CHEMISTRY

51. A sample of oleum is labeled 118%. The percentage of free SO_3 in the sample is
(a) 40 (b) 80
(c) 60 (d) 9

52. Rate constant of a first order reaction is 0.0693 min^{-1}. If we start with 20 mol L^{-1}, it is reduced to 2.5 mol L^{-1} in
(a) 10 min (b) 20 min
(c) 30 min (d) 40 min

53. If P° is the vapour pressure of a pure solvent and P is the vapour pressure of the solution prepared by dissolving a non–volatile solute in it. The mole fraction of the solvent X_A is given by
(a) $\frac{P^o - P}{P^o} = X_A$ (b) $\frac{P^o - P}{P} = X_A$
(c) $\frac{P}{P^o} = X_A$ (d) $P° - P = X_A$

54. 4 moles of A are mixed with 4 moles of B, when 2 moles of C are formed at equilibrium according to the reaction

$$A + B \rightleftharpoons C + D$$

The value of equilibrium constant is
(a) 4 (b) 1
(c) 1/2 (d) 1/4

55. The difference between heats of reaction at constant pressure and constant volume of the following reaction would be

$$2C_6H_6(l) + 15O_2(g) \longrightarrow 12CO_2(g) + 6H_2O(l) \quad \text{at } 25°C \text{ in kJ mol}^{-1} \text{ is}$$

(a) –7.43 (b) +3.72
(c) –3.72 (d) +7.43

56. The emf of the cell in which the following reaction,

$$Zn(s) + Ni^{2+}(0.1\ M) \longrightarrow Zn^{2+}(1.0\ M) + Ni(s)$$

occurs, is found to be 0.5105 V at 298 K. The standard emf of the cell is
(a) 0.4810 V (b) 0.5696 V
(c) –0.5105 V (d) 0.5400 V

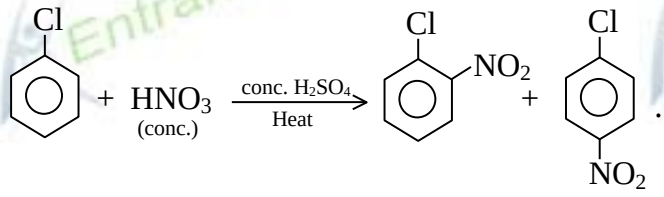
57. How many faradays are needed to reduce a mole of MnO_4^- to Mn^{2+}?
(a) 4 (b) 5
(c) 3 (d) 2

58. If the concentration of a reactant 'A' is doubled and the rate of its reaction increases by a factor of 2, the order of reaction with respect to 'A' is
(a) 1 (b) zero
(c) 2 (d) 3

59. How many geometrical isomers are possible for the compound: C_6H_5–CH=CH–CH=CH–COOH?

(a) 3 (b) 4
(c) 2 (d) 1

60. Consider the following reaction,



(I) (II)

Which of the following statement is correct?

(a) It is an electrophilic addition reaction.
(b) The attacking species is NO_3^- ion.
(c) The role of conc. H_2SO_4 is to react with conc. HNO_3 to produce NO_2^+ ions.
(d) Compound I is the major product of the reaction

61. Which one of the following relationship is correct?

(a) $\overline{KE} = \frac{2}{3}kT$ (b) $\left(P - \frac{an^2}{V^2}\right)(V - nb) = nRT$

(c) $\left(P - \frac{an^2}{V^2}\right)(V + nb) = nRT$ (d) $PV = nRT$

62. Resonance structures can be written for

(a) O_3 (b) NH_3
(c) CH_4 (d) H_2O

63. For a dilute solution, Raoult's law states that

(a) the lowering of vapour pressure is equal to the mole fraction of the solute.
(b) the relative lowering of vapour pressure is equal to the mole fraction of the solute.
(c) the relative lowering of vapour pressure is equal to the amount of the solute in the solution.
(d) the vapour pressure of the solution is equal to the mole fraction of the solvent.

64. The number of electrons required to balance the following equation,

$$NO_3^- + 4H^+ + e^- \longrightarrow 2H_2O + NO$$

is

(a) 5 (b) 4
(c) 3 (d) 2

65. Which of the following is not a redox reaction?

(a) $CaCO_3 \longrightarrow CaO + CO_2$ (b) $O_2 + 2H_2 \longrightarrow 2H_2O$
(c) $Na + H_2O \longrightarrow NaOH + ½H_2$ (d) $MnCl_3 \longrightarrow MnCl_2 + ½Cl_2$

66. The rate of reaction (A + B + C $\longrightarrow$ Products) is given by $r = -\frac{d[A]}{dt} = k[A]^{1/2}[B]^{1/3}[C]^{1/4}$ the order of reaction is

(a) 1 (b) 2

(c) 3 (d) $\frac{13}{12}$

67. If 4g of oxygen diffuse through a very narrow hole, how much hydrogen would have diffused under identical conditions?

(a) 16 g (b) 1 g

(c) ¼ g (d) 64 g

68. As long as the plant is alive the ratio ^{14}C to ^{12}C in the wood is

(a) the same as in the atmosphere. (b) less as found in the atmosphere.

(c) more as found in the atmosphere. (d) none of the above.

69. Which is the correct order of acidic strength of the following acids?

(a) $CH_3CH_2COOH > CH_2{=}CH{-}COOH > CH{\equiv}C{-}COOH$

(b) $CH_3CH_2COOH < CH_2{=}CH{-}COOH < CH{\equiv}C{-}COOH$

(c) $CH_3CH_2COOH < CH_2{=}CH{-}COOH > CH{\equiv}C{-}COOH$

(d) $CH_3CH_2COOH > CH_2{=}CHCOOH < CH{\equiv}C{-}COOH$

70. Which of the following statement regarding alkali metals is not correct?

(a) Alkali metals tarnish in air.

(b) They are kept under kerosene.

(c) All alkali metals form oxides on burning in air.

(d) The reaction of alkali metals with water increases in violence on descending the group.

71. Oxidation state of oxygen is $-\frac{2}{3}$ in

(a) K_2O (b) KO_2

(c) K_2O_3 (d) K_2O_2

72. The highest oxidation state of Cr is

(a) +4 (b) +5

(c) +6 (d) +7

73. How many isomers are possible for the compound C_3H_8O

(a) 2 (b) 3

(c) 4 (d) 5

74. Which of the following compounds is not chiral?

(a) $DCH_2CH_2CH_2Cl$ (b) $CH_3CH_2\underset{\underset{D}{|}}{C}H{-}Cl$

(c) CH_3CHDCH_2Cl (d) $CH_3CHCl.CH_2D$

75. Which one of the following has the smallest heat of hydrogenation per mole?

(a) 1–butene (b) trans–2–butene

(c) cis–2–butene (d) 1,3–butadiene

76. Which compound will react with an aqueous solution of $Ag(NH_3)_2^+OH^-$?

(a) $CH_3–C≡C–CH_3$
(b) $CH_3CH_2C≡CH$
(c) $CH_3–CH_3$
(d) $CH_2=CH_2$

77. Aldehyde is formed when following is hydrolysed

(a) ethane
(b) ether
(c) ethyne
(d) none of these

78. In the Cannizzaro reaction given below,

$$2Ph–CHO \xrightarrow{OH^-} Ph–CH_2OH + PhCO_2^-$$

the slowest step is

(a) the attack of OH^- at the carbonyl group.
(b) the transfer of hydride to the carbonyl group.
(c) the abstraction of proton from the carboxylic acid.
(d) the deprotonation of $Ph–CH_2OH$.

79. The velocity possessed by most of the gaseous molecules is

(a) average velocity
(b) most probably velocity
(c) R.M.S. velocity.
(d) none of these

80. At constant temperature, the osmotic pressure of a solution is

(a) directly proportional to the concentration.
(b) inversely proportional to the concentration.
(c) directly proportional to the square of the concentration.
(d) directly proportional to the square root of the concentration.

81. For the manufacture of ammonia by the reaction,

$$N_2 + 3H_2 \rightleftharpoons 2NH_3 + 21.9 \text{ kcal}$$

the favourable conditions are

(a) low temperature, low pressure and catalyst.
(b) low temperature, high pressure and catalyst.
(c) high temperature, low pressure and catalyst.
(d) high temperature, high pressure and catalyst.

82. Which of the following is not a redox reaction?

(a) $2Na + Cl_2 \longrightarrow 2NaCl$
(b) $C + O_2 \longrightarrow CO_2$
(c) $AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$
(d) $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$

83. The heat absorbed in a reaction at constant temperature and constant volume is

(a) ΔE
(b) ΔH
(c) $-\Delta A$
(d) $-\Delta G$

84. In the modern periodic table

(a) there are eight elements in the third period.
(b) there are eight elements in the fourth period.
(c) the horizontal rows are termed as groups.
(d) the vertical columns are termed as periods.

85. Which of the following is a neutral oxide?
(a) CO (b) CO_2
(c) SO_3 (d) MgO

86. Which of the following is not the mineral of iron?
(a) Magnetite (b) Magnesite
(c) Siderite (d) Lemonite

87. Which of the following is Epsom salt?
(a) $MgCl_2.6H_2O$ (b) $MgSO_4.7H_2O$
(c) $Mg(NO_3)_2.6H_2O$ (d) $Mg_3(PO_4)_2$

88. The oxidation states of Cr in $K_2Cr_2O_7$ and K_2CrO_4 are respectively
(a) +6, +6 (b) +6, +7
(c) +7, +6 (d) +7, +7

89. Among the following compounds, the strongest acid is
(a) HC≡CH (b) C_6H_6
(c) C_2H_6 (d) CH_3OH

90. Which of the following is correct order of reactivity of H atoms of alkanes?
(a) primary H > secondary H > tertiary H (b) secondary H > primary H > tertiary H
(c) tertiary H > primary H > secondary H (d) tertiary H > secondary H > primary H

91. Which of the following is freon–12?
(a) CCl_2F_2 (b) CCl_4
(c) CF_4 (d) C_2Cl_6

92. One can distinguish between HCOOH and CH_3COOH with
(a) $NaHCO_3$ (b) H_2SO_4
(c) Tollen's reagent (d) I_2/OH^-

93. In hcp arrangement, the co–ordination number is
(a) 6 (b) 12
(c) 8 (d) 10

94. The rate law expression for the hypothetical reaction $2A + 3B \longrightarrow 2C$ is
$\frac{dx}{dt} = k[A]\,[B]^2$. The order of reaction is
(a) 1 (b) 2
(c) 3 (d) 5

95. How many mole of MnO_4^- ion will react with 1 mol of ferrous oxalate in acidic medium?
(a) 1/5 (b) 2/5
(c) 3/5 (d) 5/3

96. In a reaction,

$$FeS_2 + KMnO_4 + H^+ \longrightarrow Fe^{+3} + SO_2 + Mn^{+2} + H_2O$$

the equivalent mass of FeS_2 would be equal to

(a) molar mass
(b) $\frac{\text{molar mass}}{10}$
(c) $\frac{\text{molar mass}}{11}$
(d) $\frac{\text{molar mass}}{13}$

97. Which of the following parameters are the same for all hydrogen–like atoms and ions in their ground states?
(a) radius of the orbit.
(b) speed of the electron.
(c) energy of the atom.
(d) orbital angular momentum of the electron.

98. The orbital angular momentum of an electron in a Bohr orbits is given as
(a) $L = n\left(\frac{h}{2\pi}\right)$
(b) $L = \sqrt{l(l+1)}\left(\frac{h}{2\pi}\right)$
(c) $L = m\left(\frac{h}{2\pi}\right)$
(d) $L = \left(\frac{h}{4\pi}\right)$

99. An element occurs in bcc structure. Its density is 8.0 g cm^{-3}. If the cell edge is 250 pm, the atomic mass of the element is
(a) 26.4 g mol^{-1}
(b) 37.6 g mol^{-1}
(c) 54.5 g mol^{-1}
(d) 86.1 g mol^{-1}

100. In the reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, the amounts of PCl_5, PCl_3 and Cl_2 at equilibrium are 2 mole each and the total pressure is 3 atm. The equilibrium constant K_p is
(a) 1.0 atm
(b) 2.0 atm
(c) 3.0 atm
(d) 6.0 atm