

CHEMISTRY

Atomic numbers: Mn = 25, Fe = 26, Co = 27, Ni = 28

Atomic masses: C = 12, O = 16, Cl = 35.5, K = 39, Mn = 55

Universal gas constant, $R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1} = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$

81. The bond order in NO is 2.5 while that in NO^+ is 3. Which of the following statements is true for these two species?

- (a) Bond length in NO^+ is greater than in NO
- (b) Bond length is unpredictable
- (c) Bond length in NO^+ is equal to that in NO
- (d) Bond length in NO is greater than in NO^+

82. Which one of the following has the regular tetrahedral structure?

- (a) XeF_4
- (b) $[\text{Ni}(\text{CN})_4]^{2-}$
- (c) BF_4^-
- (d) SF_4

83. For the reaction, $\text{CO}(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{COCl}_2(\text{g})$ the $\frac{K_p}{K_c}$ is equal to

- (a) $\frac{1}{RT}$
- (b) 1.0
- (c) \sqrt{RT}
- (d) RT

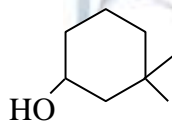
84. Excess of KI reacts with CuSO_4 solution and then $\text{Na}_2\text{S}_2\text{O}_3$ solution is added to it. Which of the statements is incorrect for this reaction?

- (a) Cu_2I_2 is formed
- (b) Evolved I_2 is reduced
- (c) $\text{Na}_2\text{S}_2\text{O}_3$ is oxidised
- (d) CuI_2 is formed

85. Which one of the following complexes is an outer orbital complex?

- (a) $[\text{Fe}(\text{CN})_6]^{4-}$
- (b) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
- (c) $[\text{Co}(\text{NH}_3)_6]^{3+}$
- (d) $[\text{Mn}(\text{CN})_6]^{4-}$

86. The IUPAC name of the compound



is

- (a) 3, 3-dimethyl-1-hydroxy cyclohexane
- (b) 1,1-dimethyl-3-cyclohexanol
- (c) 3, 3-dimethyl-1- cyclohexanol
- (d) 1,1-dimethyl-3-hydroxy cyclohexane

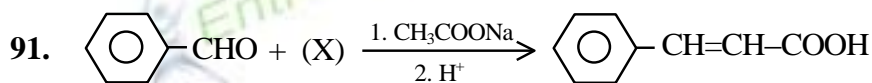
87. Consider the acidity of the carboxylic acids.

- (I) PhCOOH
- (II) $\text{o-NO}_2\text{C}_6\text{H}_4\text{COOH}$
- (III) $\text{p-NO}_2\text{C}_6\text{H}_4\text{COOH}$
- (IV) $\text{m-NO}_2\text{C}_6\text{H}_4\text{COOH}$

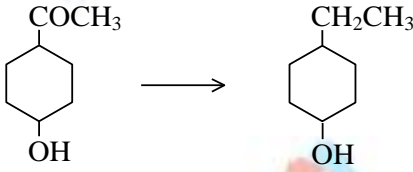
Which of the following order is correct?

- (a) (I) > (II) > (III) > (IV)
- (b) (II) > (III) > (IV) > (I)
- (c) (II) > (IV) > (I) > (III)
- (d) (II) > (IV) > (III) > (I)

88. The quantum numbers $+1/2$ and $-1/2$ for the electron spin represent
 (a) rotation of the electron in clockwise and anticlockwise direction respectively
 (b) rotation of the electron in anticlockwise and clockwise direction respectively
 (c) magnetic moment of the electron pointing up and down respectively
 (d) two quantum mechanical spin states which have no classical analogue
89. The equivalent weight of an element is 29.4. The electrochemical equivalent of this element is
 (a) 3.04×10^{-4} (b) 4.56×10^{-4}
 (c) 6.08×10^{-4} (d) 1.52×10^{-4}
90. The number of O–O bonds in (CrO_5) is
 (a) three (b) two
 (c) one (d) zero



Identify the compound (X).

- (a) CH_3COOH (b) $(\text{CH}_3\text{CO})_2\text{O}$
 (c) BrCH_2COOH (d) $\text{CHO}-\text{COOH}$
92. The order of reactivity of the following compounds with PhMgBr is
 (I) PhCOPh (II) CH_3CHO (III) CH_3COCH_3
 (a) (I) > (II) > (III) (b) (III) > (I) > (II)
 (c) (II) > (I) > (III) (d) (II) > (III) > (I)
93. Which of the following compound will not give a positive iodoform test?
 (a) $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{COOH}$ (b) $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
 (c) $\text{C}_6\text{H}_5-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$ (d) $\text{C}_6\text{H}_5-\underset{\text{O}}{\text{C}}-\text{CH}_2\text{I}$
94. The appropriate reagent for the following transformation is

- (a) Zn-Hg, HCl (b) $\text{NH}_2\text{NH}_2, \text{KOH}$
 (c) LiAlH_4 (d) HI, P_4
95. Which of the following dicarboxylic acid gives cyclic ketone on heating?
 (a) $\text{CH}_2(\text{COOH})_2$ (b) $\begin{array}{c} \text{CH}_2\text{COOH} \\ | \\ \text{CH}_2\text{COOH} \end{array}$



96. For a hypothetical reaction, $\text{A} + \text{B} \longrightarrow \text{C} + \text{D}$, the rate = $k[\text{A}]^{-1/2} [\text{B}]^{3/2}$. On doubling the concentration of A and B, the rate will be (assume that the concentration of A & B initially were same)

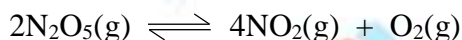
(a) 4 times

(b) 2 times

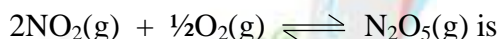
(c) 3 times

(d) none of these

97. If the equilibrium constant for the reaction,



is $x \text{ M}^{-3}$. The equilibrium constant for the reaction



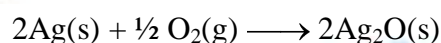
(a) \sqrt{x}

(b) $\sqrt{x^{-1}}$

(c) x^2

(d) x

98. For the combustion reaction at 298 K,



which of the following relation will be true?

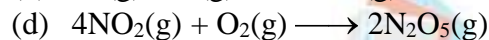
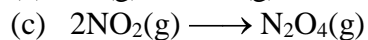
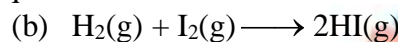
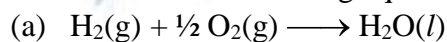
(a) $\Delta H = \Delta U$

(b) $\Delta H > \Delta U$

(c) $\Delta H < \Delta U$

(d) ΔH and ΔU bear no relation with each other

99. For which of the following equation, will ΔH be equal to ΔU ?



100. For a system, $\text{A}(\text{g}) + 2\text{B}(\text{g}) \rightleftharpoons 3\text{C}(\text{g}) + \text{D}(\text{g})$ at equilibrium, if volume is doubled, the reaction shifts in

(a) forward direction

(b) backward direction

(c) equilibrium will not be disturbed

(d) none of these

101. The degree of dissociation for a reaction, $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$ is 0.01. What would be K_c for the reaction assuming initial concentration of N_2O_4 is 1 M.

(a) $0.4 \times 10^{-3} \text{ M}$

(b) $0.5 \times 10^{-3} \text{ M}$

(c) $0.3 \times 10^{-3} \text{ M}$

(d) $0.2 \times 10^{-3} \text{ M}$

102. When a poly atomic gas undergoes an adiabatic expansion, its temperature and volume are related by the equation $\text{TV}^n = \text{constant}$, the value of n will be

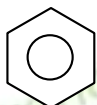
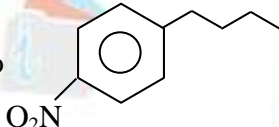
(a) 1.33

(b) 0.33

(c) 2.33

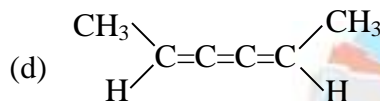
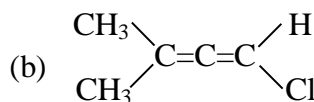
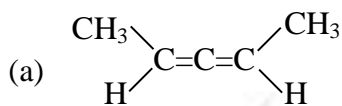
(d) 1

103. Concentration of NaOH at 25°C is 10^{-3} M. pH at this temperature is
 (a) 7 (b) 8
 (c) 9 (d) 11
104. In a mixture of two volatile liquids A and B, the mole fraction of A is 0.4. What would be the mole fraction of A in the vapour phase if the vapour pressure of pure components are given as $P_A^\circ = 100$ mm Hg and $P_B^\circ = 100$ mm Hg.
 (a) 0.4 (b) 0.6
 (c) 0.25 (d) none of these
105. The molal depression constant for water is 1.86 K kg/mol. What will be, the freezing point of 0.1 M KCl in water assuming molality is same as molarity?
 (a) $+1.86^\circ\text{C}$ (b) -0.186°C
 (c) -0.372°C (d) -0.093°C
106. If the anions (A) form hexagonal closed packing and cations (C) occupy only 2/3 of the octahedral voids in it, then the general formula of the compound would be
 (a) CA (b) CA_2
 (c) C_2A_3 (d) C_3A_2
107. A solid has a structure in which tungsten (W) atoms are located at the corners of a cubic lattice, O atoms at the center of edges and Na atom at the center of cube. The formula for the compound is
 (a) NaWO_2 (b) NaWO_3
 (c) Na_2WO_3 (d) NaWO_4
108. The amount of KMnO_4 required to prepare 100 ml of 0.1 N solution in alkaline medium when KMnO_4 is reduced to K_2MnO_4 is
 (a) 1.58 g (b) 0.52 g
 (c) 3.16 g (d) 0.31 g
109. In Bohr's hydrogen atom, the electronic transition emitting light of longest wavelength among the following is
 (a) $n = 5$ to $n = 4$ (b) $n = 4$ to $n = 3$
 (c) $n = 3$ to $n = 2$ (d) $n = 4$ to $n = 2$
110. If E_1 , E_2 and E_3 represent respectively the kinetic energies of an electron, α -particle and a proton, each having same de-Broglie's wave length, then
 (a) $E_1 > E_3 > E_2$ (b) $E_2 > E_3 > E_1$
 (c) $E_1 > E_2 > E_3$ (d) $E_1 = E_2 = E_3$

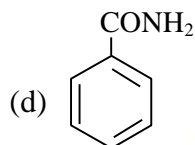
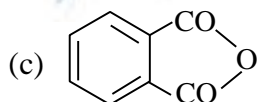
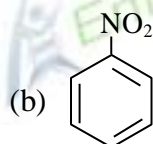
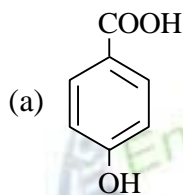
111. To transform  into , initial steps could be

- (a) Nitration followed by Friedel-Crafts alkylation.
 (b) Friedel-Crafts alkylation followed by nitration.
 (c) Nitration followed by Friedel-Crafts acylation.
 (d) Friedel-Crafts acylation followed by Clemmensen's reduction followed by nitration.

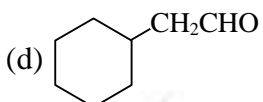
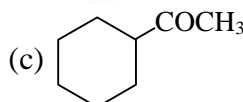
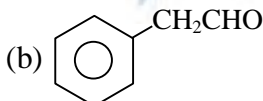
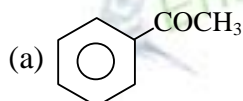
112. Which of the following compound is optically active?



113. Buff coloured precipitate is obtained when FeCl_3 is treated with



114. Hydration of in presence of $\text{H}_2\text{SO}_4/\text{HgSO}_4$ gives



115. The standard heat of formation values of $\text{SF}_6(\text{g})$, $\text{S}(\text{g})$ and $\text{F}(\text{g})$ are: -1100 , 275 and 80 kJ mol^{-1} respectively. Then the average S – F bond energy in SF_6 would be

- (a) 301 kJ mol^{-1} (b) 320 kJ mol^{-1} (c) 309 kJ mol^{-1} (d) 280 kJ mol^{-1}

116. The oxidation of oxalic acid by acidified KMnO_4 becomes fast as the reaction progresses due to:

- (a) auto catalysis by Mn^{+2} (b) presence of SO_4^{-2}
(c) presence of K^+ (d) presence of MnO_4^-

117. Which of the following is/are diamagnetic?

- (i) $\text{Ni}(\text{CO})_4$ (ii) $[\text{NiCl}_4]^{2-}$
(iii) $[\text{Ni}(\text{CN})_4]^{2-}$ (iv) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$
(a) (i) only (b) (ii) only
(c) (i) and (iii) only (d) (iv) only

118. During the electrolysis of aqueous nitric acid solution using Pt electrodes

- (a) O_2 is liberated at the cathode. (b) N_2 is liberated at the anode.
(c) O_2 is liberated at the anode. (d) H_2 is liberated at the anode.

119. Colloidal solution is

- (a) true solution.
(c) heterogeneous sol.

- (b) suspension.
(d) homogenous sol.

120. To make E_{cell} of the following concentration cell positive, what should be the relative concentration of Cl^- ions in the two half cells?



- (a) $C_1 > C_2$
(c) $C_1 = C_2$

- (b) $C_1 < C_2$
(d) E_{cell} cannot be positive