46. The correct order of N-compounds in its decreasing order of oxidation states is

(1) HNO_3, NH_4Cl, NO, N_2

(2) HNO_3, NO, NH_4Cl, N_2

(3) HNO_3, NO, N_2, NH_4Cl

(4) NH_4Cl, N_2, NO, HNO_3

47. Which one of the following elements is unable to form MF_6^{3-} ion ?

(1) B

(2) Al

(3) Ga

(4) In

48. Considering Ellingham diagram, which of the following metals can be used to reduce alumina ?

(1) Mg

(2) Zn

(3) Fe

(4) Cu

49. The correct order of atomic radii in group 13 elements is

(1) B < Ga < Al < Tl < In

(2) B < Al < Ga < In < Tl

(3) B < Al < In < Ga < Tl

(4) B < Ga < Al < In < Tl

50. Which of the following statements is ***not*** true for halogens ?

(1) All but fluorine show positive oxidation states.

(2) All are oxidizing agents.

(3) All form monobasic oxyacids.

(4) Chlorine has the highest electron-gain enthalpy.

51. In the structure of ClF_3, the number of lone pairs of electrons on central atom 'Cl' is

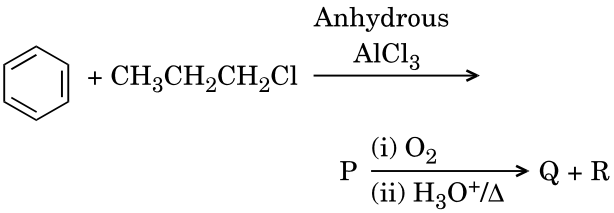
(1) four

(2) two

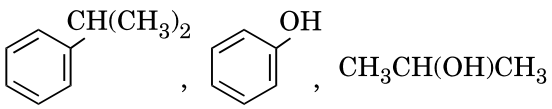
(3) one

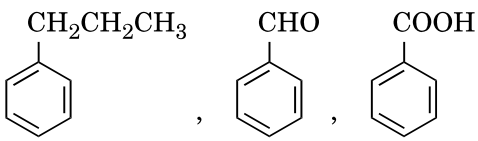
(4) three

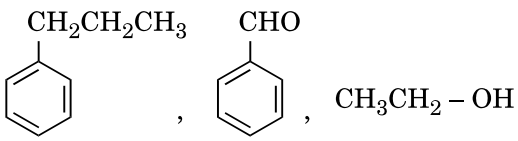
52. Identify the major products P, Q and R in the following sequence of reactions :

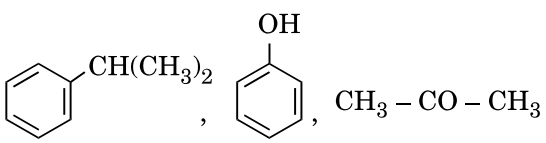


P Q R

(1) 

(2) 

(3) 

(4) 

53. Which of the following compounds can form a zwitterion ?

(1) Benzoic acid

(2) Acetanilide

(3) Aniline

(4) Glycine

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54. Regarding cross-linked or network polymers, which of the following statements is ***incorrect*** ?

(1) Examples are bakelite and melamine.

(2) They are formed from bi- and tri-functional monomers.

(3) They contain covalent bonds between various linear polymer chains.

(4) They contain strong covalent bonds in their polymer chains.

55. Nitration of aniline in strong acidic medium also gives m-nitroaniline because

(1) In absence of substituents nitro group always goes to m-position.

(2) In electrophilic substitution reactions amino group is meta directive.

(3) In spite of substituents nitro group always goes to only m-position.

(4) In acidic (strong) medium aniline is present as anilinium ion.

56. The difference between amylose and amylopectin is

(1) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

(2) Amylose have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

(3) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ α-linkage

(4) Amylose is made up of glucose and galactose

57. A mixture of 2·3 g formic acid and 4·5 g oxalic acid is treated with conc. H_2SO_4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be

(1) 2·8

(2) 3·0

(3) 1·4

(4) 4·4

58. Which of the following oxides is most acidic in nature ?

(1) BaO

(2) BeO

(3) MgO

(4) CaO

59. Which oxide of nitrogen is ***not*** a common pollutant introduced into the atmosphere both due to natural and human activity ?

(1) N_2O

(2) NO_2

(3) N_2O_5

(4) NO

60. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether. A, B and C are in the order

(1) C_2H_5Cl, C_2H_6, C_2H_5OH

(2) C_2H_5OH, C_2H_5Cl, C_2H_5ONa

(3) C_2H_5OH, C_2H_6, C_2H_5Cl

(4) C_2H_5OH, C_2H_5ONa, C_2H_5Cl

61. The compound C_7H_8 undergoes the following reactions :

$$C_7H_8 \xrightarrow{3\ Cl_2\ /\ \Delta} A \xrightarrow{Br_2\ /\ Fe} B \xrightarrow{Zn\ /\ HCl} C$$

The product 'C' is

(1) 3-bromo-2,4,6-trichlorotoluene

(2) *o*-bromotoluene

(3) *m*-bromotoluene

(4) *p*-bromotoluene

62. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is

(1) $CH_3 - CH_3$

(2) $CH_2 = CH_2$

(3) $CH \equiv CH$

(4) CH_4

63. Which of the following molecules represents the order of hybridisation sp^2, sp^2, sp, sp from left to right atoms ?

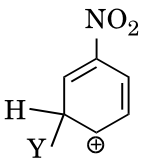
(1) $CH_2 = CH - CH = CH_2$

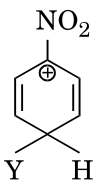
(2) $CH_2 = CH - C \equiv CH$

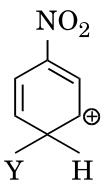
(3) $HC \equiv C - C \equiv CH$

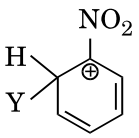
(4) $CH_3 - CH = CH - CH_3$

64. Which of the following carbocations is expected to be most stable ?

(1) 

(2) 

(3) 

(4) 

65. Which of the following is correct with respect to – I effect of the substituents ? (R = alkyl)

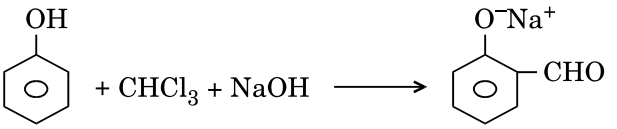
(1) $-NH_2 > -OR > -F$

(2) $-NR_2 < -OR < -F$

(3) $-NH_2 < -OR < -F$

(4) $-NR_2 > -OR > -F$

66. In the reaction



the electrophile involved is

(1) dichloromethyl anion ($\overset{\ominus}{C}HCl_2$)

(2) formyl cation ($\overset{\oplus}{C}HO$)

(3) dichloromethyl cation ($\overset{\oplus}{C}HCl_2$)

(4) dichlorocarbene ($:CCl_2$)

67. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their

(1) more extensive association of carboxylic acid via van der Waals force of attraction

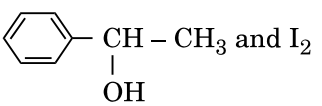
(2) formation of carboxylate ion

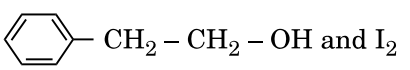
(3) formation of intramolecular H-bonding

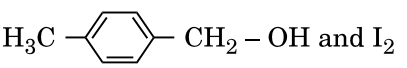
(4) formation of intermolecular H-bonding

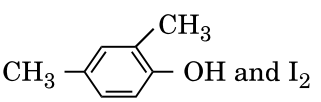
68. Compound A, $C_8H_{10}O$, is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell.

A and Y are respectively

(1) 

(2) 

(3) 

(4) 

69. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the ***correct*** code :

	Column I		*Column II*
a.	Co^{3+}	i.	$\sqrt{8}$ B.M.
b.	Cr^{3+}	ii.	$\sqrt{35}$ B.M.
c.	Fe^{3+}	iii.	$\sqrt{3}$ B.M.
d.	Ni^{2+}	iv.	$\sqrt{24}$ B.M.
		v.	$\sqrt{15}$ B.M.

	a	**b**	**c**	**d**
(1)	iv	i	ii	iii
(2)	i	ii	iii	iv
(3)	iv	v	ii	i
(4)	iii	v	i	ii

70. Which one of the following ions exhibits d-d transition and paramagnetism as well ?

(1) MnO_4^-

(2) $Cr_2O_7^{2-}$

(3) CrO_4^{2-}

(4) MnO_4^{2-}

71. Iron carbonyl, $Fe(CO)_5$ is

(1) trinuclear

(2) mononuclear

(3) tetranuclear

(4) dinuclear

72. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is

(1) Ionization isomerism

(2) Coordination isomerism

(3) Geometrical isomerism

(4) Linkage isomerism

73. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are

(1) square planar geometry and paramagnetic

(2) tetrahedral geometry and diamagnetic

(3) square planar geometry and diamagnetic

(4) tetrahedral geometry and paramagnetic

74. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

a. 60 mL $\frac{M}{10}$ HCl + 40 mL $\frac{M}{10}$ NaOH

b. 55 mL $\frac{M}{10}$ HCl + 45 mL $\frac{M}{10}$ NaOH

c. 75 mL $\frac{M}{5}$ HCl + 25 mL $\frac{M}{5}$ NaOH

d. 100 mL $\frac{M}{10}$ HCl + 100 mL $\frac{M}{10}$ NaOH

pH of which one of them will be equal to 1 ?

(1) d

(2) a

(3) b

(4) c

75. On which of the following properties does the coagulating power of an ion depend ?

(1) Both magnitude and sign of the charge on the ion

(2) Size of the ion alone

(3) The magnitude of the charge on the ion alone

(4) The sign of charge on the ion alone

76. Given van der Waals constant for NH_3, H_2, O_2 and CO_2 are respectively 4·17, 0·244, 1·36 and 3·59, which one of the following gases is most easily liquefied ?

(1) O_2

(2) H_2

(3) NH_3

(4) CO_2

77. The solubility of $BaSO_4$ in water is $2{\cdot}42 \times 10^{-3}$ gL^{-1} at 298 K. The value of its solubility product (K_{sp}) will be

(Given molar mass of $BaSO_4$ = 233 g mol^{-1})

(1) $1{\cdot}08 \times 10^{-14}$ mol^2 L^{-2}

(2) $1{\cdot}08 \times 10^{-12}$ mol^2 L^{-2}

(3) $1{\cdot}08 \times 10^{-10}$ mol^2 L^{-2}

(4) $1{\cdot}08 \times 10^{-8}$ mol^2 L^{-2}

78. In which case is the number of molecules of water maximum ?

(1) 0·00224 L of water vapours at 1 atm and 273 K

(2) 0·18 g of water

(3) 18 mL of water

(4) 10^{-3} mol of water

79. The correct difference between first- and second-order reactions is that

(1) a first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed

(2) the half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$

(3) the rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations

(4) the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

80. Among CaH_2, BeH_2, BaH_2, the order of ionic character is

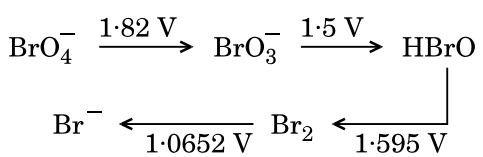
(1) $BeH_2 < BaH_2 < CaH_2$

(2) $CaH_2 < BeH_2 < BaH_2$

(3) $BeH_2 < CaH_2 < BaH_2$

(4) $BaH_2 < BeH_2 < CaH_2$

81. Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below :



Then the species undergoing disproportionation is

(1) Br_2

(2) BrO_4^-

(3) BrO_3^-

(4) HBrO

82. For the redox reaction

$$MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficients of the reactants for the balanced equation are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	16	5
(2)	2	5	16
(3)	16	5	2
(4)	5	16	2

83. Which one of the following conditions will favour maximum formation of the product in the reaction,

$A_2(g) + B_2(g) \rightleftharpoons X_2(g) \quad \Delta_r H = -X$ kJ ?

(1) High temperature and high pressure

(2) Low temperature and low pressure

(3) Low temperature and high pressure

(4) High temperature and low pressure

84. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction

(1) is tripled

(2) is doubled

(3) is halved

(4) remains unchanged

85. The bond dissociation energies of X_2, Y_2 and XY are in the ratio of 1 : 0·5 : 1. ΔH for the formation of XY is – 200 kJ mol^{-1}. The bond dissociation energy of X_2 will be

(1) 800 kJ mol^{-1}

(2) 100 kJ mol^{-1}

(3) 200 kJ mol^{-1}

(4) 400 kJ mol^{-1}

86. The correction factor 'a' to the ideal gas equation corresponds to

(1) electric field present between the gas molecules

(2) volume of the gas molecules

(3) density of the gas molecules

(4) forces of attraction between the gas molecules

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87. Consider the following species :

CN^+, CN^-, NO and CN

Which one of these will have the highest bond order ?

(1) CN^+

(2) CN^-

(3) NO

(4) CN

88. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is

(1) Mg_2X

(2) MgX_2

(3) Mg_2X_3

(4) Mg_3X_2

89. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with temperature) is

(1) $\frac{3\sqrt{3}}{4\sqrt{2}}$

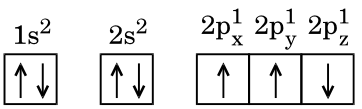
(2) $\frac{4\sqrt{3}}{3\sqrt{2}}$

(3) $\frac{\sqrt{3}}{\sqrt{2}}$

(4) $\frac{1}{2}$

90. Which one is a ***wrong*** statement ?

(1) The electronic configuration of N atom is



(2) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

(3) Total orbital angular momentum of electron in 's' orbital is equal to zero.

(4) The value of m for d_{z^2} is zero.

91. Oxygen is ***not*** produced during photosynthesis by

(1) *Cycas*

(2) *Nostoc*

(3) Green sulphur bacteria

(4) *Chara*

92. Double fertilization is

(1) Fusion of two male gametes with one egg

(2) Fusion of one male gamete with two polar nuclei

(3) Fusion of two male gametes of a pollen tube with two different eggs

(4) Syngamy and triple fusion

93. Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other ?

(1) Banana

(2) *Yucca*

(3) *Hydrilla*

(4) *Viola*

94. Pollen grains can be stored for several years in liquid nitrogen having a temperature of

(1) – 196°C

(2) – 80°C

(3) – 120°C

(4) – 160°C

95. Which of the following elements is responsible for maintaining turgor in cells ?

(1) Potassium

(2) Sodium

(3) Magnesium

(4) Calcium

96. What is the role of NAD^+ in cellular respiration ?

(1) It is a nucleotide source for ATP synthesis.

(2) It functions as an electron carrier.

(3) It functions as an enzyme.

(4) It is the final electron acceptor for anaerobic respiration.

97. In which of the following forms is iron absorbed by plants ?

(1) Free element

(2) Ferrous

(3) Ferric

(4) Both ferric and ferrous

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