CHEMISTRY

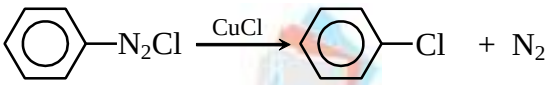
Atomic masses: H = 1, C = 12, N = 14, O = 16
Avogadro's number (N_{AV}): 6.023×10^{23}
Atomic numbers: V = 23, Cr = 24, Fe = 26

51. The compound, which will give a precipitate with $AgNO_3$ solution, is
(a) CCl_4 (b) $CH_3–CH_2–Cl$
(c) $(CH_3)_3CCl$ (d) $CHCl_3$

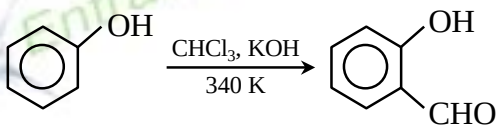
52. For the reaction $C_2H_5OH + HX \longrightarrow C_2H_5X + H_2O$ the order of reactivity is
(a) HCl > HBr > HI (b) HI > HBr > HCl
(c) HBr > HCl > HI (d) HI > HCl > HBr

53. Equation showing 'Sandmeyer's reaction' is

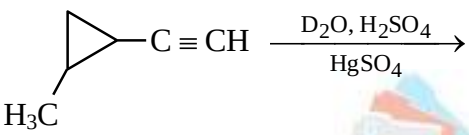
(a) $2CH_3CHO \xrightarrow{NaOH} CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_2 - CHO$

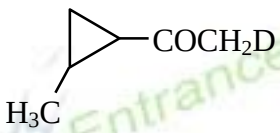
(b) 

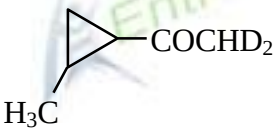
(c) 

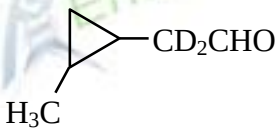
(d) 

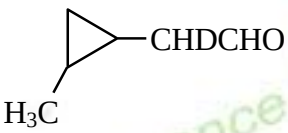
54. On boiling with concentrated hydrobromic acid, ethyl phenyl ether will yield
(a) phenol and ethyl bromide (b) bromobenzene and ethanol
(c) phenol and ethane (d) bromobenzene and ethane

55.  Product (P). The principal organic product P is

(a) 

(b) 

(c) 

(d) 

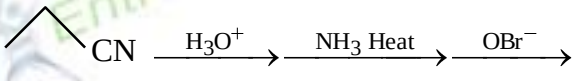
56. Formic acid and acetic acid may be distinguished by the reaction with
(a) Sodium (b) 2,4–Dinitrophenyl hydrazine
(c) Sodium ethoxide (d) Dilute acidic permanganate

57. Schiff's reagent is
(a) magenta coloured solution of rosaniline hydrochloride decolourised with H_2SO_3.
(b) magenta solution of rosaniline hydrochloride decolourised with Cl_2.
(c) magenta solution of cobalt chloride solution.
(d) manganese sulphate solution made ammonical.

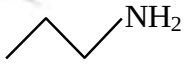
58. Order of ease of esterification of following alcohols with HCOOH
(I) CH_3CH_2OH (II) $(CH_3)_2CHOH$ (III) $(CH_3)_3COH$

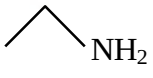
(a) I < II < III (b) III < II < I
(c) II < I < III (d) equal

59. Treatment of aniline with bromine water produces
(a) 2, 4, 6-tribromoaniline (b) mixture of ortho and para bromoaniline
(c) bromobenzene (d) N-bromoaniline

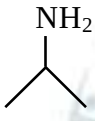
60. 

A. The product A of the reaction sequence is

(a) 

(b) 

(c) 

(d) 

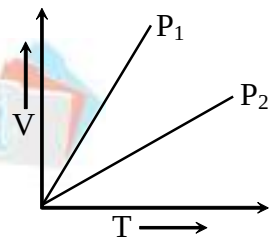
61. One litre of 0.1 M $CuSO_4$ solution is electrolysed till the whole of copper is deposited at cathode. During the electrolysis a gas is released at anode. The volume of the gas evolved at anode at STP is
(a) 112 mL (b) 254 mL (c) 1120 mL (d) 2240 mL

62. An element (X) having equivalent mass E forms a general oxide X_mO_n, its atomic mass should be
(a) $\frac{2En}{m}$ (b) 2mEn (c) $\frac{E}{n}$ (d) $\frac{mE}{2n}$

63. A vessel contains equal masses of three gases A, B and C. The total pressure exerted by the mixture of gases is 3.5 bar at 25°C. The molecular mass of C is twice that of B and molecular mass of A is half of that of B. The partial pressure of B in the vessel is
(a) 1 bar (b) 2 bar (c) 1.5 bar (d) 2.5 bar

64. At relatively high pressure, van der Waal's equation reduces to
(a) PV = RT (b) PV = RT – a/V (c) PV = RT + Pb (d) $PV = RT - a/V^2$

65. The volume (V) of an ideal gas is plotted against its temperature (T) at constant pressures P_1 and P_2. The plots are shown in the figure. So the correct relation between P_1 and P_2 is



(a) $P_1 > P_2$ (b) $P_1 < P_2$
(c) $P_1 = P_2$ (d) $\frac{P_2}{P_1} = \frac{1}{2}$

66. 2 g of hydrogen diffuses out from a container in 10 min. What mass of chlorine will diffuse out in the same time from the same container under similar conditions?
(a) $\sqrt{2\times 71}$ g (b) $\sqrt{\frac{2}{71}}$ g (c) $\sqrt{\frac{71}{2}}$ g (d) $\sqrt{71}$ g

67. An element A has face centred cubic structure with edge length equal to 361 pm. The apparent radius of atom A is
(a) 127.6 pm (b) 180.5 pm (c) 160.5 pm (d)64 pm

68. When electrons are trapped in the crystal lattice in place of anion vacancy, the defect in the crystal is called

(a) F-centre (b) dislocation (c) electronic defect (d)G-centre

69. If the speed of an electron in the Bohr's first orbit of hydrogen atom be x, then the speed of the electron in second orbit of He^+ is

(a) $\frac{x}{2}$ (b) $2x$ (c) x (d)$4x$

70. Which one of the following statements is incorrect?

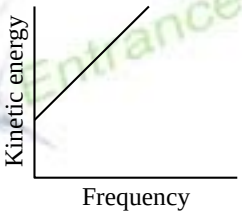
(a) Isotones are atoms of different elements having same number of neutrons.

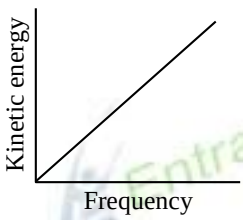
(b) Isotopes are atoms of different elements having same number of protons.

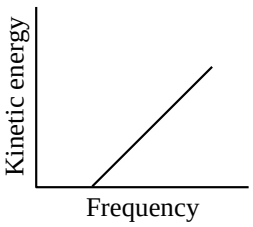
(c) Isobars are atoms of different elements having same number of nucleons.

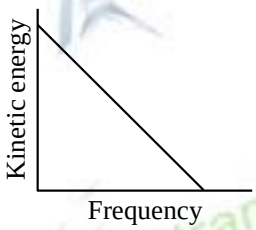
(d) Isotones and isobars are atoms of different elements.

71. According to Einstein's photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

(a) 

(b) 

(c) 

(d) 

72. The kinetic energy of an electron in n^{th} orbit of hydrogen atom is given by the relation

(a) $K^2\frac{4\pi^2me^4}{n^2h^2}$ (b) $-K^2\frac{2\pi^2me^4}{n^2h^2}$

(c) $K^2\frac{2\pi^2me^4}{n^2h^2}$ (d) none of these

where K is constant, h is planck's constant, m is the mass and e is the charge of an electron.

73. The basic character of oxides MgO, SrO, K_2O, NiO, Cs_2O increase in the order

(a) $MgO > SrO > K_2O > NiO > Cs_2O$ (b) $Cs_2O < K_2O < MgO < SrO < NiO$

(c) $NiO < MgO < SrO < K_2O < Cs_2O$ (d) $K_2O < NiO < MgO < SrO < Cs_2O$

74. The rate of disintegration of a radioactive element changes from initial value of 10,000 dpm to 2500 dpm in 50 days. The decay constant is

(a) $\frac{2500}{10000}d^{-1}$ (b) $1.386 \times 10^{-2}\ d^{-1}$

(c) $\frac{0.693}{2.303} \times 50\ d^{-1}$ (d) $2.772 \times 10^{-2}\ d^{-1}$

75. How many moles of butane must be burnt to increase the temperature of 10 dm^3 of water from 30ºC to 100ºC? Given that $\Delta H^{\circ}_{comb.}$ of butane, density of H_2O and specific heat of water are -2.879×10^3 kJ mol^{-1}, 1.0 g cm^{-3}, 4.184 JK^{-1} g^{-1} respectively.
(a) 1.017 mol (b) 2.1 mol (c) 1.5 mol (d)0.8 mol

76. A system X undergoes following changes ; $\underset{(P_1V_1T_1)}{\mathbf{X}} \longrightarrow \underset{(P_2V_2T_1)}{\mathbf{W}} \longrightarrow \underset{(P_3V_2T_2)}{\mathbf{Z}} \longrightarrow \underset{(P_1V_1T_1)}{\mathbf{X}}$

The overall process may be called
(a) reversible process (b) cyclic process
(c) cyclic as well as reversible (d) isochoric process

77. Examine the two spontaneous reactions and mark the correct statement
(i) $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$; $\Delta H = -890$ kJ
(ii) $2HgO(s) \longrightarrow 2Hg(l) + O_2(g) - 181.6$ kJ
(a) both the reactions are exothermic (b) both the reactions are endothermic
(c) sign of ΔS for both is negative (d) sign of ΔG for both is negative

78. $\Delta H^{o}_{Combustion}$ of NH_3 and H_2 gases at 298 K are 9.06 kcal and 68.9 kcal respectively. $\Delta H^{o}_{formation}$ of ammonia at 298 K in kcal mol^{-1} is
(a) + 94.3 (b) + 112.3
(c) – 112.3 (d) – 94.3

79. Pure ammonia is placed in a vessel at a temperature when its dissociation is appreciable. At equilibrium
(a) α does not change with pressure.
(b) concentration of ammonia does not change with pressure.
(c) concentration of hydrogen is less than that of nitrogen.
(d) K_p does not change significantly with pressure.

80. If *x* is the degree of dissociation of PCl_5 at a given temperature in the equilibrium $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$. 2 moles of PCl_5 are taken in a vessel, then at equilibrium the total number of moles of various species would be
(a) 4 (b) 2 + x
(c) 2(1 – x) (d) 2(1 + x)

81. The conjugate acid of NH_2^- is
(a) NH_3 (b) NH_4^+
(c) N_2H_4 (d) NH_2OH

82. The correct order of increasing $[H_3O^+]$ in the following aqueous solutions is
(a) 0.01 M H_2S < 0.01 M H_2SO_4 < 0.01 M NaCl < 0.01 M $NaNO_2$
(b) 0.01 M NaCl < 0.01 M $NaNO_2$ < 0.01 M H_2S < 0.01 M H_2SO_4
(c) 0.01 M $NaNO_2$ < 0.01 M NaCl < 0.01 M H_2S < 0.01 M H_2SO_4
(d) 0.01 M H_2S < 0.01 M $NaNO_2$ < 0.01 M NaCl < 0.01 M H_2SO_4

83. For preparing a buffer solution of pH 5 by mixing sodium acetate and acetic acid, the ratio of the concentration of salt and acid should be ($K_a = 10^{-5}$)
(a) 1 : 10 (b) 1 : 1
(c) 10 : 1 (d) 1 : 100

84. A hypothetical reaction, $X_2 + Y_2 \rightarrow 2XY$ follows the mechanism as given below

$X_2 \longrightarrow X + X$ ..... (Fast)

$X + Y_2 \longrightarrow XY + Y$ ..... (Slow)

$X + Y \longrightarrow XY$ ..... (Fast)

The order of the overall reaction is

(a) 2 (b) 1 (c) 1.5 (d) zero

85. If order of reaction $A + B \xrightarrow{hv} AB$ is zero. It means that

(a) rate of reaction is independent of temperature

(b) rate of reaction is independent of the concentration of the reacting species

(c) the rate of formation of activated complex is zero

(d) rate of decomposition of activated complex is zero

86. Two liquids A and B have $p^\circ_A > p^\circ_B$. They constitute an ideal binary solution. Which one of the following relations between mole fraction of A in liquid phase (x_A) and that in vapour phase (y_A) is true?

(a) $x_A = y_A$ (b) $x_A > y_A$

(c) $x_A < y_A$ (d) no correlation between x_A and y_A

87. 4.8% solution of glucose would be isotonic with respect to ..... solution of urea

(a) 4.5% (b) 13.5% (c) 1.5% (d) 9%

88. The ratio of elevation in boiling point of aqueous solution of sodium chloride to that of an aqueous solution of glucose of same molalities is approximately

(a) 1 (b) 2 (c) 0.5 (d) 2.5

89. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3]^{-1}$ is

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

90. From the following facts

(i) $2X^- + Y_2 \longrightarrow 2Y^- + X_2$ (ii) $2W^- + Y_2 \longrightarrow$ No reaction

(iii) $2Z^- + X_2 \longrightarrow 2X^- + Z_2$

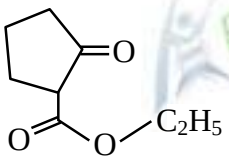
predict the correct relation among the reduction potentials of the species used in the above reactions.

(a) $E_{W_2/W^-} > E_{Y_2/Y^-} > E_{X_2/X^-} > E_{Z_2/Z^-}$ (b) $E_{W_2/W^-} > E_{Y_2/Y^-} > E_{Z_2/Z^-} > E_{X_2/X^-}$

(c) $E_{W_2/W^-} > E_{Z_2/Z^-} > E_{Y_2/Y^-} > E_{X_2/X^-}$ (d) $E_{W_2/W^-} > E_{X_2/X^-} > E_{Y_2/Y^-} > E_{Z_2/Z^-}$

91. The net charge on one gram-ion of N^{3-} has been calculated by a student as $Y \times 10^6$C. The value of Y is

(a) 2.88 (b) 8.2 (c) 6 (d) 3.49

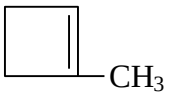
92. The IUPAC name of the compound  is

(a) 2-carbethoxy cyclopentan-1-one (b) 1-oxo-2-carbethoxy cyclopentane

(c) carbethoxy cyclo pentanone (d) none of these

93. Among the following compounds that can exist as enantiomers

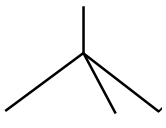
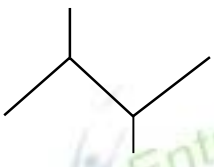
(a) $CH_3CH=C=CHCH_3$ (b) $CH_3 \cdot CH(OH) \cdot COOH$

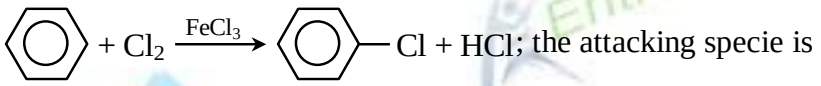
(c)  (d) Both (a) and (b)

94. Sec-butyl chloride on boiling with alcoholic KOH gives ..... as the major product.
(a) 1-butene (b) 2-butene (c) 1-butanol (d) 2-butanol

95. The compound that has the highest boiling point

(a)  (b) 

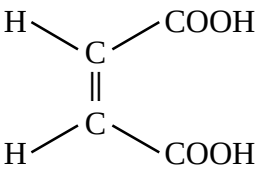
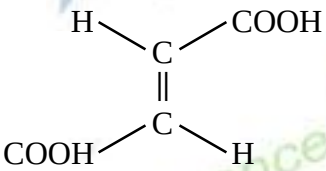
(c)  (d) 

96. In the reaction,  the attacking specie is

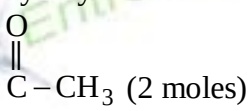
(a) Cl_2 (b) Cl^+
(c) Cl^- (d) $FeCl_4^-$

97. Which one of the following organic compounds readily decolourises bromine water and forms an anhydride on heating?

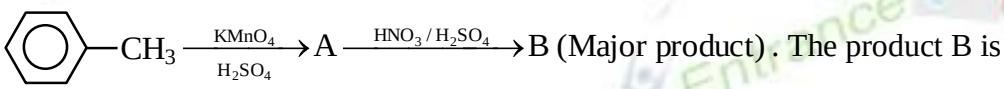
(a)  (b) 

(c)  (d) 

98. Cyclohexene on ozonolysis followed by reductive hydrolysis yields

(a) CH_3CH_2CHO (2 moles) (b)  (2 moles)

(c)  (d) $OHC-(CH_2)_4-CHO$

99.  The product B is

(a) 4-nitrotoluene (b) 3-nitrotoluene
(c) 3-nitrobenzoic acid (d) 4-nitrobenzoic acid

100. Among following, the alkane which exists in solid state at room temperature
(a) n-heptane (b) n-octane
(c) n-decane (d) none of these