupied by  $Na^{+}$  ions                                      2) occupied by  $Cl^{-}$  ions
- 3) occupied by either  $Na^{+}$  or  $Cl^{-}$  ions                      4) vacant
86. Following data has been given for  $CO_2$  for the concentration in  $H_2O$

| Temperature | Henrys constant | Pressure |
|-------------|-----------------|----------|
| 273K        | 600atm          | 0.30 atm |
| 333K        | 3400atm         | $P_2$    |

If solution of  $CO_2$  in  $H_2O$  is heated from 273 to 333 k, pressure( $p_2$ ) needed to keep  $CO_2$  in the solution is

- 1) 0.108 atm                      2) 1.7 atm                      3) 0.212 atm                      4) 0.468 atm
87. A solution of urea (molar mass 60) boils at  $100.18^{\circ}C$  at atmospheric pressure. If  $K_f$  and  $K_b$  for water are 1.86 and 0.512 K molality<sup>-1</sup> respectively, the above solution will freeze at
- 1)  $-6.54^{\circ}C$                       2)  $6.54^{\circ}C$                       3)  $-0.654^{\circ}C$                       4)  $0.654^{\circ}C$
88. Which of the following is contributed towards the extra stability of lyophilic colloids?
- 1) Hydration                      2) charge                      3) colour                      4) Tyndall effect
89. If 900 J/g of heat is exchanged at boiling point of water, then what is the increase in entropy
- 1) 43.4 J/mol                      2) 87.2 J/mol                      3) 900 J/mol                      4) zero
90. Smelting of iron ore takes place through this reaction



$\Delta H_f^{\circ}$  of  $Fe_2O_3$  and  $CO_2$  are -8242 kJ/mol and -393.7 kJ/mol

The reaction is

- 1) Endothermic                      2) Exothermic                      3)  $\Delta H = 0$                       4) none of these

### BIOLOGY

91. Organisms that fix nitrogen in aquatic habitats are
- 1) Brown algae                      2) Green algae                      3) Cyanobacteria                      4) All of these
92. Which of one following events do not take place during normal inspiration in human?
- 1) Upward and outward movement of ribs and sternum
- 2) Contraction of phrenic muscles
- 3) Increased intra pulmonary pressure
- 4) Decreased intra pulmonary pressure