AIEEE-2008 Chemistry

CHEMISTRY- PART C

71. Which one of the following is the correct statement?
(1) Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase.
(2) $B_2H_6.2NH_3$ is known as 'inorganic benzene.
(3) Boric acid is a protonic acid
(4) Beryllium exhibits coordination number of six

71. **(1)** $BeCl_2$ exhibits chain like structure where as $AlCl_3$ dimerises

72. The treatment of CH_3MgX with $CH_3C \equiv C - H$ produces

(1) $CH_3-\overset{H}{\overset{|}{C}}=\overset{H}{\overset{|}{C}}-CH_3$ (2) CH_4

(3) $CH_3 - CH = CH_2$ (4) $CH_3C \equiv C - CH_3$

72. **(2)**

73. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is
(1) $-CHO, -COOH, -SO_3H, -CONH_2$
(2) $-CONH_2, -CHO, -SO_3H, -COOH$
(3) $-COOH, -SO_3H, -CONH_2, -CHO$
(4) $-SO_3H, -COOH, -CONH_2, -CHO$

73. **(3)** As per the order of preference

74. The pK_a of a weak acid, HA, is 4.80. The pK_b of a weak base, BOH, is 4.78. The pH of an aqueous solution of the corresponding salt, BA will be
(1) 7.01 (2) 9.22 (3) 9.58 (4) 4.79

74. **(1)**

75. The hydrocarbon which can react with sodium in liquid ammonia is
(1) $CH_3CH = CHCH_3$ (2) $CH_3CH_2C \equiv CCH_2CH_3$
(3) $CH_3CH_2CH_2C \equiv CCH_2CH_2CH_3$ (4) $CH_3CH_2C \equiv CH$

75. **(4)**

76. Given $E^\circ_{Cr^{3+}/Cr} = 0.72$ V $E^\circ_{Fe^{2+}/Fe} = -0.42$ V
The potential for the cell
$Cr|Cr^{3+}(0.1M) \,||\, Fe^{2+}(0.01\ M) \,|\, Fe$ is
(1) – 0.339 V (2) – 0.26 V (3) 0.26 V (4) 0.339 V

76. **(3)**

77. Amount of oxalic acid present in a solutioin can be determined by its titration with $KMnO_4$ solution in the presence of H_2SO_4. The titration givws unsatisfactory result when carried out in the presence of HCl, because HCl
(1) reduces permanganate to Mn^{2+}
(2) oxidises oxalic acid to carbon dioxide and water
(3) gets oxidised by oxalic acid to chlorine
(4) furnishes H^+ ions in addition to those from oxalic acid

77. **(1)**

78. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is
(1) R_2SiCl_2 (2) R_3SiCl (3) R_4Si (4) $RSiCl_3$

78. **(4)** $RSiCl_3$ on hydrolysis gives a cross-linked silicone.

79. Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below **:**

$$\tfrac{1}{2}Cl_2(g) \xrightarrow{\frac{1}{2}\Delta_{diss}H^\ominus} Cl(g) \xrightarrow{\Delta_{eg}H^\ominus} Cl^-(g) \xrightarrow{\Delta_{hyd}H^\ominus} Cl^-(aq)$$

The energy involved in the conversion of
$\tfrac{1}{2}Cl_2(g)$ to $Cl^-(aq)$
(using the data,

$\Delta_{diss}H^\ominus_{Cl_2} = 240$ kJ mol^{-1},

$\Delta_{diss}H^\ominus_{Cl} = -349$ kJ mol^{-1}

$\Delta_{diss}H^\ominus_{Cl^-} = -381$ kJ mol^{-1}) will be
(1) – 850 kJ mol^{-1} (2) + 120 kJ mol^{-1}
(3) + 152 kJ mol^{-1} (4) – 610 kJ mol^{-1}

79. **(4)** Energy involved = ½ × 240 – (349) – (381) = – 610 kJ / mol.

80. Which of the following factors is of ***no significance*** for roasting sulphide ores of the oxides and not subjecting the sulphide ores to carbon reduction directly?
(1) Metal sulphides are less stable than the corresponding oxides
(2) CO_2 is more volatile than CS_2
(3) Metal sulphides are thermodynamically more stable than CS_2
(4) CO_2 is thermodynamically more stable than CS_2

80. **(2)**

81. Four species are listed below:
i. HCO_3^- ***ii.*** H_3O^+ ***iii.*** HSO_4^- ***iv.*** HSO_3F
Which one of the following is the correct sequence of their acid strength?
(1) ***i < iii < ii < iv*** (2) ***iii < i < iv < ii***
(3) ***iv < ii < iii < i*** (4) ***ii < iii < i < iv***

81. **(1)**

82. Which one of the following constitutes a group of the isoelectronic species?
(1) CN^-, N_2, O_2^{2-}, C_2^{2-} (2) N_2, O_2^-, NO^+,CO
(3) C_2^{2-}, O_2^{2-}, CO, NO (4) NO^+, C_2^{2-},CN^-, N_2

82. **(4)** All of these have 14 electrons each.

83. Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives
(1) *p*-nitrophenol (2) nitrobenzene
(3) 2,4,6- trinitrobenzene (4) *o*-nitrophenol

83. **(3)**

84. The ionization enthalpy of hydrogen atom is 1.312×10^6 J mol^{-1} . The energy required to excite the electron in the atom from $n = 1$ to $n = 2$ is
(1) 7.56×10^5 J mol^{-1} (2) 9.84×10^5 J mol^{-1}
(3) 8.51×10^5 J mol^{-1} (4) 6.56×10^5 J mol^{-1}

84. **(2)** $E = 1.312 \times (3 / 4) \times 10^6 = 9.84 \times 10^5$ J mol^{-1}

85. The organic chloro compound, which shows complete sterochemical inversion during a S_N2 reaction, is
(1) $(CH_3)_2CHCl$ (2) CH_3Cl (3) $(C_2H_5)_2CHCl$ (4) $(CH_3)_3CCl$

85. **(2)**

86. Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains
(1) mixture of *o*-and *p*-bromoanilines (2) mixture of *o*- and *m*-bromotoluenes
(3) mixture of *o*-and *p*-bromotoluenes (4) mixture of *o*-and *p*-dibromobenzenes

86. **(3)** *o*-and *p*-nitrotoluene is converted to *o*-and *p*-nitrobenzene which are diazotised and we get bromo derivatives of toluene.

87. In the following sequence of reactions, the alkene affords the compound '*B*'

$$CH_3CH = CHCH_3 \xrightarrow{O_3} A \xrightarrow[Zn]{H_2O} B.$$

The compound *B* is

(1) $CH_3CH_2COCH_3$ (2) CH_3CHO
(3) CH_3CH_2CHO (4) CH_3COCH_3

87. **(2)**

88. Which one of the following pairs of species have the same bond order?

(1) O_2^- and CN^- (2) NO^+ and CN^+
(3) CN^- and NO^+ (4) CN^- and CN^+

88. **(3)** CN^- and NO^+ have same number of electrons

89. At 80°C, the vapour pressure of pure liquid '*A*' is 520 mm *Hg* and that of pure liquid '*B*' is 1000 mm *Hg*. If a mixture solution of '*A*' and '*B*' boils at 80°C and 1 atm pressure, the amount of '*A*' in the mixture is (1 atm = 760 mm *Hg*)

(1) 48 mol percent (2) 50 mol percent
(3) 52 mol percent (4) 34 mol percent

89. **(2)**

90. For a reaction $\frac{1}{2} A \rightarrow 2B$, rate of disapperance of '*A* ' is related to the rate of appearance of '*B*' by the expression

(1) $-d[A]/dt = d[B]/dt$ (2) $-d[A]/dt = 4\ \{d[B]/dt\}$
(3) $-d[A]/dt = \frac{1}{2}\ \{d[B]/dt\}$ (4) $-d[A]/dt = (1/4)\ \{d[B]/dt\}$

90. **(4)** rate of disappearance of *A* is $-2d[A]/dt$
rate of appearance of *B* is $\frac{1}{2}\, d[B]/dt$

91. The equilibrium constants K_{P_1} and K_{P_2} for the reactions $X \leftrightarrow 2Y$ and $Z \leftrightarrow P + Q$, respectively are in the ratio of 1 : 9. If the degree of dissociation of *X* and *Z* be equal then the ratio of total pressures at equilibria is

(1) 1 : 3 (2) 1 : 9 (3) 1 : 36 (4) 1 : 1

91. **(3)**

92. In context with the industrial preparation of hydrogen from water gas ($CO + H_2$), which of the following is the correct statement?

(1) H_2 is removed through occlusion with *Pd*
(2) *CO* is oxidised to CO_2 with steam in the preence of a catalyst followed by absorption of CO_2 in alkali.
(3) *CO* and H_2 are fractionally separated using differences in their densities.
(4) *CO* is removed by absorption in aqueous Cu_2Cl_2 solution.

92. **(4)** In Bosch process, *CO* is removed by absorption in Cu_2Cl_2 solution.

93. In which of the following octahedral complexes of *Co*(at.no. 27) will the magnitude of Δ_0 be the highest?
(1) $[Co(H_2O)_6]^{3+}$ (2) $[Co(NH_3)_6]^{3+}$ (3) $[Co(CN)_6]^{3-}$ (4) $[Co(C_2O_4)_3]^{3+}$

93. **(3)** CN^- is a very strong ligand and cause maximum splilting

94. The coordination number and the oxidation state of the element '*E*' in the complex $[E(en)_2(C_2O_4)]NO_2$ (where (*en*) is ethylene diamine) are, respectively.
(1) 4 and 3 (2) 6 and 3 (3) 6 and 2 (4) 4 and 2

94. **(2)** Oxidation number = 3 ; $x + O + (-2) - (-1) = 0 \Rightarrow x = 3$
Co-ordination number = 6 [both oxalate and (en) are bidentate ligand]

95. Identify the ***wrong*** statement in the following **:**
(1) Ozone layer does not permit infrared radiation from the sun to reach the earth
(2) Acid rain is mostly because of oxides of nitrogen and sulphur
(3) Chlorofluorocarbons are responsible for ozone layer depletion
(4) Greenhouse effect is responsible for global warming

95. **(1)**

96. Larger number of oxidation states are exhibited by the actinoids than those by the lanthanoids, the main reason being
(1) more energy difference between 5*f* and 6*d* than between 4*f* and 5*d* orbitals
(2) more reactive nature of the actinoids than the lanthanoids
(3) 4*f* orbitals more diffused than the 5*f* orbitals
(4) lesser energy difference between 5*f* and 6*d* than between 4*f* and 5*d* orbitals

96. **(3)** 5*f* orbitals extend inot space beyond the 6*s* and 6*p* and participate in bonding whereas 4f is buried deep inside the atom.

97. In a compound, atoms of element *Y* form ccp lattice and those of element *X* occupy (2 / 3)rd of tetrahedral voids. The formula of the compound will be
(1) X_2Y (2) X_3Y_4 (3) X_4Y_3 (4) X_2Y_3

97. **(3)**

98. Gold numbers of protective colloids *A*, *B*, *C* and *D* are 0.50, 0.01, 0.10 and 0.005, respectively. The correct order of their protective powers is
(1) $A < C < B < D$ (2) $B < D < A < C$
(3) $D < A < C < B$ (4) $C < B < D < A$

98. **(1)** Higher is the gold number, lower will be the protective power $A < C < B < D$

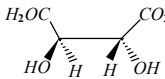
99. The vapour pressure of water at 20°C is 17.5 mm *Hg*. If 18 g of glucose ($C_6H_{12}O_6$) is added to 178.2 g of water at 20°C, the vapour pressure of the resulting solution will be
(1) 16.500 mm *Hg* (2) 17.325 mm *Hg*
(3) 17.675 mm *Hg* (4) 15.750 mm *Hg*

99. **(2)** $(17.5 - p_s) / p_s = 0.1 / (01 + 9.9) \Rightarrow p_s = 17.326$ mm of *Hg*.

100. Bakelite is obtained from phenol by reacting with
(1) CH_3COCH_3 (2) $HCHO$ (3) $(CH_2OH)_2$ (4) CH_3CHO

100. **(2)** Phenol and formaldehyde reacted in the presence of a basic catalyst to form bakelite.

101. The absolute configuration of



(1) *R*, *S* (2) *S*, *R* (3) *S*, *S* (4) *R*, *R*

101. (4)

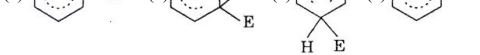
102. For the following three reactions a, b and c, equilibrium constants are given:
a. $CO\ (g) + H_2O\ (g) \leftrightarrow CO_2\ (g) + H_2\ (g)$; K_1
b. $CH_4\ (g) + H_2O\ (g) \leftrightarrow CO\ (g) + 3H_2\ (g)$; K_2
c. $CH_4(g) + 2H_2O\ (g) \leftrightarrow CO_2(g) + 4H_2\ (g)$; K_3
Which of the following relations is correct?
(1) $K_3 = K_1 K_2$ (2) $K_3 . K^3_2 = K_1^2$
(C) $K_1\sqrt{K_2} = K_3$ (4) $K_2 K_3 = K_1$

102. **(1)** Equation (c) can be obtained by adding equation (a) and (b) $\therefore\ k_3 = k_1 . k_2$

103. Standard energy of X_2, Y_2 and XY_3 are 60, 40 and 50 $JK^{-1}\ mol^{-1}$, respectively. For the reaction, $\frac{1}{2} X_2 + (3/2)\ Y_2 \rightarrow XY_3$, $\Delta H = -30$ kJ, to be at equilibrium, the temperature will be
(1) 750 K (2) 1000 K (3) 1250 K (4) 500 K

103. **(1)** $\Delta G = \Delta H - T\Delta S \Rightarrow \Delta H = T\Delta S \quad \Delta S = 50 - \frac{1}{2}(60) - (3/2)(40) = -40$
$\therefore\ T = (-30 \times 1000) / -40 \Rightarrow 750$ K

104. The electrophilie, E^+ attacks the benzene ring to generate the intermediate σ-complex. Of the following, which σ-complex is of lowest energy?



104. **(4)**

105. α-*D*-(+)-glucose and β-*D*-(+)- glucose are
(1) anomers (2) enantiomers (3) conformers (4) epimers

105. **(1)** Due to anomeric carbon glucose exists in two forms having different physical properties are called anomers.