46. Which of the following does not have spherical as well as angular node ?

1) 1s 2) 2p 3) 3d 4) 5f

47. Equal masses of H_2 and He gases mixed in vessel recorded a pressure of 7.5 atm. The partial pressure of H_2 is

1) 4.8 atm 2) 2.4 atm 3) 5 atm 4) 7.5 atm

48. pH of a solution is changed from 2 to 5. What has been done to the solution ?

1) 3 times dilution 2) 3 times concentration

3) 100 times concentration 4) 1000 times dilution

49. The enthalpy of vaporization of benzene is 30.8 kJ mol^{-1} at its boiling point (80.1^{0}C). Calculate the entropy change in the condensation process.

1) +87.3 JK^{-1} mol^{-1} 2) -87.3 JK^{-1} mol^{-1} 3) 240 JK^{-1} mol^{-1} 4) -240 JK^{-1} mol^{-1}

50. 2-3% gypsum is added to sample for

1) increasing hardness 2) decreasing setting time

3) increasing setting time 4) making is soft

51. $AlCl_3$ and $FeCl_3$ can be separated from their mixture by using

1) NH_4OH 2) NaOH 3) H_2O 4) magnetic method

52. Which of the following are correct w.r.t D_2O?

1) It can be used as moderator 2) Its m.p. is 3.82^{0}C

3) Its b.p. is 101.42^{0}C 4) All of these

53. 0.5 molal aqueous solutions of each of NaCl, $BaCl_2$ and $AlCl_3$ have boiling points T_1, T_2 and T_3 respectively. Which of the following is correct ?

1) $T_1 > T_2 > T_3$ 2) $T_3 > T_2 > T_1$ 3) $T_2 > T_1 > T_3$ 4) $T_1 > T_3 > T_2$

54. i) $P + Q \rightleftharpoons A(\text{fast})$

ii) $A + R \rightarrow B(\text{slow})$

iii) $B + Q \rightarrow S + T(\text{fast})$

are the elementary steps of the reactions,

$2P + Q + 2R \rightarrow S + T$

The rate law of the reaction is:

1) r = k [P] [Q] **2) r = k $[P]^2$ [Q] $[R]^3$** **3)** $r = k[P]^{1/2}[Q][R]^{1/3}$ **4)** $r = k[P][Q][R]$

55. NH_3 gives brown precipitate with Nessler's reagent. The formula of brown compound is :

1) K_2HgI_4 2) $H_2N - Hg - O - Hg - I$

3) $Ca_3P_2 + CaC_2$ 4) $(NH_4)_2MoO_4$

ROUGH

56. In which of the following molecules/ions are all the bonds not equal ?

1) XeF_4 2) BF_4^- 3) SF_4 4) SiF_4

57. If $P > \Delta_0$, the d^4 is represented as

1) $t_{2g}^{211} e_g^0$ 2) $t_{2g}^{111} e_g^1$ 3) $t_{2g}^0 e_g^{22}$ 4) $t_{2g}^1 e_g^{21}$

58. $CuSO_4.H_2O$ is blue in colour but anhydrous $CuSO_4$ is white though in both copper exists as Cu^{2+} ion with one unpaired electron the reason is :

1) $CuSO_4$ (anhydrous) absorbs white light 2) $CuSO_4 . 5H_2O$ absorbs blue light

3) Splitting of d-sub shell occurs in $CuSO_4$ (anhydrous) and absorption of orange red light takes place

4) Splitting of d-sub shell occurs in $CuSO_4.5H_2O$ and absorption of orange-red light takes place

59. Which one of the following elements, when present as an impurity in silicon makes it a p-type semiconductor?

1) *As* 2) *P* 3) *In* 4) *Sb*

60. Buna-N synthetic rubber is a copolymer of

1) $CH_2 = CH - CH = CH_2$ and $C_6H_5CH = CH_2$

2) $CH_2 = CH - CN$ and $CH_2 = CH - CH = CH_2$

3) $CH_2 = CH - CN$ and $CH_2 = CH - \underset{\displaystyle CH_3}{\underset{|}{C}} = CH_2$

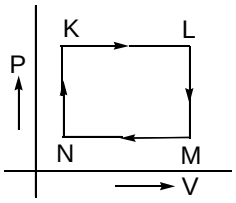
4) $CH_2 = CH - \overset{\displaystyle Cl}{\overset{|}{C}} = CH_2$ and $CH_2 = CH - CH = CH_2$

61. 0.24 g of a volatile substance displaced 53.78 mL of air at STP. The molecular mass of the of the substance is

1) 24g 2) 53.78g 3) 50g 4) 100g

ROUGH

62. A fixed mass of a gas is subjected to transformation of states from K to L to M to N and back to K as shown



The pair of isochoric processes among the transformations of sates is

1) K to L and L to M 2) L to M and N to K 3) L to M and M to N 4) M to N and N to K

63. If fraction of space occupied in hcp is 'x' and in *fcc* is 'y', then

1) x > y 2) x < y 3) x = y 4) uncertain

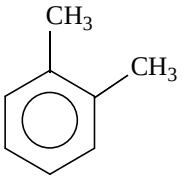
64. The energy of second Bohr's orbit in hydrogen atom is – 328kJ mol^{-1}. The energy of the third Bohr's orbit of H is

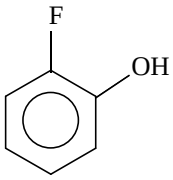
1) – 583.11kJ mol^{-1} 2) – 853.11kJ mol^{-1} 3) – 145.78 kJ mol^{-1} 4) – 511.83kJ mol^{-1}

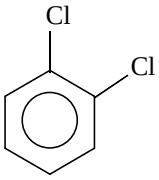
65. Which one of the following constitutes a group of the isoelectronic species ?

1) N_2, O_2^-, NO^+, CO 2) C_2^{2-}, O_2^-, CO, NO 3) $NO^+, C_2^{2-}, CN^-, N_2$ 4) $CN^-, N_2, O_2^{2-}, C_2^{2-}$

66. In which of the following the experimental dipole moment is more than what is expected from theory ?

1) 

2) 

3) 

4) All of these

67. The reaction ,

$C_6H_6(l) + \frac{15}{2}O_2(g) \longrightarrow 6CO_2(g) + 3H_2O(l)$ **is spontaneous, then which of the following is correct ?**

1) $\Delta H > T\Delta S$ 2) $\Delta H < T\Delta S$ 3) $\Delta H = T\Delta S$ 4) $\Delta H > 0 \text{ and } \Delta S > 0$

68. The dissociation equilibrium of a gas AB_2 can be represented as

$$2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$$

The degree of dissociation is 'x' and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_p and total pressure P is

1) $(2K_p / P)^{1/3}$ 2) $(2K_p / P)^{1/2}$ 3) (K_p / P) 4) $(2K_p / P)$

ROUGH

69. The pH of water at 298 K is 7.0. If water is heated to 350 K, then

1) pH will decrease, water will become acidic 2) pH will remain same

3) pH will increase, water wil remain neutral 3) pH will decrease, water will remain neutral

70. 1 mole of each of A and B form an ideal solution of vapour pressure 100 mm Hg. Addition of 2 moles of B to it, decrease the vapour pressure by 20 mm Hg. Vapour pressures of A and B in pure state are respectively

1) 100 and 100 mm Hg 2) 100 and 80 mm Hg

3) 60 and 140 mm Hg 4) 140 and 60 mm Hg

71. A 4.0 molar aqueous solutio of NaCl is prepared and 500mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes. The total number of moles of chlorine gas evolveed is

1) 0.5 2) 1.0 3) 2.0 4) 3.0

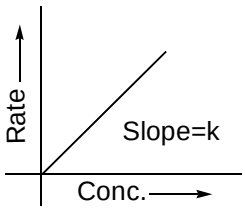
72. For the given three cells, which of the following is correct?

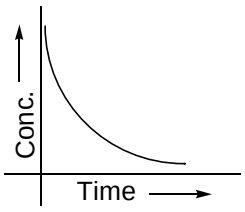
a) $Zn\left|Zn^{2+}(1.0M)\right\|Cu^{2+}(1.0M)\left|Cu;E_1\right.$ b) $Zn\left|Zn^{2+}(1.0M)\right\|Cu^{2+}(10.0M)\left|Cu;E_2\right.$

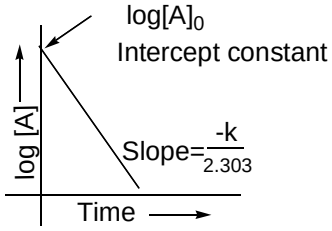
c) $Zn\left|Zn^{2+}(10.0M)\right\|Cu^{2+}(1.0M)\left|Cu;E_3\right.$

1) $E_1 > E_2 > E_3$ 2) $E_3 > E_2 > E_1$ 3) $E_2 > E_1 > E_3$ 4) $E_1 = E_2 = E_3$

73. Which of the following graphs represents the first order reaction ?

1) 

2) 

3) 

4) All represent 1st order reaction

74. A colloidal solution is subjected to an electrical field. The particles move towards anode. The coagulation of same sol is studied using NaCl, $BaCl_2$ and AlC_3 solutions. Their coasgulating power should be

1) $NaCl > BaCl_2 > AlCl_3$ 2) $BaCl_2 > AlCl_3 > NaCl$

3) $AlCl_3 > BaCl_2 > NaCl$ 4) $BaCl_2 > NaCl > AlCl_3$

ROUGH

75. Which is wrongly reported ?

1) Spelter : impure zinc
2) Pig iron : impure iron
3) Sphalerite : ZnO
4) Blister Copper : Impure Copper

76. 100 cm^3 of a sample of H_2O_2 gives 1000cm^3 of O_2 at STP. The given sample is

1) 10 volume H_2O_2 2) 100 volume H_2O_2 3) 10% H_2O_2 (W/V) 4) 2.786N

77. Cs_2CO_3 is highly soluble in water while $BaCO_3$ quite sparingly soluble. Which of the following is correct ?

1) $\Delta_{hydr}.H$ dominates over lattice energy in case of Cs_2CO_3 while it is opposite in case of $BaCO_3$
2) $\Delta_{hydr}.H$ dominates over lattice energy in case of $BaCO_3$ while its opposite in case of Cs_2CO_3
3) K_{sp} of both Cs_2CO_3 and $BaCO_3$ is high
4) K_{sp} of both Cs_2CO_3 and $BaCO_3$ is low

78. Which of these is not a monomer for a high molecular mass silicon polymer ?

1) Me_3SiCl 2) $PhSiCl_3$ 3) $MeSiCl_3$ 4) Me_2SiCl_2

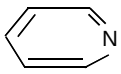
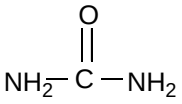
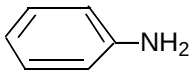
79. In PO_4^{3-}, the bond order of P– O bond and formal charge on O – atom are, respectively

1) 0.25, – 0.25 2) 0.50, – 0.50 3) 1.25, – 0.75 4) 0.75, – 1.25

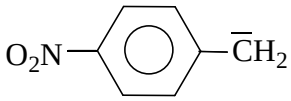
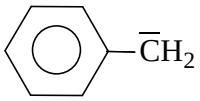
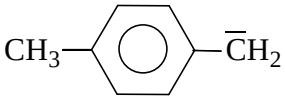
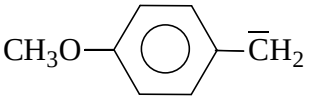
80. Chormite ore $(X)\xrightarrow[\text{fuse}]{Na_2CO_3/air}(Y)$.X and Y are

1) Cr_2O_3 and $Na_2Cr_2O_7$
2) $FeO.Cr_2O_3$ and $Na_2Cr_2O_7$
3) $FeO.Cr_2O_3$ and Na_2CrO_4
4) Cr_2O_3 and Na_2CrO_4

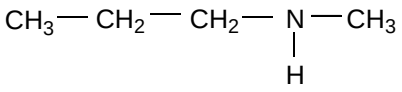
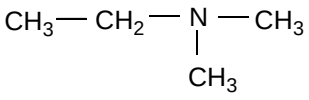
81. Kjeldahl's method can not be used to estimate nitrogen in which of the following compounds?

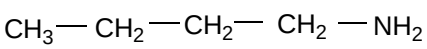
1) 
2) 
3) 
4) All of these

82. Which of the following is the most stable carbocation

1) 
2) 
3) 
4) 

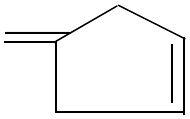
83. How are the following related ?

I) 
II) 

III) 

1) I and II are position isomers
2) I and III are chain isomers
3) I, II and III are metamers
4) I, II and III are functional isomers

ROUGH

84. Ozonolysis is of  **(using H_2O/Zn) produces**

1) $HCHO + OHC - CH_2 - CH_2 - CH_2 - CHO$ 2) $HCHO + OHC - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - CHO$

3) $CO_2 + H_2O + OHC - CH_2 - CH_2 - CH_2CHO$ 4) $H_2O + CO_2 - OHC - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - CHO$

85. Which of the following is a chain initiation step in the chlorination of CH_4?

1) $Cl - Cl \xrightarrow{hv} 2\dot{C}l$ 2) $CH_4 + \dot{C}l \longrightarrow \dot{C}H_3 + HCl$

3) $\dot{C}H_3 + Cl_2 \longrightarrow CH_3Cl + \dot{C}l$ 4) $\dot{C}H_3 - \dot{C}H_3 \longrightarrow CH_3 - CH_3$

86. Ethanal is treated with HCN and the resulting compound on hydrolysis followed by polymerisation gives 'X'. 'X' is used as / in

1) Orthopedic devices 2) Making capsules

3) Post operative stitches 4) Photo films

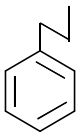
87. $CH_3 - CH(OH) - CH_2 - CH_2 - CH_3$ and $CH_3 - CH_2 - CHOH - CH_2 - CH_3$

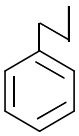
can be distinguished by

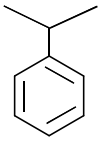
1) $HCl / ZnCl_2$ 2) Br_2 / CCl_4 3) $KMnO_4 / H^+$ 4) I_2 / NaOH

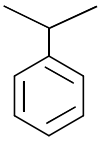
88.  $+ Cl - CH_2 - CH_2 - CH_3 \xrightarrow{AlCl_3} P \xrightarrow[(ii)H_3O^+]{(i)O_2/\Delta} Q + \text{Phenol}$

The major product P and Q are

1)  and CH_3-CH_2-CHO

2)  and CH_3-CH_2-CHO

3)  and CH_3COCH_3

4)  and CH_3-CH_2-CHO

89. Which will oxidise glucose to gluconic acid ?

1) Br_2 water 2) Benedict solution 3) Tollens'reagent 4) All of these

90. In the titration of Oxalic acid solution with $KMnO_4$, the substance working as catalyst is

1) $KMnO_4$ 2) MnO_2 3) Oxalic acid 4) $MnSO_4$

ROUGH