<u>CHEMISTRY</u>

- 51. Upon mixing 45.0 mL 0.25 M lead nitrate solution with 25.0 mL of a 0.10 M chromic sulphate solution, precipitation of lead sulphate take place. How many moles of lead sulphate are formed?
 - a) 0.75×10^{-3} b) 7.5×10^{-3}
 - c) 11.25×10^{-3} d) 5.7×10^{-3}
- 52. According to kinetic theory of gases, for a diatomic molecule
- (a) the pressure exerted by the gas is proportional to mean velocity of the molecule
- (b) the pressure exerted by the gas is proportional to the root mean velocity of the molecule
- (c) the root mean square velocity of the molecules is inversely proportional to the temperature
- (d) the mean transnational kinetic energy of the molecule is proportional to the absolute temperature
- 53. Which hydrogen like species will have same radius as that of Bohr orbit of hydrogen atom?
 - a) $n=2, Li^{2+}$ b) $n=2, Be^{3+}$ c) $n=2, He^{+}$ d) $n=3, Li^{2+}$
- 54. calculate the energy required to excite 1L of hydrogen gas at 1 atm and 298 K to the first excited state of atomic hydrogen. The energy for the dissociation of H-H bond is 436 kJ mol⁻¹

a) 39.98 kj	b) 98.39j
c) 98.39 kj	d) 39 kj

55. Hyperconjugation involves overlap of the following orbitals

a)	σ-σ	b)	σ- p
c)	p - p	d)	π-π

- 56. In BF₃, the B-F bond length is 1.30 Å, when BF₃, is allowed to be treated with Me₃N, it forms an adduct Me₃N \rightarrow BF₃, the bond length of B-F in the adduct is
 - a) greater than 1.30 Å
 - b) smaller than 1.30 Å
 - c) equal to 1.30 Å
 - d) none of these.
- 57. Which of the following statements is not correct for sigma- and pi-bonds formed between two carbon atom?
 - a) Free rotation of atoms about a sigma-bond is allowed but not in case of a pi-bond.
 - b) Sigma-bond determines the direction between carbon atoms but a pi-bond has no primary effect in this regard.
 - c) Sigma-bond is stronger than a pi-bond
 - Bond energies of sigma-and pi-bond are of the order of 264 kJ/mol and 347 kJ/mol respectively
- 58. Which one of the following is an exothermic reaction?
 - a) $N_2(g) + O_2(g) + 180.8 \text{kJ} \rightarrow 2 \text{NO}(g)$
 - **b)** $N_2(g)+3H_2(g)-92kJ\rightarrow 2NH_3(g)$
 - c) $C(g) + H_2O(g) \rightarrow CO(g) + H_2(g) 131.lkJ$
 - d) C(graphite) + 2S(s) \rightarrow CS₂(l)-91.9kJ
- 59. The heat liberated when 1.89 g of benzoic acid is burnt in a bomb colorimeter at 25°Cand it increases the temperature of 18.94 kg of water by 0.632°C. If the specific heat of water at 25°Cis 0.998 cal/g-deg,the value of the heat of combustion of benzoic acid is

a) 881.1kcal	b) 771.124kcal
c) 981.1kcal	d) 871.2kcal

60. 25.3 g of sodium carbonate, Na₂CO₃ is dissolved in enough water to make 250mL of solution, If sodium carbonate dissociates completely, molar concentration of sodium ion, Na+ and carbonate ions. CO₃²⁻ are respectively (Molar mass of Na₂CO₃ = 106g mol⁻¹)
(a) 0.477 M and 0.477M (b) 0.955M and 1.910M

(c) 1.910 M and 0.955 M (d) 1.90 M and 1.910 M

61. To 500cm³ of water, 3.0×10^{-3} kg of acetic acid is added. If 23% of acetic acid is dissociated, what will be the depression in freezing point? k_f and density of water are 1.86 K kg^{-1} mol⁻¹ and 0.997gcm⁻³ respectively.

a) 0.23°C	b) 23°C
c)2.3°C	d) 3.2°C

- 62. The elevation in boiling point of a solution of 13.44 g of $CuCl_2$ in 1kg of water using the following information will be (molecular weight of $CuCl_2 = 134.4$ and $k_b = 0.52$ Km⁻¹) **a)** 0.16 b) 0.05 c) 0.1 d) 0.2
- 63. When 20 g of naphthoic acid $(C_{11}H_8O_2)$ is dissolved in 50 g of benzene $(k_f = 1.72 \text{ K kg} \text{ mol}^{-1})$, a freezing point depression of 2 K is observed. The van't Hoff factor (*i*) is

a)	0.5	b)	1
c)	2	d)	3

- 64. According to hard and soft acid-base principle, a hard acid
 - a) has low charge density
 - b) shows preference for soft bases
 - c) shows preference for donor atoms of low electronegativity
 - d) is not polarisable

- 65. The solubility product of a salt having formula M_2X_3 is $2.2x10^{-20}$. If the solubility of an another salt having formula M_2X is twice the molar solubility of M_2X_3 , the solubility product of M_2X is
 - a) 3×10^{-12} b) 9.16×10^{-5} c) 4.58×10^{-5} d) 2.76×10^{-18}
- 66. One mole of N₂ and 3 moles of PCl₅ are placed in a 100 L vessel heated to 227°C. The equilibrium pressure is 2.05 atm. Assuming ideal behavior, calculate the degree of dissociation for PCl₅ PCl₅(g) → PCl₃(g) + Cl₂(g)

a) 3.3	b) 0.33
c) 33	d) 0.333

67. What is the pH of 0.01M glycine solution? For glycine, $Ka_1 = 4.5 \times 10^{-3}$ and $ka_2 = 1.7 \times 10^{-10}$ at 298 K?

a) 3.0	b) 10.0
c) 6.1	d) 7.1

68. Calculate the equilibrium constant for the constant for the reaction $Fe^{2^{+}}+Ce^{4^{+}} \longrightarrow Fe^{3^{+}}+Ce^{3^{+}}$ Given, $E^{0} (Ce^{4^{+}}/Ce^{3^{+}}) = 1.44 \text{ V}, E^{0}(Fe^{3^{+}}/Fe^{2^{+}})$ =0.68 Va) 8.68×10^{12} b) 6.88×10^{12} c) 68.8×10^{12} d) 0.868×10^{12}

69. Under the same reaction conditions, initial concentration of 1.386 mol dm⁻³ of a substance becomes half in 40 s and 20 s through first order and zero order kinetics respectively. Ratio (k_1/k_0) of the rate constants for first order (k_1) and zero order (k_0) of the reaction is **a**) 0.5 mol⁻¹ dm³ b) 1.0 mol⁻³dm⁻³

	/
c)1.5 mol dm^{-3}	d) $2.0 mol^{-1} dm^{3}$

70. The rate of first of the reaction is $0.4 \text{ mol } \text{L}^{-1}\text{S}^{-1}$ at 10 min and 0.03 mol $\text{L}^{-1}\text{s}^{-1}$ at 20 min after initiation. Find the half-life of the reaction.

a) 25 min	b) 35 min
c) 15 min	d) 2.59 min

- 71. For reaction, $aA \rightarrow xP$, when [A] = 2.2 mM, the rate was found to be 2.4 mMs⁻¹. On reducing concentration of A to half, the rate changes to 0.6 mMs⁻¹. The order of reaction with respect to A is
 - a)1.5b)2.0c)2.5d)3.0

72. Which one is not correct?

- a) Rate of zero order reaction depends upon initial concentration of reactant
- b) Rate of zero order reaction does not depend upon initial concentration of reactant
- c) $t_{1/2}$ of first order reaction is independent of initial concentration of reactant
- d) $t_{1/2}$ of zero order reaction is dependent of initial concentration of reactant
- 73. Lyophilic sols are
 - a) irreversible sols
 - b) prepared from inorganic compounds
 - c) coagulated by adding electrolytes
 - d) self-stabilising
- 74. Which represents the correct order of first ionisation potential of third period elements?

a)Na>Mg>Al>Si	b)Na <mg<al>Si</mg<al>
c)Na <si<al<mg< td=""><td>d) Na<al<mg<si< td=""></al<mg<si<></td></si<al<mg<>	d) Na <al<mg<si< td=""></al<mg<si<>

- 75. The strength of $H_2O_2(in g/L)in 11.2$ volume solution of H_2O_2 is a) 17 b) 51 c) 34 d) 85
- 76. The reagent commonly used to determine hardness of water titrimetrically is
 a) oxalic acid
 b) disodium salt of EDTA
 c) sodium citrate
 d) sodium thisulphate
- 77. Predict the product of reaction of I_2 with $H_2 O_2$ in basic medium.
 - a) I'
 b) I_2O_3

 c) IO_3^- d) I_3^-
- 78. The compound (s) formed upon combustion of sodium metal in excess air is
 - a) Na_2O_2 b) Na_2O_3 c) NaO_2 d) NaOH
- 79. $B(OH)_3 + NaOH \implies NaBO_2 + Na[B(OH)_4] + H_2O$

How can this reaction is made to proceed in forward direction

- a) Addition of cis 1, 2 diol
- b)Addition of borax
- c) Addition of *trans* 1, 2 diol
- d)Addition of Na₂HPO₄

- 80. Incorrect statement about Ge is
 - a) GeO_2 is weakly acidic
 - b) $Ge(OH)_2$ is amphoteric
 - c) Ge Cl_2 is more stable than Ge Cl_4
 - d) Ge-Ge bond energy is lesser than that of Si - Si
- 81. Which one is correct statement?
 - a) Basicity of H₃PO₄ and H₃PO₃ is 3 and 3 respectively
 - b) Acidity of H₃ PO₄ and H₃PO₃ is 3 and 3 respectively
 - c) Acidity of H₃ PO₄ and H₃ PO₃ is 3 and 2 respectively
 - **d**) Basicity of H₃PO₄ and H₃PO₃ is 3 and 2 respectively
- 82. Transition metals show paramagnetic behavior. This is because of theira) high lattice energy.
 - b) variable oxidation state.
 - c) characteristic configuration.
 - **d)** unpaired electrons.
- 83. The ion of least magnetic moment among the following is
 T: ³⁺

a) T1	b) N1 ²
c) Co ²⁺	d) Mn ²⁺

84. What is the EAN of nickel in Ni(CO)₄?
a) 38
b) 30
c) 36
d) 32

- 85. Among the following metal carbonyls, the C-O bond order is lowest in a) $[Mn(CO)_6]^+$ b) $[Fe(CO)_5]$ c) $[Cr(CO)_6]$ d) $[V(CO)_6]^-$
- 86. Both $[Ni(CO)_4]$ and $[Ni(CO)_4]^{2^2}$ are diamagnetic. The hybridisations of nickel in these complexes respectively, are

a)
$$sp^{3}$$
, sp^{3}
b) sp^{3} , dsp^{2}
c) dsp^{2} , sp^{3}
d) dsp^{2} , dsp^{2}

- 87. The chemical formula of zeolite is a) $K_2 Al_2 Si_2 O_8 .xH_2 O$ b) $CaAl_2 Si_2 O_8$ c) $Na_2 Al_2 Si_2 O_8 .xH_2 O$ d) $Na_2 [Na_4 (PO_3)_6]$
- 88. Among the following the strongest nucleophile is

a)
$$C_2H_5SH$$
b) CH_3COO c) CH_3NH_2 d) $NCCH_2^-$



- 90. Which of the following substance is used as an anti knocking compound?a) Tetraethyl lead b) Lead tetrachloride
 - c) Lead acetate b) Ethyl acetate
- 91. 3-phenylpropene on reaction with HBr gives (as a major product)
 a) C₆H₅CH₂CH(Br) CH₃
 b) C₆H₅CH(Br)CH₂CH₃
 c)C₆H₅CH₂CH₂CH₂Br
 d) C₆H₅CH(Br) CH=CH₂
- 92. HBr reacts fastest with
 a) 2- methyl propan-2-ol
 b) propan-1-ol
 c) propan -2-ol
 d) 2-methyl propan-1-ol
- 93. (I) 1,2-dihydroxy benzene
 (II) 1,3-dihydroxy benzene
 (III) 1,4- dihydroxy benzene
 (IV) Hydroxy benzene
 The increasing order of boiling points of above mentioned alcohols is
 a) I < II < III < IV
 b)I < II < IV < III
 c) IV <I <II < III
 d) IV <II <I < III
- 94. Acetamide and ethylamine can be distinguished by reacting with

a) dilute HCI and heat
b) NaOH solution and heat
c) acidified KMnO4
d) Br, water

- 95. In alkyl cyanide, alkyl group attached witha) C of CN groupb) N of CN group
 - c) either C or N of CN group
 - d) both C and N of CN group

- 96. Which of the following is currently used as a true cord?
 a) polyethylene
 b) polypropylene
 c) Bakelite
 d) Nylon-6
- 97. Find the hydrolysis product when a phosphodiester bond of nucleotide breaks.
 a) 3-OH-deoxyribose-5-PO₄³⁻
 b)5-OH- deoxyribose-3-PO₄³⁻
 c)2-OH- deoxyribose-2-PO₄³⁻
 d)4-OH- deoxyribose-2-PO₄³⁻
- 98. When glucose reacts with bromine water, the main product is
 - a) acetic acid
 - b) saccharic acid
 - c) glyceraldehyde
 - d) gluconic acid
- 99. The pair whose both species are used in antiacid medicinal preparations is
 a) NaHCO₃ and Mg (OH)₂
 b) Na₂CO₃ and Ca (HCO₃)₂
 c) Ca (HCO₃)₂ and Ca (MgOH)₂
 d) Ca (OH)₂ and NaHCO₃
- 100. Which of the following compounds is an azo dye?
 - a) Martius yellow
 - b) Malachite green
 - c) Methyl orange
 - d) Mercurochrome