MCQs

Q1. For a substance at a given temperature, the osmotic pressure of its concentrated solution

(a) Is same as that of dilute solution

(b) Is lower than that of dilute solution

(c) Is higher than that of dilute solution

(d) Cannot be compared with osmotic pressure of dilute solution

Q2. In the electrolysis of alumina to obtain aluminium metal, cryolite is added mainly to

(a)   Lower the melting point of alumina

(b)   Dissolve alumina in molten cryolite

(c)   Remove the impurities of alumina

(d)   None of these

Q3. When Br_2 is treated with aqueous solution of NaF, NaCl, NaI separately

(a) F_2, Cl_2, I_2 are liberated

(b) Only F_2 and Cl_2 are liberated

(c) Only Cl_2 is liberated

(d) Only I_2 is liberated

Q4. The ease of dehydrohalogenation of alkyl halide with alcoholic KOH is

(a)   Tertiary < secondary < primary

(b)   Tertiary > secondary > primary

(c)   Tertiary < secondary > primary

(d)   Tertiary > secondary < primary

Q5. Raoult's law is obeyed by each constituent of a binary liquid solution when:

(a)   The forces of attractions between like molecules are greater than those between unlike molecules

(b)   The forces of attractions between like molecules are smaller than those between unlike molecules

(c)   The forces of attractions between like molecules are identical with those between unlike molecules

(d)   The volume occupied by unlike molecules are different
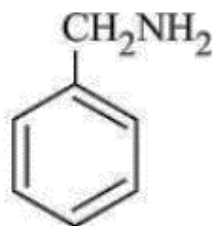
Q6. In a cubic structure of compound which is made from X and Y, where X atoms are at the corners of the cube and Y at the face centres of the cube. The molecular formula of the compound is:

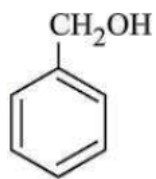(a) X_2Y

(b) X_3Y

(c) XY_2

(d) XY_3

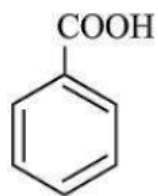Q7. The product 'Y' in the following reaction sequence is
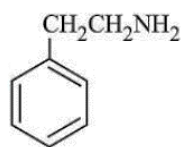

(a)

(b)

CH₂OH

(c)

COOH

(d)

CH₂CH₂NH₂
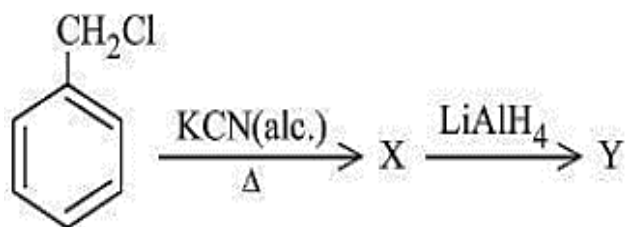
Q8. Identify the true statements (s):

(A)   A catalyst is chemically unchanged at the end of a reaction

(B)   A catalyst may appear in the kinetic rate equation of the reaction

(C)   A catalyst will not affect the composition of an equilibrium mixture

(D)   A catalyst cannot cause a non-spontaneous reaction to proceed

(a)   A and B only

(b)   C and D only

(c)   A, B and C only

(d)   A, B, C and D all

Q9. On treating a mixture of two alkyl halides with sodium metal in dry ether, 2-methyl propane was obtained. The alkyl halides are

(a)   2-chloropropane and chloromethane

(b)   2-chloropropane and chloroethane

(c)   Chloromethane and chloroethane

(d)   Chloromethane and 1-chloropropane

Q10. The existence of two different coloured complexes of $[Co(NH_3)_4Cl_2]^+$ is due to

(a)   Ionization isomerism

(b)   Coordination isomerism

(c)   Linkage isomerism

(d)   Geometrical isomerism

Q11. When acetaldehyde is heated with Fehling's solution, a red precipitate is formed. Which of the following is that?

(a) Cu_2O

(b)   Cu

(c)   CuO

(d) $CuSO_4$

Q12. $CH_3Br + OH \rightarrow CH_3OH + Br^-$ reaction proceeds by S_N2 mechanism. Its rate is dependent on the concentration of

(a) CH_3Br, OH^-

(b)   Only CH_3Br

(c)   Only OH^-

(d) CH_3Br, CH_3OH

Q13. $CH_3Br + KCN$ (alc.) $\rightarrow X$ Reduction/Na + C2H5OH   Y

What is Y in the series?

(a) CH_3CN

(b) C_2H_5CN

(c) $C_2H_5NH_2$

(d) CH_3NH_2

Q14. Which of the following compound will exhibit geometrical isomerism?

(a)   1-phenyl-2-butene

(b)   3-phenyl-1-butene

(c)   2-phenyl-1-butene

(d)   1,1-diphenyl-1-propane

Q15. The rate of a chemical reaction generally increases rapidly even with small temperature increase because of rapid increase in the:

(a)   Collision frequency

(b)   Fraction of molecules

(c)   Activation energy

(d)   Average kinetic energy of molecules

Q16. Which of the following statement is not true about colloidal solution?

(a)   These are visible under powerful microscope

(b)   Their particles do not settle down with passage of time

(c)   These particles are electrically charged

(d)   These are homogeneous in nature

Q17. When salicylic acid is treated with acetic anhydride we get

(a)   Aspirin

(b)   Paracetamol

(c)   Salol

(d)   None of these

Q18. Which of the following fibre are used for formation of air craft canopies?

(a)   Nylon

(b)   Dacron

(c)   Orlon

(d)   Terylene

Q19. Which polymer is used in non-stick cooking vessels?

(a)   Polythene

(b)   Isoprene

(c)   Teflon

(d)   Neoprene

Q20. The following compound will undergo electrophilic substitution more readily than benzene

(a)   Nitrobenzene

(b)   Benzoic acid

(c)   Benzaldehyde

(d)   Phenol

Q21. Liquation process is used for the concentration of which ore?

(a)   Stibinite

(b)   Tinstone

(c)   Limestone

(d)   Haematite

Q22. Which one of the following is employed as a tranquilizer?

    (a) Equanil

    (b) Naproxen

    (c) Tetracycline

    (d) Chlorpheninamine

Q23. An aqueous solution of a weak monobasic acid containing 0.1 g in 21.7 g of water freezes at 272.813 K. if the value of K_f for water is 1.86 K/m, what is the molecular mass of the monobasic acid

    (a) 50 g/mole

    (b) 46 g/mole

    (c) 55 g/mole

    (d) 60 g/mole

Q24. IUPAC name of $Na_3[Co(ONO)_6]$ is:

    (a) Sodium cobaltinitrite

    (b) Sodium hexanitritocobaltate (III)

    (c) Sodium hexanitrocabolat (III)

    (d) Sodium hexanitritocobaltate (II)

Q25. Picric acid is very strong acid due to presence of:

(a) COOH group

(b) Three NO_2 groups

(c) H^+ group

(d) OH group

Q26. Arrange the following compounds in the increasing order of their boiling points.

A. $CH_3CH_2CH_2COOH$

B. $CH_3CH_2CH_2CH_2OH$

C. $CH_3CH_2OCH_2CH_3$

D. $CH_3CH_2CH_2CH_3$

E. $CH_3CH_2CH_2CHO$

Choose the correct answer from the options given below:

(a) D < E < C < B < A

(b) D < C < E < B < A

(c) D < B < A < C < E

(d) D < B < A < E < C

Q27. Identify the incorrect statement about glucose.

(a) Glucose exist as a 5-membered ring

(b) It forms n-hexane on prolonged heating With HI

(c) Acetylation of glucose takes place with acetic anhydride

(d) It does not give 2, 4-DNP test.

Q28. Which of the following statements about hormones is not correct?
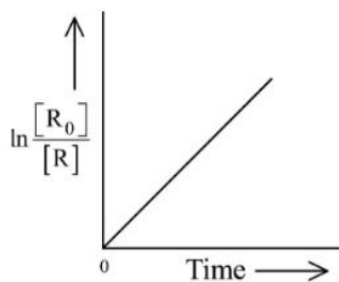
(a) They are secreted in the blood stream or lymph by ductless glands

(b) They stimulate the activity of certain organs

(c) They may be proteins, steroids or amino acid derivatives

(d) Insulin hormone regulates blood sugar level and is secreted by the pituitary gland

Q29. For the graphical representation of a first order reaction

The slope of the straight line is

(a) k

(b) -k

(c) $\dfrac{k}{2.303}$

(d) $-\dfrac{k}{2.303}$

Q30. During the process of digestion, the proteins present in food material are hydrolysed to amino acid. The two enzymes involved in the process are:

Proteins $\xrightarrow[\text{(A)}]{\text{enzyme}}$ Polypetides $\xrightarrow[\text{(B)}]{\text{enzyme}}$ aminoacids

(a) invertase and zymase

(b) amylase and maltose

(c) diatase and lipase

(d) pepsin and tripsin

Q31. Physical adsorption of a gaseous species may change to chemical adsorption with

(a) Decrease in temperature

(b) Increase in temperature

(c) Increase in surface area of adsorbent

(d) Decrease in surface area of adsorbent

Q32. Choose the correct combination(s):

(A) Nylon 6 : Addition Copolymer

(B) Buna-S : Addition homopolymer

(C) Melamine : Condensation Copolymer

(D) Telfon : Addition homopolymer

Choose the correct answer from the options given below:

(a) (A), (C) only

(b) (C), (D) only

(c) (A), (B), (C) only

(d) (B), (C), (D) only

Q33. A compound is formed by two elements P and Q. The element Q forms ccp and atoms P occupy $1/3^{rd}$ of tetrahedral voids. What is the formula of the compound?

(a) P_2Q_3

(b) Q_2P_3

(c) PQ_2

(d) P_2Q

Q34. Predict which of the following mixtures will show a positive deviation from Raoult's Law?

(a) Nitric acid and Water

(b) Ethanol and acetone
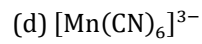
(c) Phenol and aniline

(d) Chloroform and acetone

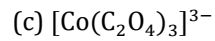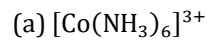Q35. The expression for calculating half life for a radioactive decay is:

(a) $t_{\frac{1}{2}} = \frac{R_0 - R}{K}$

(b) $t_{\frac{1}{2}} = \frac{K}{0.693}$

(c) $t_{\frac{1}{2}} = \frac{0.693}{K}$

(d) $t_{\frac{1}{2}} = \frac{K}{R_o - R}$

Q36. Spin free complex among the following is:

(a) $[Co(NH_3)_6]^{3+}$

(b) $[CoF_6]^{3-}$

(c) $[Co(C_2O_4)_3]^{3-}$

(d) $[Mn(CN)_6]^{3-}$

Q37. A binary ideal solution of AB type has

(a) $\Delta H_{mix} = 0$, $\Delta V_{mix} \neq 0$

(b) $\Delta H_{mix} = 0$, $\Delta V_{mix} = 0$

(c) $\Delta H_{mix} \neq 0$, $\Delta V_{mix} \neq 0$

(d) $\Delta H_{mix} \neq 0$, $\Delta V_{mix} = 0$

Q38. The incorrect statement about rubber is:
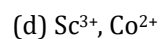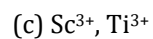
(a) Latex is a colloidal solution of rubber particles

(b) Rubber particles are negatively charged

(c) Rubber particles are positively charged

(d) Rubber is obtained by coagulation of latex

Q39. In which of the following pairs, both the ions are coloured in an aqueous solution?

(a) Ni^{2+}, Cu^+

(b) Ni^{2+}, Ti^{3+}

(c) Sc^{3+}, Ti^{3+}

(d) Sc^{3+}, Co^{2+}
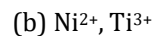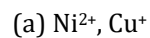
Q40. Identify the product (A) obtained in the following reaction.

$+$ ⌒OH ⟶ (A)
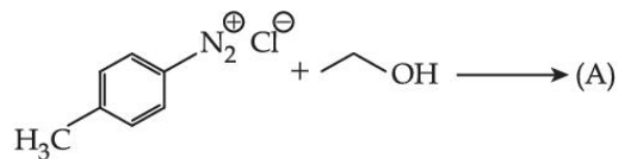
(a)
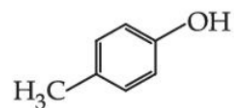
(b)
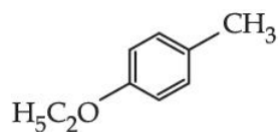
(c)
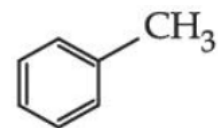
(d)
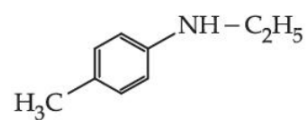
Q41. 0.5 molal aqueous solution of a weak acid (HX) is 20% ionised. If K_f for water is 1.86 K kg mol^{-1} the lowering in freezing point of solution will be:

(a) 0.56 K

(b) 1.12 K

(c) -0.56 K

(d) -1.12K

Q42. In which case there is a change in oxidation number?

(a) Aqueous solution of CrO_4^{2-} is acidified.

(b) SO_2 gas is passed through acidified $Cr_2O_7^{2-}$ solution.

(c) $Cr_2O_7^{2-}$ solution is made alkaline.

(d) CrO_2Cl_2 is dissolved in NaOH.

Q43. When a primary amine reacts with $CHCl_3$ in presence of ethanolic KOH to produce a foul-smelling compound, the reaction is called:

(a) Hoffmann's exhaustive ammonolysis

(b) Coupling reaction

(c) Gabriel-phthalimide reaction

(d) Carbylamine test

Q44. What are the hydrolysis products of glyceryl oleate $(C_{17}H_{32}COO)_3C_3H_5$ during preparation of soap?

$C_{17}H_{32}COONa + C_3H_5OH$

$C_{17}H_{32}COOH + CH_3CH_2CH_2OH$

$C_{17}H_{32}COOH + CH_2OHCHOHCH_2OH$

$C_{17}H_{32}COONa + CH_2OHCHOHCH_2OH$
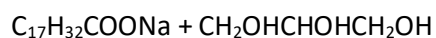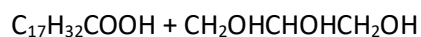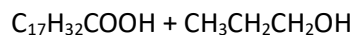

Q45. During the denaturation of proteins, which of the following bond/interaction is not broken?

(a) Electrostatic attractions

(b) Hydrogen bonds

(c) Disulphide bonds

(d) Peptide bonds

Q46. Match List-I with List-II:

List-I		List-II	
(A)	C_6H_5CHO	(I)	Precipitation

			with 2, 4 DNP
(B)	$CH_3C \equiv CH$	(II)	Precipitation with $AgNO_3$ (ammoniacal)
(C)	HCN	(III)	Nucleophile
(D)	I^-	(IV)	Cyanohydrin formation

Choose the correct answer from the options given below:

(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(b) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(c) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

(d) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

Q47. Match List-I with List-II:

List-I		List-II	
(A)	Zone refining	(I)	Titanium
(B)	Mond's process	(II)	Zinc
(C)	Electrolytic refining	(III)	Nickel
(D)	van-Arkel method	(IV)	Germanium

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(b) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

(c) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(d) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Q48. Match List-I with List-II:

List-I		List-II	
(A)	Mathematical expression for rate of reaction	(I)	rate constant
(B)	Rate of reaction for zero order reaction is equal to	(II)	rate law
(C)	Unit for rate constant	(III)	order of

	for zero order reaction is same as that of		slowest step
(D)	Order of a complex reaction is determined by	(IV)	rate or reaction

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(b) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(c) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

(d) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Q49. In section A, there are some organic compounds and in section B, their uses are mentioned. Match the correct options.

Section A		Section B	
(A)	Ethanol	(i)	Nail polish remover
(B)	Formalin	(ii)	To have sour taste in food
(C)	Acetone	(iii)	In fragrant materials like perfumes
(D)	Ethanoic acid	(iv)	To preserve dead bodies

(a)   (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

(b)   (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)

(c)   (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

(d)   (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

Q50. The correct match between Item-I and Item-II is:

Item-I		Item-II	
(A)	Chloroxylenol	(i)	Carbylamines Test
(B)	Norethindrone	(ii)	Sodium Hydrogen carbonate test
(C)		(iii)	Ferric chloride test

	Sulphapyridine		
(D)	Penicillin	(iv)	Bayer's test

(a)   (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

(b)   (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

(c)   (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

(d)   (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)

Q51. Match the Bravais lattices with their crystal systems.

List 1		List 2	
(A) Primitive, face centred, body centred, end centred		(i) Cubic	
(B) Primitive, face centred, body centred		(ii) Orthorhombic	
(C) Primitive, body centred		(iii) Hexagonal	
(D) Primitive only		(iv) Tetragonal	

(a)   (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)

(b)   (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

(c)   (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

(d)   (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)

Q52. Match the contents in List-A to that in List-B.

List A (Aldehyde)		List-B (Oxidized product of Aldehyde)	
(A)	Formaldehyde	1.	Acetic acid
(B)	Acetaldehyde	2.	Propanoic acid
(C)	Propionaldehyde	3.	Isobutyric acid
(D)	Isobutyraldehyde	4.	Methanoic acid

(a)   (A) → (1), (B) → (2), (C) → (3), (D) → (4)

(b)   (A) → (4), (B) → (1), (C) → (2), (D) → (3)

(c)   (A) → (2), (B) → (3), (C) → (4), (D) → (1)

(d)   (A) → (3), (B) → (4), (C) → (2), (D) → (1)

Q53. Match the sugars in column I with their types given in column II and mark the appropriate choice.

Column I	Column II
(A) Glucose	(i) Ketohexose
(B) Fructose	(ii) Aldehexose
(C) Ribose	(iii) Aldotetrose
(D) Erythrose	(iv) Aldopentose

(a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

(b) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)

(c) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

(d) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)

Q54. Match List-I with List-II:

List-I		List-II	
(A)	Anti-histamines	(I)	Meprobamate
(B)	Tranquilizers	(II)	Arsphenamine
(C)	Antifertility drugs	(III)	Seldane
(D)	Antibiotics	(IV)	Norethindrone

Choose the correct answer from the options given below:

(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(b) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

(c) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(d) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

Q55. Match List-I with List-II:

List-I		List-II	
(A)	$[Co(NH_3)_6]^{3+}$	(I)	sp^3
(B)	$[CoF_6]^{3-}$	(II)	dsp^2
(C)	$[NiCl_4]^{2-}$	(III)	d^2sp^3
(D)	$[Ni(CN)_4]^{2-}$	(IV)	ps^3d^2

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(b) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(c) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

(d) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

Q56. Match List-I with List-II:

List-I		List-II	
(A)	Triclinic	(I)	$BaSO_4$
(B)	Monoclinic	(II)	$K_2Cr_2O_7$
(C)	Rhombohedral	(III)	$Na_2SO_4.10H_2O$
(D)	Orthorhombic	(IV)	$CaCO_3$

Choose the correct answer from the options given below:

(a) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)

(b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(c) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(d) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

Q57. Match List-I with List-II:

List-I		List-II	
(A)	Haemoglobin	(I)	Negatively charged sol
(B)	Acid dye stuff	(II)	Methylene blue sol
(C)	Gold solution	(III)	Positively charged sol
(D)	Basic dye stuff	(IV)	Eosin

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(b) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(c) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

(d) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

Q58. Match List-I with List-II:

List-I		List-II	
(A)	Activation energy	(I)	Difference in the energy of activated complex and reactants
(B)	Threshold energy	(II)	Minimum energy possessed by reactant molecules to form effective collisions
(C)	Heat of Reaction	(III)	Negative for exothermic reaction
(D)	Role of a catalyst	(IV)	To give new path of reaction

Choose the correct answer from the options given below:

(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(c) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(d) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

Q59. Match List-I with List-II:

List-I (Physical Quantity)		List-II (Units)	
(A)	Conductance	(I)	ohm cm
(B)	Specific conductance	(II)	$ohm^{-1} cm^2 mol^{-1}$
(C)	Specific resistance	(III)	mho
(D)	Molar conductance	(IV)	$Ohm^{-1} cm^{-1}$

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

(b) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(c) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

(d) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Q60. Match List-I with List-II:

List-I (Conversions)		List-II (Catalysts)	
(A)	$SO_2 \rightarrow H_2SO_4$	(I)	Fe
(B)	Ethene $\rightarrow$ Polythene	(II)	$PdCl_2$
(C)	$N_2 + 3H_2 \rightarrow 2NH_3$	(III)	V_2O_5
(D)	Ethyne $\rightarrow$ Ethanal	(IV)	Ziegler natta

Choose the correct answer from the options given below:

(a) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)

(b) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(c) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(d) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Q61. Assertion: CH_3OCH_3 and C_2H_5OH has comparable molecular weight but boiling point of C_2H_5OH is more than dimethyl ether.

Reason: C_2H_5OH forms intermolecular H-bonding while CH_3OCH_3 forms intramolecular H-bonding.

(a)   Assertion and reason both are correct and reason is correct explanation of assertion

(b)   Assertion and reason both are correct but reason is not correct explanation of assertion

(c)   Assertion is correct statement but reason is wrong statement

(d)   Assertion is wrong statement but reason is correct statement.

Q62. Assertion: Enzymes have active sites that hold substrate molecule for a chemical reaction.

Reason: Drugs compete with natural substrate by attaching covalently to the active site of enzyme.

(a)   Assertion and reason both are correct and reason is correct explanation of assertion

(b)   Assertion and reason both are correct but reason is not correct explanation of assertion

(c)   Assertion is correct statement but reason is wrong statement

(d)   Assertion is wrong statement but reason is correct statement.

Q63. Assertion: Amorphous solids are isotropic.

Reason: Amorphous solids lack a regular three-dimensional arrangement of atoms.

(a)   Assertion and reason both are correct and reason is correct explanation of assertion

(b)   Assertion and reason both are correct but reason is not correct explanation of assertion

(c)   Assertion is correct statement but reason is wrong statement

(d)   Assertion is wrong statement but reason is correct statement.

Q64. Assertion: The solubility of aldehydes and ketones in water decreases with increase of size of the alkyl group.

Reason: Alkyl groups are electron releasing group.

(a)   Assertion and reason both are correct and reason is correct explanation of assertion

(b)   Assertion and reason both are correct but reason is not correct explanation of assertion

(c)   Assertion is correct statement but reason is wrong statement

(d)   Assertion is wrong statement but reason is correct statement.

Q65. Assertion: The boiling points of alkyl halides decrease in the order:

    RI > RBr > RCl > RF
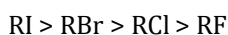
    Reason: The boiling points of alkyl chlorides, bromides and iodides are considerably higher than that of the hydrocarbon of comparable molecular mass.

(a)   If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b)   If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c)   If the Assertion is correct but Reason is incorrect.

(d)   If both the Assertion and Reason are incorrect.

Q66. Assertion: Phosphorus chlorides (tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols.

    Reason: Phosphorus chlorides give pure alkyl halides.

(a)   If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b)   If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c)   If the Assertion is correct but Reason is incorrect.

(d)   If both the Assertion and Reason are incorrect.

Q67. Assertion: Bakelite is a thermosetting polymer.

Reason: Bakelite can be melted again and again without any change.

(a)   If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b)   If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c)   If the Assertion is correct but Reason is incorrect.

(d)   If the Assertion is incorrect but Reason is correct.

Q68. Assertion: Rate of reaction increases with increase in temperature.

Reason: Number of collision increases with increase in temperature.

(a)   If both assertion & reason are correct statements and reason is the correct explanation of assertion.

(b)   If both assertion & reason are correct statements and reason is not the correct explanation of assertion.

(c)   If the assertion is the correct statement & the reason is an incorrect statement.

(d)   If the assertion is incorrect statement and reason is the correct statement.

Q69. Assertion: $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless.

Reason: d-d transition is not possible in $[Sc(H_2O)_6]^{3+}$.

(a)   If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b)   If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c)   If the Assertion is correct but Reason is incorrect.

(d)   If both the Assertion and Reason are incorrect.

Q70. Assertion: Transition metals are efficient catalysts.

Reason: Transition metals usually contain incomplete d-orbitals and provide larger surface area of adsorption.

(a)   Assertion and reason both are correct and reason is correct explanation of assertion

(b)   Assertion and reason both are correct but reason is not correct explanation of assertion

(c)   Assertion is correct statement but reason is wrong statement

(d)   Assertion is wrong statement but reason is correct statement.z

Q71. Aryl halides do not undergo nucleophilic substitution reactions under ordinary conditions because

A. Approach of nucleophile is retarded

B. Carbon carrying halogen atom is sp^3 hybridised

C. The substrate molecule is destabilised due to resonance

D. Of partial double bond character between carbon and halogen.

Choose the correct answer from the options given below.

(a) A and D only

(b) B and C only

(c) A and C only

(d) B and D only

Q72. Statement 1: Alkene participate in addition reaction.

Statement 2: Alkenes are unsaturated hydrocarbons.

(a)   If both Statement I and Statement II are correct and the Statement II is a correct explanation of the Statement I.

(b)   If both Statement I and Statement II are correct but Statement II is not a correct explanation of the Statement I.

(c)   If the Statement I is correct but Statement II is incorrect.

(d)   If both the Statement I and Statement II are incorrect.

Q73. Which of the following statement(s) is/are incorrect?

I. Cellulose is a polysaccharide composed of a large number of β-D-glucose units.

II. β-D-glucose units in cellulose are joined by β-glycosidic linkages.

III. Starch is a mixture of amylose and amylopectin.

IV. Amylose is a branched chain polysaccharide.

V. Amylopectin is a linear polysaccharide.

(a) Only I

(b) Only III

(c) II and III

(d) IV and V

Q74. The correct statement (s) from the following is/are:

i) All the d and f-block elements are metals.

ii) All d and f-block elements form coloured ions.

iii) All d and f-block elements are paramagnetic.

(a)   i only

(b)   i and ii

(c)   ii and iii

(d) All

Q75. Which are correct statements about $KMnO_4$?

(A)   Its solution is unstable in acidic medium

(B)   Its small quantity added to conc. H_2SO_4, a green coloured solution containing MnO_3^+ ions is formed

(C) MnO_4^+ changes to Mn^{2+} in basic solution

(D)   It is self-indicator in Fe^{2+} or $Cr_2O_4^{2-}$ titration.

(a)   A and B only

(b)   C and D only

(c)   A, B and C only

(d)   A, B and D only

Q76. Statement 1: Dettol is an antibiotic.

Statement 2: Antibiotics are used to kill microorganisms.

(a) Only statement 1 is correct

(b) Only statement 2 is correct

(c) Both statements are correct

(d) Both statements are incorrect

Q77. Choose the correct option from the following:

(a)   Teflon is prepared by heating tetrafluoroethene in presence of a persulfate catalyst at high pressure

(b)   Natural rubber is polyisoprene containing trans alkene units

(c)   Nylon-6 has amide linkage

(d)   Cellulose have only alpha-D-glucose units that are joined by glycosidic linkages

(a)   A and C only

(b)   B and D only

(c)   A, B and C only

(d)   B, C and D only

Q78. Statement I: $CHCl_3$ is stored in transparent bottles.

Statement II: $CHCl_3$ is oxidized in air.

(a)   If both Statement I and Statement II are correct and the Statement II is a correct explanation of the Statement I.

(b)   If both Statement I and Statement II are correct but Statement II is not a correct explanation of the Statement I.

(c)   If the Statement I is incorrect but Statement II is correct.

(d)   If both the Statement I and Statement II are incorrect.

Q79. Statement I: Lanthanides have much less tendency to form complexes than antinides.

Statement II: Compared to actinides, the lanthanides have relatively larger size of atoms and less nuclear charge.

(a)   If both Statement I and Statement II are correct and the Statement II is a correct explanation of the Statement I.

(b)   If both Statement I and Statement II are correct but Statement II is not a correct explanation of the Statement I.

(c)   If the Statement I is incorrect but Statement II is correct.

(d)   If both the Statement I and Statement II are incorrect.

Q80. In the extraction of Al metal from Bauxite ore, the correct sequence of various processes involved is :

A. Heating the ore to remove volatile impurities.

B. Electrolysis of molten ore-mixture

C. Leaching of alumina with concentrated NaOH

D. Grading and crushing of big ore particles.

E. Mixing alumina with CaF_2 or Na_3AlF_6

Choose the correct answer from the options given below:

(a) D, B, C, A, E

(b) D, A, C, B, E

(c) D, C, A, E, B

(d) D, B, C, A, E

Read the passage and answer the following questions (81-85)

The lower aliphatic amines are gases with fishy odour. Primary amines with three or more carbon atoms are liquid and still higher ones are solid. Aniline and other arylamines are usually colourless but get coloured on storage due to atmospheric oxidation.

Lower aliphatic amines are soluble in water because they can form hydrogen bonds with water molecules. However, solubility decreases with increase in molar mass of amines due to increase in size of the hydrophobic alkyl part. Higher amines are essentially insoluble in water.

Considering the electronegativity of nitrogen of amine and oxygen of alcohol as 3.0 and 3.5 respectively, you can predict the pattern of solubility of amines and alcohols in water. Out of butan-1-ol and butan-1-amine, which will be more soluble in water and why? Amines are soluble in organic solvents like alcohol, ether and benzene. You may remember that alcohols are more polar than amines and form stronger intermolecular hydrogen bonds than amines.

Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one and hydrogen of another molecule. This intermolecular association is more in primary amines than in secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it. Tertiary amines do not have intermolecular association due to the absence of hydrogen atom available for hydrogen bond formation. Therefore, the order of boiling points of isomeric amines is as follows:

Primary > Secondary > Tertiary

Q81.   Tertiary amines have lowest boiling points amongst isomeric amines because:

(a) They have highest molecular mass

(b) They do not form hydrogen bonds

(c) They are more polar in nature

(d) They are most basic in nature

Q82.   Choose the correct statement from the following:

(a)   Methyl amine is less soluble than propyl amines

(b)   Methyl amine is solid with fishy odour

(c)   Aniline gets coloured on storage

(d)   Amines are more polar than alcohols

Q83.   The decreasing order of boiling points of isomeric amines is p-amine > s-amine > t-amine. This trend of boiling point can be explained as

(a)   Boiling point increases with increase in molecular mass

(b)   Tertiary amines have highest boiling point due to highest basicity

(c)   Intermolecular hydrogen bonding is maximum in primary amines and absent in tertiary amines

(d)   Intramolecular hydrogen bonding is present in tertiary amines

Q84.   The correct order of boiling points of the following isomeric amines is:

$C_4H_9NH_2$, $(C_2H_5)_2NH$, $C_2H_5N(CH_3)_2$

(a) $C_2H_5N(CH_3)_2 > (C_2H_5)_2NH > C_4H_9NH_2$

(b) $(C_2H_5)_2NH > C_2H_5N(CH_3)_2 > C_4H_9NH_2$

(c) $C_4H_9NH_2 > (C_2H_5)_2NH > C_2H_5N(CH_3)_2$

(d) $(C_2H_5)_2NH > C_4H_9NH_2 > C_2H_5N(CH_3)_2$

Q85.   Which of the following compounds has the lowest boiling point?

(a) 2-propanamine

(b) Ethylmethylamine

(c) 1-propanamine

(d) N,N-dimethylmethanamine

Read the passage and answer the following Questions (86-90)

A large number of polymers are quite resistant to the environmental degradation processes and are thus responsible for the accumulation of polymeric solid waste materials. These solid wastes cause acute environmental problems and remain under graded for quite a long time. In view of the general awareness and concern for the problems created by the polymeric solid wastes, certain new biodegradable synthetic polymers have been designed and developed. These polymers contain functional groups similar to the functional groups present in biopolymers.

Aliphatic polyesters are one of the important classes of biodegradable polymers.

Q86.   The monomers used for the synthesis of nylon-2-nylon-6 are:

(a) Caprolactum

(b) Alanine and amino caproic acid

(c) Glycine and amino caproic acid

(d) Hexamethylenediamine and adipic acid

Q87.   The biodegradable polymer is:

(a) Buna-S

(b) Nylon-6, 6

(c) Nylon-2-nylon-6

(d) Nylon-6

Q88.   The monomer of biodegradable polymer nylon 2-nylon 6 are

(a) Glycine + adipic acid

(b) Glycol + phthalic acid

(c) Phenol + urea

(d) Glycine + amino caproic acid

Q89.   The biodegradable polymer among the following is

(a) Cellulose

(b) Nylon-6

(c) Polythene

(d) PVC

Q90.   The PHBV is used in which of the following?

(a) Medical applications

(b) Adhesive applications

(c) Orthopaedic devices

(d) None of these

Read the passage and answer the following questions (Q91-95):

The study of the conductivity of electrolyte solutions is important for the development of electrochemical devices, for the characterization of the dissociation equilibrium of weak electrolytes, and for the fundamental understanding of charge transport by ions. The conductivity of the electrolyte is measured for electrolyte solution with concentrations in the range of 10^{-3} to 10^{-1} mol L^{-1}, as a solution in this range of concentrations can be easily prepared. The molar conductivity (Λm)

of strong electrolyte solutions can be nicely fit by the Kohlrausch equation.

$\Lambda m = \Lambda°m - K \sqrt{C}$ ...(i)

Where $\Lambda°m$ is the molar conductivity at infinite dilution and C is the concentration of the solution. K is an empirical proportionality constant to be obtained from the experiment. The molar conductivity of weak electrolytes, on the other hand, is dependent on the degree of dissociation of the electrolyte. At the limit of a very dilute solution, the Ostwald dilution law is expected to be followed,

$$\frac{1}{\Lambda_m} = \frac{1}{\Lambda_m^\circ} + \frac{\Lambda_m}{(\Lambda_m^\circ)^2} \frac{C_A}{K_d} \qquad \qquad ...(ii)$$

where CA is the analytical concentration of the electrolyte and Kd is the dissociation constant. The molar conductivity at infinite dilution can be decomposed into the contributions of each ion.

$$\Lambda_m^\circ = v_+\lambda_+^\circ + v_-\lambda_-^\circ \qquad \qquad ...(iii)$$

Where, $\lambda+$ and $\lambda-$ are the ionic conductivities of positive and negative ions, respectively and $v+$ and $v-$ are their stoichiometric coefficients in the salt molecular formula.

Q91. Which statement about the term infinite dilution is correct?

(a) Infinite dilution refers to a hypothetical situation when the ions are infinitely far apart.

(b) The molar conductivity at infinite dilution of NaCl can be measured directly in solution.

(c) Infinite dilution is applicable only to strong electrolytes.

(d) Infinite dilution refers to a real situation when the ions are infinitely far apart.

Q92. Which of the following is a strong electrolyte in aqueous solution?

(a) HNO_2

(b) HCN

(c) NH_3

(d) HCl

Q93. Which of the following is a weak electrolyte in aqueous solution?

(a) K_2SO_4

(b) Na_3PO_4

(c) NaOH

(d) H_2SO_3

Q94. If the molar conductivities at infinite dilution for NaI, CH3COONa and (CH3COO)2Mg are 12.69, 9.10 and 18.78 S cm2 mol–1 respectively at 25°C, then the molar conductivity of MgI2 at infinite dilution is

(a) 25.96 S cm^2 , mol^{-1}

(b) 390.5 S cm^2 mol^{-1}

(c) 189.0 S cm^2 mol^{-1}

(d) 3.89 × 10^{-2} S cm^2 mol^{-1}

Q95. Which of the following is the correct order of molar ionic conductivities of the following ions in aqueous solutions?

(a) $Li^+ < Na^+ < K^+ < Rb^+$

(b) $Li^+ > Na^+ > K^+ > Rb^+$

(c) $Rb^+ < Na^+ < Li^+ < K^+$

(d) $Li^+ < Rb^+ < Na^+ < K^+$

Read the passage and answer the following questions (Q96-100):

Ethers are class of organic compounds that contain ether group – an oxygen atom connected to two alkyl groups or aryl groups. They have the general formula R – O – R′, where R and R′ represents the alkyl or aryl groups. Ether, like water have a tetrahedral geometry i.e., oxygen is sp^3 hybridized. The C – O – C bond angle in ethers is slightly greater than the tetrahedral angle due to repulsive interactions between the two bulky groups when they are attached to oxygen.

Q96.   Which of the following cannot be made by using Williamson Synthesis?

(a) Methoxybenzene

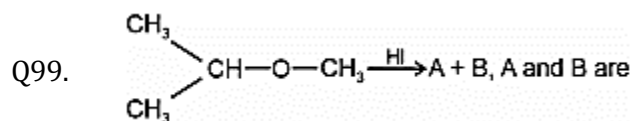(b) Benzyl p-nitro phenyl ether

(c) tert-Butyl methyl ether

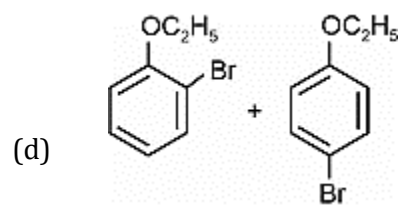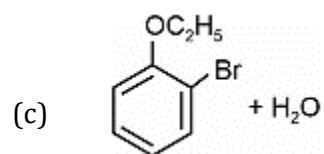(d) Di-tert-Butyl ether

Q97.   The IUPAC name of the ether

$CH_2 = CH — CH_2 — O — CH_3$ is

(a) Alkyl methyl ether

(b) 1-Methoxyprop-2-ene

(c) 3-Methoxyprop-1-ene

(d) Vinyl dimethyl ether

Q98.   Dehydration of alcohol to ethers is catalyzed by:

(a) Conc. H_2SO_4 at 413 K

(b) Hot & NaOH

(c) Hot & HBr

(d) Hot & HNO_3

Q99.

$\underset{CH_3}{\overset{CH_3}{>}}CH—O—CH_3 \xrightarrow{HI} A + B$, A and B are

(A) $\underset{CH_3}{\overset{CH_3}{>}}CH-I + CH_3OH$

(B) $\underset{CH_3}{\overset{CH_3}{>}}CH-OH + CH_3I$

(C) $H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$

(D) $CH_3OH + CH_3I$

Q100.

$+ HBr \longrightarrow A + B$, A and B are:

(a)

$+ C_2H_5Br$

(b)

$+ C_2H_5OH$

(c)

$+ H_2O$

(d)
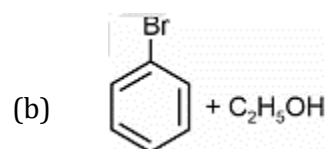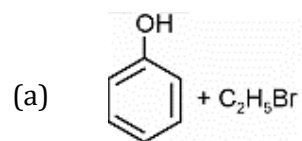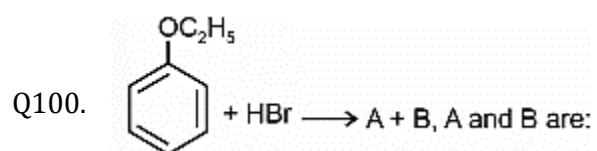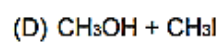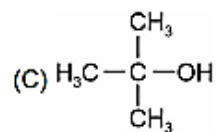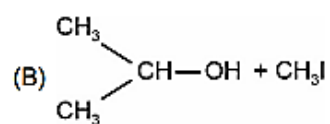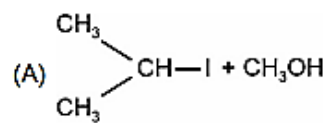
Solutions

S1.Ans.(c)

Sol. Osmotic pressure is a colligative property that depends only on the number of particles of solute dissolved in a definite amount of the solvent and does not depend on the nature of the solute.

The expression for osmotic pressure is given as:

$\pi = CRT$

Where,

π = osmotic pressure

C = concentration of solution

T = absolute temperature

From the expression, it can be observed that osmotic pressure is directly proportional to the concentration of the solution at a fixed temperature. Thus, the more is the concentration of the solution, the more will be its osmotic pressure. So, on dilution, as the concentration decreases, the osmotic pressure also decreases.

Therefore, at a given temperature, the osmotic pressure of a concentrated solution of a substance is higher than that of a dilute solution.

S2.Ans.(a)

Sol. The electrolysis of pure alumina faces some difficulties. Pure alumina is a bad conductor of electricity. The fusion temperature of pure alumina is about 2000 °C and at this temperature when electrolysis is carried out on the fused mass, the metal formed vaporizes, as the boiling point of aluminium is 1800 °C. These difficulties are overcome by using a mixture containing alumina, cryolite (Na_3, AlF_6), and fluorspar (CaF_2,). But the addition of cryolite do not minimize the anode effect and do not remove the impurities from alumina.

S3.Ans.(d)

Sol. In a redox reaction, the element above can push the element below out of a group.

Bromine gas can displace iodine compounds but not fluorine or chlorine when it is passed through solutions of NaF, NaCl, and NaI.

$2NaI + Br_2 \rightarrow 2NaBr + I_2$
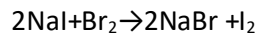
Iodine gas is released.

S4.Ans.(b)

Sol. According to Saytzeff rule, any alkyl halide that given a more highly substituted (more stable) alkene undergoes dehydrohalogenation faster than the one which gives a less highly substituted (less stable) alkene. Thus, the ease of dehydrohalogenation of different alkyl halides having the same halogen decreases in the order

Tertiary $(3°)$ > secondary $(2°)$ > primary $(1°)$

S5.Ans.(c)

Sol. When the forces of attractions between like molecules are identical with those between unlike molecules, Raoult's law is obeyed by each constituent of a binary liquid solution.

In such case, the total vapour pressure of the solution is the sum of the partial vapour pressures of components of the solution.
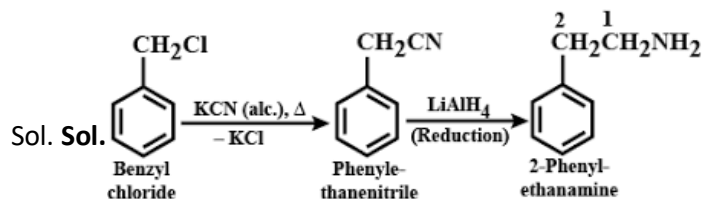
S6.Ans.(d)

Sol. For a cubic structure,

Number of atoms at each corner per unit cell = 1 atom

At each face = 6/2 = 3 atoms

The molecular formula of the compound = XY_3

S7.Ans.(d)

Sol. **Sol.**

Benzyl chloride → (KCN (alc.), Δ, – KCl) → Phenylethanenitrile → (LiAlH₄ (Reduction)) → 2-Phenylethanamine

S8.Ans.(d)

Sol. A catalyst participates in the reaction. It may be consumed during the reaction but it is regenerated at the end of the reaction. Hence, a catalyst is chemically unchanged at the end of a reaction.
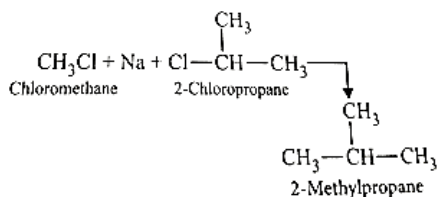
A catalyst may take part in the rate determining step. hence, it may appear in the kinetic rate equation of the reaction.

A catalyst will only increase the rate at which equilibrium is established. It will not affect the composition of an equilibrium mixture.

A catalyst only affects the rates of forward and reverse reaction. It cannot cause a non-spontaneous (G > 0) reaction to proceed.

S9.Ans.(a)

Sol. It is a Wurtz reaction in which 2-methyl propane is formed when alkyl halides reacts with sodium metal in dry ether. So when 2-chloropropane and chloromethane reacts with sodium metal in dry ether, 2- methyl propane is obtained.

$$CH_3Cl + Na + Cl-\underset{\underset{CH_3}{|}}{CH}-CH_3 \longrightarrow$$

Chloromethane   2-Chloropropane

$$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_3$$

2-Methylpropane

S10.Ans.(d)

Sol. $[Co(NH_3)_4Cl_2]^+$ is an octahedral complex, in the form of $[MA_4B_2]$ exhibiting two geometrical isomers (cis and trans).

This result in two different coloured complexes. Compounds which possess the same structural formula, but differ with respect to the positions of the identical groups in space are called cis-trans isomers and the phenomenon is known as Geometrical isomerism.

S11.Ans.(a)

Sol. Fehling's solution is a widely used reagent to distinguish between aldehydes and ketones. Fehling's solution is prepared by mining Fehling A (Deep blue aqueous solution of copper (II) sulphate) and Fehling B (a colourless solution of aqueous Potassium Sodium tartrate, also known as Rochelle salt) and then made strongly alkaline with potassium hydroxide. The deep blue active ingredient in Fehling's

solution is the bis complex of Cu^{2+}. The net reaction between an aldehyde and the copper (II) ions in Fehling's solution may be written as:
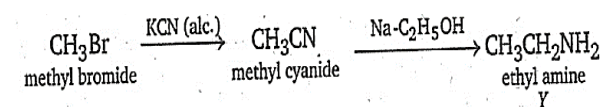
$RCHO + 2Cu^{2+} + SOH^- \rightarrow RCOO^- + Cu_2O + 3H_2O$
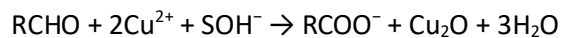
Thus, the red precipitate formed when Fehling's solution reacts with aldehyde is Cu_2O.

S12.Ans.(a)

Sol. For S_N2 reaction, rate $\propto$ [substrate][nucleophile]

S13.Ans.(c)

Sol. First step is nucleophilic substitution reaction and in next step reduction of cyanide takes place to give amine.

$$\underset{\text{methyl bromide}}{CH_3Br} \xrightarrow{KCN \, (alc.)} \underset{\text{methyl cyanide}}{CH_3CN} \xrightarrow{Na\text{-}C_2H_5OH} \underset{\substack{\text{ethyl amine} \\ Y}}{CH_3CH_2NH_2}$$

S14.Ans.(a)

Sol. 1-phenyl-2-butene shows geometrical isomerism in the form of cis and trans isomers.

However, the geometrical isomerism is not possible for 3-phenyl-1-butene, 2-phenyl-1-butene and 1,1-diphenyl-1-propane.

1 -Phenyl - 2 - butene trans   1 -Phenyl - 2 - butene cis

3 - Phenyl - 1 - butene   2 - Phenyl - 1 - butene   1,1 - Phenyl - 1 - propane
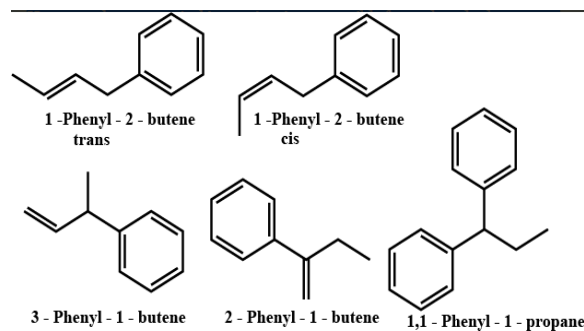
S15.Ans.(b)

Sol. It was observed that for most of the reactions, rate increases with the increase in temperature. For most of the reactions, it was found that the rate of the reaction increases two or three fold with the increase in 10 °C temperature.

The rate of a chemical reaction generally increases rapidly even for small temperature increase because of rapid increase in the fraction of molecules with proper orientation.
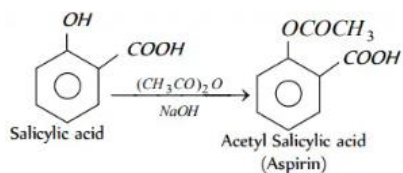
S16.Ans.(d)

Sol. In colloidal solution, a material is evenly suspended in a liquid, e.g., milk or oil in water is a colloidal solution which is present in two phases in heterogenous phase, e.g., foams, emulsions, sols.

S17.Ans.(a)

Sol.

S18.Ans.(b)

Sol. Modern aircraft uses synthetic polymers materials such as Dacron and butyrates dope for adhesive, restoration of older types that were originally covered using traditional methods. Dacron is used for parachute canopies and aircraft canopies.

S19.Ans.(c)

Sol. Teflon, which is the trade name for Polytetrafluoroethylene (PTFE), is the polymer used to deposit non-stick coatings on cookware.

S20.Ans.(d)

Sol. Phenol will undergo electrophilic substitution more readily than benzene because electron in phenol is more than benzene.

S21.Ans.(a)

Sol. Stibnite (antimonite) is a sulphide mineral with the formula Sb_2S_3. It is concentrated by liquation process.

It was formerly used for extracting antimony minerals from ore.

Separating silver from copper with the use of lead as a solvent, and refining tin

S22.Ans.(a)

Sol. Chlorpheninamine is an antihistamine.

Naproxen is an analgesic.

Tetracycline is an antibiotic.

Equanil is a tranquilizer.

S23.Ans.(d)

Sol. Given that,

Weight of solute= 0.1g

Weight of solvent =21.7g

K_f for water = 1.86 K/m

ΔT_f = Freezing point of water − Freezing point of solution =273-272.813 = 0.337K

m = Kf x w x 1000/ ΔT_f x W = 60 g/mole

S24.Ans.(b)

Sol. The above complex $Na_3[Co(ONO)_6]$ has two ions: Na+ and a complex ion which is negatively charged $[Co(ONO)_6]^{3-}$

According to the rules, name of the positive ion comes first (i.e., sodium), do not mention the number of sodium as it is not present in a square bracket.

After naming the positive ion, next will be the negative ion, Now in this example, the negative ion is a complex compound, which contains 'metal' and 'ligand'. While naming a complex, name of ligand comes first, also mention the number of ligand by using prefix (di, tri, tetra. etc..) and if a bidentate ligand is present then mention the atom which is attached to central metal (i.e., hexanitrito −O−) followed by

name of metal with the ending 'ate' (i.e., cobaltate, always use the word 'ate' if the complex is negatively charge) and than oxidation number of metal.

To show the oxidation state, we use Roman numerals inside parenthesis.

S25.Ans.(b)

Sol. Sol. Three $-NO_2$ groups in picric acid deactivate the phenolate ion. Due to electron withdrawing nature of $-NO_2$ groups, picric acid becomes stronger acid that phenol

S26.Ans.(b)

Sol. Sol. Carboxylic acids tend to have higher boiling points when compared to ethers, alcohols, aldehydes, or ketones with a similar molecular weight.

Factors affecting boiling points

1. Number of carbon atoms in hydrocarbon:

The boiling point of the hydrocarbon increases with the increase in the carbon atoms and the increase in the molecular weight as due to increase in size of the molecule, intermolecular forces of attraction increases.

2. Hydrogen bonding:

Due to intermolecular H−bonding between molecules, intermolecular forces of attraction increases and the compounds which can form intermolecular H−bonding have higher boiling point.

The number of carbon atoms and molecular masses of all these compounds are same. So, this is not the deciding criteria for the difference between the boiling points of these compounds.

Since, only butan−1−ol molecules are associated with intermolecular hydrogen bonding, therefore, the boiling point of butan−1−ol would be the highest.

Now, if butanal and ethoxyethane is compared, butanal is more polar, hence can be said that there will be more dipole-dipole interactions between butanal molecules. Therefore, the boiling point of butanal is higher than that of ethoxyethane.

There will be only weak London forces exist between butane molecules, so boiling point of butane is least amongst given four compounds.

Increasing order of boiling points

Order of boiling point can be given as:

$CH_3CH_2CH_2CH_3 < CH_3CH_2OCH_2CH_3 < CH_3CH_2CH_2CHO < CH_3CH_2CH_2CH_2OH < CH_3CH_2CH_2COOH$
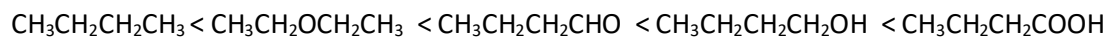
S27.Ans.(a)

Sol. Sol. Glucose is a monosaccharide containing six carbon atoms and an aldehyde group, and is therefore an aldohexose.
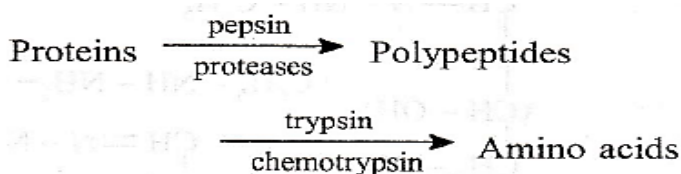
S28.Ans.(d)

Sol. Sol. Insulin is a peptide hormone secreted by the β cells of the pancreatic islets of Langerhans and maintains normal blood glucose levels by facilitating cellular glucose uptake, regulating carbohydrate, lipid and protein metabolism and promoting cell division and growth through its mitogenic effects.

S29.Ans.(b)

Sol. Sol. For first-order reactions, the equation $ln[A] = -kt + ln[A]^0$ is similar to that of a straight line (y = mx + c) with slope -k. This line can be graphically plotted as follows. Thus, the graph for $ln[A]$ v/s t for a first-order reaction is a straight line with slope -k.

S30.Ans.(d)

Sol.

$$Proteins \xrightarrow[\text{proteases}]{\text{pepsin}} Polypeptides$$

$$\xrightarrow[\text{chemotrypsin}]{\text{trypsin}} Amino\ acids$$

S31.Ans.(b)

Sol. Sol. As temperature increases, the enegy possessed by reactant molecules increases. And when the energy become greater than or equal to activation energy, they can form chemical bonds. Thus physical adsorption changes to chemical adsorption at high temperature.

S32.Ans.(b)

Sol. Sol. A. Nylon 6 or polycaprolactam is a polymer, in particular semicrystalline polyamide. Unlike most other nylons, nylon 6 is not a condensation polymer, but instead is formed by ring-opening polymerization; this makes it a special case in the comparison between condensation and addition polymers.

B. Copolymer is the polymer which is formed by addition polymerization of two different monomers, such as Buna-N, Buna-S etc.

C. Dacron, Melamine and Glyptal are condensation polymers.

D. Teflon is formed from the monomer tetrafluoroethene by its repeated addition. It is also a homopolymer i.e. consisting of a single monomer.

S33.Ans.(a)

Sol. Sol. Let the number of atoms in cubic close packing be x

∴ Number of tetrahedral voids = 2x

Number of P atoms = 2/3 x

Number of P atoms/Number of Q atoms = 2x/3x = 2/3

Therefore, the formula of the compound is P_2Q_3

S34.Ans.(b)

Sol. Sol. Ethanol and acetone

Mixture of ethanol and acetone shows positive deviation from Raoult's law. In pure ethanol, molecules are hydrogen bonded. On adding acetone, its molecules get in between the host molecules and break some of the hydrogen bonds between them. Due to weakening of interactions, the solution shows positive deviation from Raoult's law.

S35.Ans.(c)

Sol. Sol. The time taken for half of the original population of radioactive atoms to decay is called the half-life.

$$T_{1/2} = \frac{\ln 2}{\lambda} \approx \frac{0.693}{\lambda} \approx 0.693\tau$$

Radioactive half-life

Radioactive decay constant

Mean lifetime

S36.Ans.(b)

Sol. Sol. $[CoF_6]^{3-} \rightarrow sp^3d^2$ hybridization $\rightarrow$ Four unpaired electrons

A high spin complex (or spin free complex), such as $[CoF_6]^{3-}$ is one in which the d electrons are arranged according to Hund's rule to give the maximum number of unpaired electrons. Usually outer orbital complexes (sp^3d^2) are high spin (or spin-free) complexes.

S37.Ans.(b)

Sol. Sol. The solution is said to be an ideal solution, only when the intermolecular forces of attraction between A – A, B – B and A – B are nearly equal.

The enthalpy of mixing of two components should be zero, that is, $\Delta_{mix}H=0$.

The enthalpy of mixing of two components should be zero, that is, $\Delta_{mix} H = 0$. This signifies that no heat is released or absorbed during mixing of two pure components to form an ideal solution. The volume of the mixing is equal to zero that is, $\Delta_{mix} V = 0$.
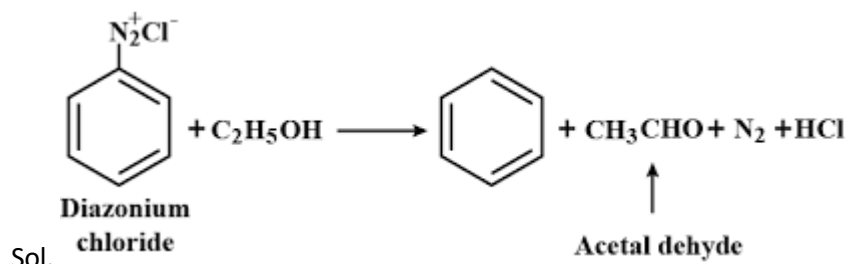
S38.Ans.(c)

Sol. Sol. The latex is considered as a colloidal dispersion of rubber in water. The latex is a negatively charged substance in which the rubber particles are made up by the negatively charged protein membrane.
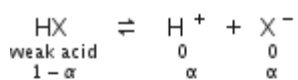
S39.Ans.(b)

Sol. Sol. Ti^{3+}, Ni^{2+} and Co^{2+} are coloured due to presence of unpaired electrons.

S40.Ans.(c)

Sol.

Diazonium chloride ... + C₂H₅OH ⟶ ... + CH₃CHO + N₂ + HCl

Acetal dehyde

S41.Ans.(b)

Sol.

$$HX \rightleftharpoons H^+ + X^-$$
weak acid
$1-\alpha$ ... α ... α

α = 20% dissociation

$i = 1 - \alpha + \alpha + \alpha$
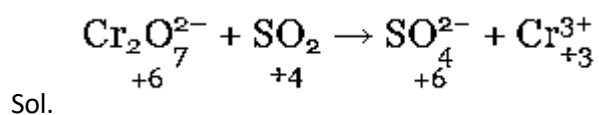
$= 1 + \alpha = 1 + 0.2 = 1.2$

$\Delta T_f = i \times K_f \times m$

$= 1.2 \times 1.86 \, K \, kg \, mol^{-1} \times 0.5$

$= 1.12 \, K$

S42.Ans.(b)

Sol.

$$Cr_2O_7^{2-} + SO_2 \rightarrow SO_4^{2-} + Cr^{3+}$$
$+6$ ... $+4$ ... $+6$ ... $+3$

S43.Ans.(d)
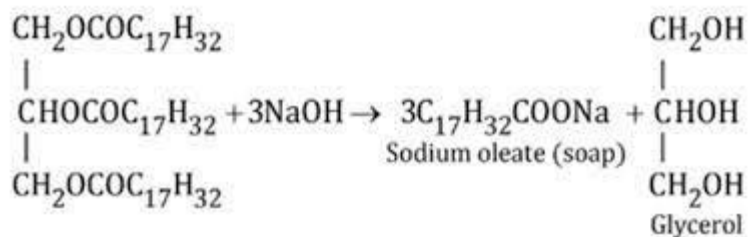
Sol. R-NH₂ + CHCl₃ + 3KOH $\xrightarrow{\Delta}$ R-NC + 3KCl + 3H₂O

When primary amine reacts with CHCl3 in alcoholic KOH, the product is an-isocyanide which is foul-smelling.

This reaction is known as carbylamine test / Isocyanide test. This test is not given by secondary or tertiary amines.

S44.Ans.(d)

$$CH_2OCOC_{17}H_{32}$$
$$|$$
$$CHOCOC_{17}H_{32} + 3NaOH \rightarrow 3C_{17}H_{32}COONa + CHOH$$
$$|$$ 　　　　　　　　　　Sodium oleate (soap)
$$CH_2OCOC_{17}H_{32}$$

(right side)
$$CH_2OH$$
$$|$$
$$CHOH$$
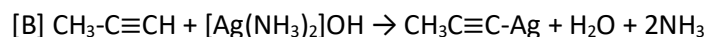$$|$$
$$CH_2OH$$
Glycerol

Sol.

S45.Ans.(d)

Sol. The bond in proteins that is not broken under usual conditions of denaturation Peptide bonds.

S46.Ans.(c)

Sol. [A] In the case of the two compounds you

mentioned, $C_6H_5CH_2CHO$ and C_6H_5CHO, both of them contain a carbonyl group, so they should both give a positive 2,4-DNP test.

[B] CH_3-C≡CH + $[Ag(NH_3)_2]OH$ → $CH_3C≡C$-Ag + H_2O + $2NH_3$

[C] To form a cyanohydrin, a hydrogen cyanide adds reversibly to the carbonyl group of an organic compound thus forming a hydroxyalkanenitrile adducts (commonly known and called as cyanohydrins)

[D] I⁻ is a strong nucleophile because it is polarizable, making it faster for its orbitals to overlap with the electrophile.

S47.Ans.(c)

Sol. [A] Zone refining is a very useful method to get

metals with high purity such as silicon and germanium.

[B] Nickel is refined by the Mond process.

[C] Electrolytic refining is a technique used for the extraction and purification of metals by the process of electrolysis. Metals like copper, nickel, gold, lead, silver, and zinc can be purified using electrolytic refining.

[D] Van Arkel method is used to purify Ti, B, Hf & Zr.

S48.Ans.(c)

Sol. [A] Rate laws or rate equations are mathematical

expressions that describe the relationship between the rate of a chemical reaction and the concentration of its reactants.

[B]   For a zero-order reaction, the rate law is rate = k, where k is the rate constant.

[C]   If the value of n is 0, it will be zero order reaction and if it is 1 then it first order reaction and so on. Therefore, in the zero-order reaction, the rate is independent of the concentration of reactants and hence, the units of rate and rate constant becomes equal which is mol/L/time.

[D]   Order of a complex reaction can be determined by determining its mechanism, generally using the rate determining step.
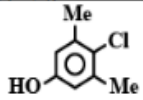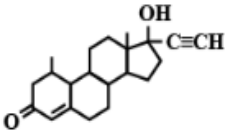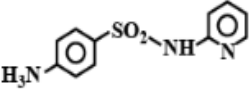
S49.Ans.(d)
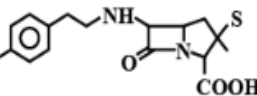
Sol. Ethanol is a primary alcohol. We can use ethanol as an ingredient in cooling baths in many laboratories. We can use ethanol in fragment materials such as perfumes.

Formalin is an aldehyde. It is used in embalming fluids to delay decay in human corpses, as well as in the preservation of animal specimens. In medicine, we use formalin to preserve dead bodies.

Acetone is a ketone. It has various industrial applications and is used as a solvent in adhesives, paints, nail polish and nail polish remover.

Ethanoic acid is a carboxylic acid. We use ethanoic acid as an ingredient in cooking. Ethanoic acid is used to give sour taste in food.

S50.Ans.(b)

(A) Chloroxylenol		FeCl₃ test	
(B) Norethindrone		Bayer's test	
(C) Sulphapyridine		Carbylamine test	
(D) Penicllin		Sodium hydrogen carbonate test	

Sol.

S51.Ans.(c)

Sol. Orthorhombic structure has 4 bravais lattices namely primitive, body centred, face centred and end centred.

Cubic structure has 3 bravais lattices namely primitive, body centred and face centred.

Hexagonal structure has only primitive bravais lattice.

Tetragonal structure has 2 bravais lattices namely primitive and body centred.

S52.Ans.(b)

Sol. Formaldehyde (HCHO) on oxidation gives methanoic acid (HCOOH).

Acetaldehyde (CH_3CHO) on oxidation gives acetic acid (CH_3COOH).

Propionaldehyde (CH_3CH_2CHO) on oxidation gives propanoic acid (CH_3CH_2COOH).

Isobutyraldehyde ($CH_3CH(CH_3)CHO$) on oxidation gives isobutyric acid (($CH_3CH(CH_3)COOH$).

S53.Ans.(c)

Sol. An aldohexose is a hexose with an aldehyde group on one end. The aldohexoses have four chiral centres for a total of 16 possible aldohexose stereoisomers (24). Of these, only three commonly occur in nature: D-glucose, D-galactose, and D-mannose.

A ketohexose is a ketone-containing hexose (a six-carbon monosaccharide). The most common ketohexoses, each of which represents a pair of enantiomers (D- and L-isomers), include psicose, fructose, sorbose, and tagatose.

Ribose is an aldopentose, which means a pentose sugar with an aldehyde functional group in position one

Erythrose is a tetrose saccharide with the chemical formula $C_4H_8O_4$. It has one aldehyde group, and so is part of the aldose family.

S54.Ans.(d)

Sol. Sol. A. Seldane is an antihistamine. Antihistamines prevent sneezing, runny nose, itching and watering of the eyes, and other allergic symptoms.

B. Meprobamate is used to treat anxiety disorders or for short-term relief of the symptoms of anxiety in adults and children 6 years of age and older. Meprobamate is in a class of medications called tranquilizers.

C. Norethindrone is an example of synthetic progesterone which is one of the most commonly used antifertility drugs.

D. Arsphenamine, also known as Salvarsan or compound 606, is an antibiotic drug that was introduced at the beginning of the 1910s as the first effective treatment for syphilis, relapsing fever, and African trypanosomiasis.

S55.Ans.(a)

Sol. Sol. A. In [Co $(NH_3)_6]^{3+}$, Co is in +3 oxidation state with the configuration $3d^6$. In the presence of NH_3 a strong ligand, the 3d electrons pair up leaving two d-orbitals empty. Hence, the hybridization is d^2sp^3 forming an inner orbital octahedral complex.

B. Co is in +3 oxidation state in the complex $[CoF_6]^{3-}$. Hence, $[CoF_6]^{3-}$ is sp^3d^2 hybridised and it is octahedral in shape.

C. the hybridization of $[NiCl_4]^{2-}$ is sp^3.

D. Ni in $[Ni(CN)_4]^{2-}$ undergoes dsp^2 hybridization which results in square planar geometry.

S56.Ans.(b)

S57.Ans.(a)

Sol. Sol. A. Blood contains heparin (anti-coagulant) which has negative charge attributed to it hence blood becomes negatively charged whereas hemoglobin is a positively charged sol as it contains positively charged central metal atom Fe^{2+}

B. Eosin is an acidic dye: it is negatively charged (general formula for acidic dyes is: Na^+dye^-).

C. Gold sol being a sol of gold (Au) metal is thus, a lyophobic sol. Metal sols are generally negatively charged. Therefore, gold sol is also a negative charged sol.

D. Methylene blue is a thiazine dye that is basic in nature. Methylene blue stains negatively charged cell components like nucleic acids.

S58.Ans.(a)

Sol. Sol. A. The potential energy difference between the reactant and the activated complex is called activation energy.

B. The minimum energy that two molecules should possess so that their collisions result in a chemical reaction is called threshold energy.

C. A system that releases heat to the surroundings, an exothermic reaction, has a negative ΔH by convention, because the enthalpy of the products is lower than the enthalpy of the reactants of the system.

D. A catalyst increases the rate of reaction in both forward and backward directions by providing an alternate pathway with lower activation energy.

S59.Ans.(b)

Sol. Sol. A. Conductance is defined as the reciprocal of resistance.

SI unit of conductance is Siemen or ohm^{-1} or mho.

B. So, the unit of specific conductance is $cm^{-1}\,\Omega^{-1}$ or Seimen cm^{-1}.

C. In this convention, the unit of resistivity is Ohmcm (Ωcm) . If the distances are expressed in meter (m), the SI unit of specific resistance is given by Ohmm (Ω).

D. Molar conductivity is defined as the conductivity of an electrolyte solution divided by the molar concentration of the electrolyte, and so measures the efficiency with which a given electrolyte conducts electricity in solution. S.I Unit is $S\,m^2\,mol^{-1}$.

S60.Ans.(b)

Sol. Sol. A. The reaction of conversion of sulfur dioxide to sulfur trioxide is catalyzed by the catalyst, vanadium pentaoxide, and the reaction is-

$$SO_2\left(g\right) \overset{V_2O_5}{\rightleftharpoons} SO_3\left(g\right)$$
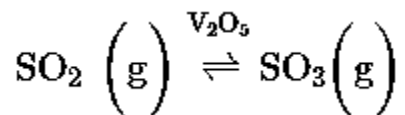
Hence, the catalyst is Vanadium pentoxide(V_2O_5) or platinum(Pt).

B. The Ziegler-Natta catalyst polymerisation is a beneficial and versatile reaction for producing polymers. Some of the most popular applications of this catalyst are; They are used for the production of High and Low-Density Polyethylene.

C. Finely divided iron acts as a catalyst in Haber's process ($N_2 + 3H_2 => 2NH_3$).

D. Wacker's process is the oxidation of ethylene to acetaldehyde in the presence of $PdCl_2$ as the catalyst.

S61.Ans.(c)

Sol. Due to the presence of hydroxyl group -OH there is extensive hydrogen bonding between the ethanol molecules C_2H_5OH. But there is no such Hydrogen bonding in dimethyl ether due to absence of -OH group. So boiling point of dimethyl ether is much lower than ethanol.

S62.Ans.(c)

Sol. Drugs compete with the natural substrate for their attachment on the active site of enzymes by weak bonds such as ionic bonding, H-bonding, van der Waals interactions or dipole-dipole interactions.

S63.Ans.(a)

Sol. Amorphous solids (such as glass) lack a regular three-dimensional arrangement of atoms. Solids are most stable in crystalline form. However, if a solid is formed rapidly (for example, when a liquid is cooled suddenly), its atoms or molecules do not have time to align themselves and may become locked in positions other than those of a regular crystal. Such resulting solids are called amorphous solids which have diffused melting point.

Also, amorphous solids are isotropic (like liquids and gases). Isotropic means the value of any physical property (like refractive index, conductivity etc.) measured in different directions is same since they are homogeneous.

S64.Ans.(b)

Sol. The solubility decreases due to the increase in bulkiness as due to this steric hindrance around the carbonyl group increases so the water molecules cannot interact with the carbonyl group easily and less tendency of formation of hydrogen bond.

S65.Ans.(b)

Sol.   Assertion and reason both are correct statements but reason is not the correct explanation of assertion.

          For the same hydrocarbon part, the boiling point depends upon the atomic mass of the halogen atom. Higher the mass of the halogen atom, the higher will be the boiling point.

          So, we can say that the boiling point decreases with a decrease in the atomic mass of the halogen atom.

S66.Ans.(d)

Sol. Thionyl chloride is best halogen carrier to convert alcohol to alkyl halide because it gives by-products in gaseous state. Thus, we get pure alkyl halide in this reaction.

$$R - OH + SOCl_2 \rightarrow R - Cl + SO_2 \uparrow + HCl \uparrow$$
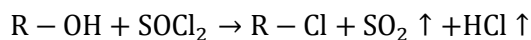
S67.Ans.(c)

Sol. Bakelite is a thermosetting polymer which are cross linked or heavily branched molecules, which on heating undergo extensive cross-linking in moulds and again become infusible. This cannot be reused means it can't regain their original shape after melting.

S68.Ans.(b)

Sol. Rate of reaction increases with increase in temperature. On increase of temperature, number of collisions increases. But the increase in the rate of reaction with increase in temperature is mainly due to increase in the number of effective collisions.

S69.Ans.(a)

Sol. Both assertion and reason are true and reason is the correct explanation of assertion.

$[Sc(H_2O)_6]^{3+}$ has no unpaired electron in its d subshell and thus d−d transition is not possible whereas $[Ti(H_2O)_6]^{3+}$ has one unpaired electron in its d subshell which gives rise to d−d transition to impart colour.

S70.Ans.(a)

Sol. A Catalyst is a substance which accelerates the rate of a chemical reaction without undergoing any change in its chemical composition or mass during the reaction. A catalyst accelerates the rate of a reaction by lowering the activation energy. Transition metals are efficient catalysts. For example, Ni, Pd and Pt are used for the hydrogenation of alkenes.

Transition metals usually contain incomplete d-orbitals (so that they can show variable valency) and provide a larger surface area for adsorption.

Hence, both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

S71.Ans.(a)

Sol. Because of the + R effect of halogen atom, CX bond of aryl halide has some double bond character, hence it is inert towards nucleophile and approach of nucleophile is retarded.

S72.Ans.(a)

Sol. As alkenes are unsaturated hydrocarbons so they have atleast one double bond which can participate in addition reaction, so they can perform addition reaction (like with halogens, hydrogen, halogen acids etc.).

S73.Ans.(d)

Sol. Statements I to III are correct.

Cellulose is a polysaccharide composed of large number of β-D-glucose units joined by β-glycosidic linkages.

Starch is a mixture of amylose and amylopectin. It is a polymer of α-D-glucose units.

IV. Amylose is a branched chain polysaccharide. Hence, the statement IV is incorrect.

V. Amylopectin is a branched polysaccharide. Thus, the statement V is incorrect.

S74.Ans.(a)

Sol. D & f block elements are metals. Only those elements in d & f block forms coloured ions which have empty d orbitals or some impurities. Only those elements are paramagnetic which have unpaired electrons in their electronic configuration.
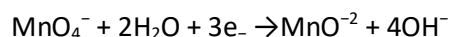
S75.Ans.(d)

Sol. A. In acidic medium, KMnO4 forms MnSO4

$2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5O$

Thus, the option A is correct.

B. On addition of a small quantity of $KMnO_4$ to conc. sulphuric acid, a green coloured solution containing MnO_3^+ ion is obtained.

Thus, the option B is correct.

C. in basic medium, MnO_4^- changes to MnO_2

$MnO_4^- + 2H_2O + 3e_- \rightarrow MnO^{-2} + 4OH^-$

Thus, the option C is correct.

D. $KMnO_4$ has intense purple colour.

When the end point is reached, a slight excess of $KMnO_4$ turns the solution pink.

Hence, $KMnO_4$ acts as a self-indicator in the titration of Fe^{2+} ion with $C_2O_4^{2-}$.

Thus, the option D is correct.

S76.Ans.(b)

Sol. Antibiotics are used to kill bacteria and microorganisms. They are usually taken orally or injected.

Antiseptics are used just to inhibit or prevent bacterial growth and not to kill them. They are used by applying on the skin. Dettol is antiseptic.

S77.Ans.(a)

Sol. (1) Teflon is prepared by heating

tetrafluoroethene in presence of a persulphate catalyst at high pressure via radical addition mechanism.

(2)   Natural rubber is polyisoprene containing cis alkene units.

(3)   Nylon-6 has amide linkages. It is fact.

(4)   Cellulose is a β-d-glucose linear chain linked with β-(1-4)-glycosidic bonds.

S78.Ans.(c)

Sol. In presence of sunlight, chloroform gets oxidized, and phosgene forms. So chloroform is kept in dark brown bottles to stop this oxidation reaction The reaction of the process (oxidation) is given above. Hence, statement I is wrong and statement II is correct.

S79.Ans.(a)

Sol. Because of higher effective nuclear charge and smaller size of atoms the actinides have higher charge density and because of that they have greater tendency to form complexes than the lanthanides.

S80.Ans.(a)

S81.   Ans.(b)

Sol.   Primary and secondary amines can form hydrogen bonds whereas tertiary amines fail to do so. Hence, their boiling points are lowest.
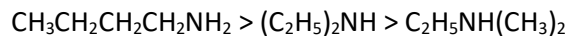
S82.   Ans.(c)

Sol.   Aniline gets coloured on storage due to atmospheric oxidation.

S83.   Ans.(c)

Sol.   The decreasing order of boiling points:

n-butylamine (primary amine) > diethylamine (secondary amine) > ethyldimethylamine (tertiary amine).

$CH_3CH_2CH_2CH_2NH_2 > (C_2H_5)_2NH > C_2H_5NH(CH_3)_2$

In primary amines only one hydrogen is substituted by an alkyl group, in secondary amines, two hydrogens are substituted by alkyl groups and in tertiary amines, all the three hydrogens are substituted by alkyl groups thereby resulting in the absence of intermolecular hydrogen bonding. Higher the hydrogen bonding difficult is to break the bonds thereby high boiling point.

Intermolecular hydrogen bonding is maximum in primary amines and absent in tertiary amines.

S84.   Ans.(c)

Sol.   Order of Boiling points of amines:

Primary amines (RNH_2)> Secondary amines (R_2NH)> Tertiary amines $(R'NR_2)$

Intermolecular hydrogen bonding is more in primary amines than that in secondary amines and nil in tertiary amines as there are no hydrogens attached to the nitrogen atom.

$C_4H_9NH_2 > (C_2H_5)_2NH > C_2H_5N(CH_3)_2$
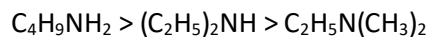
S85.   Ans.(d)

Sol.   N,N-dimethylmethanamine will have the lowest boiling points as it cannot form hydrogen bonds.

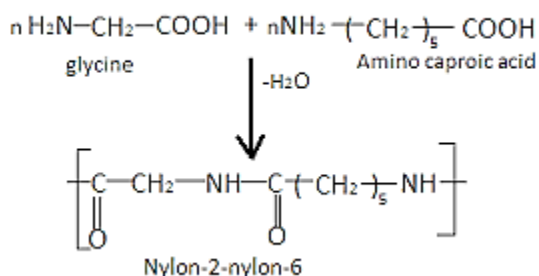Other amines can form hydrogen bonds and have higher boiling points

S86.Ans.(c)

Sol.   Nylon 2-nylon-6 is an alternating polyamide copolymer of glycine and amino caproic acid. It is a biodegradable polymer.

H_2N-CH_2-COOH: glycine

$H_2N(CH_2)_5COOH$: amino caproic acid

S87.Ans.(c)

Sol.   Nylon-2-Nylon 6 is a Biodegradable polymer.

Nylon-2-nylon-6

S88.Ans.(d)

Sol.   Nylon 2-nylon 6 is an alternating polyamide copolymer of glycine ($H_2N–CH_2–COOH$) and aminocaproic acid [$H_2N(CH_2)_5COOH$].

S89.Ans.(a)

Sol.   Cellulose is a biodegradable polymer. Different enzymes secreted by bacteria digest it. Synthetic polymers like polyvinyl chloride, nylon-6, polyester, polyethene etc.) are not acted upon by bacteria and hence, are non-biodegradable.

S90.Ans.(c)

Sol.   PHBV [Poly(3-hydroxybutyrate-co-3-hydroxyvalerate)] find its applications in controlled release of drugs, medical implants and repairs, speciality packaging, orthopaedic devices and manufacturing bottles for consumer goods.

S91.Ans.(a)

Sol. Infinite dilution refers to a hypothetical situation when the ions are infinitely far apart: This statement is correct. Infinite dilution is a theoretical concept used to describe the behavior of electrolytes in very dilute solutions, where the concentration of ions approaches zero.

S92.Ans.(d)

Sol. Hydrogen chloride is a strong electrolyte, and it dissolves in water completely to form Hydrogen ions and chlorine ions.

S93.Ans.(d)

Sol. Sulfurous acid, H_2SO_3 is a weak acid. Therefore, it is a weak electrolyte.

S94.Ans.(a)

$$\lambda^\infty_{m(NaI)} = \lambda^\infty_{m(Na^+)} + \lambda^\infty_{m(I^-)} \qquad .....(i)$$

$$\lambda^\infty_{m(CH_3COONa)} = \lambda^\infty_{m(CH_3COO^-)} + \lambda^\infty_{m(Na^+)} \qquad .....(ii)$$

$$\lambda^\infty_{m(CH_3COO)_2Mg} = 2.\lambda^\infty_{m(CH_3COO^-)} + \lambda^\infty_{m(Mg^{2+})} \qquad .....(iii)$$

Sol. $$\lambda^\infty_{m(MgI_2)} = \lambda^\infty_{m(Mg^{2+})} + 2\lambda^\infty_{mI^-} \qquad .....(iv)$$

We can get equation (iv) from equation 1, 2 and 3

Equation (iii) + 2(eq. (i)) − 2(eq. ii)

$\lambda^\infty_{m(MgI_2)}$ = 18.78 + 2(12.69) − 2(9.10) = 25.96

S95.Ans.(a)

Sol. Larger is the size of the ion, smaller is the degree of hydration and larger is the molar ionic conductance. Hence, the correct order of the molar ionic conductance is $Li^+ < Na^+ < K^+ < Rb^+$
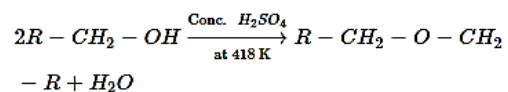
S96.   Ans. (d)

Sol.   In williamson's synthesis, primary alkyl halide is always taken otherwise alkene is the major product. Hence di-tert butyl ether cannot be made.
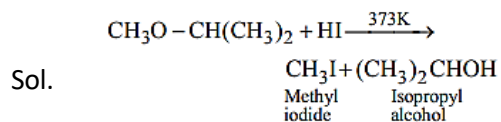
S97.   Ans. (c)

Sol. $\overset{1}{C}H_2=\overset{2}{C}H-\overset{3}{C}H_2-O-CH_3$: 3-methoxyprop-1-ene
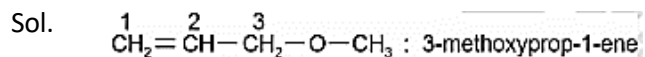
S98.   Ans. (a)

Sol.   Dehydration of alcohols into ether take place in presence of Conc. H_2SO_4 at 140°C

$$2R-CH_2-OH \xrightarrow[\text{at 418 K}]{\text{Conc. } H_2SO_4} R-CH_2-O-CH_2$$
$$-R+H_2O$$

S99.   Ans. (b)

Sol. $CH_3O-CH(CH_3)_2 + HI \xrightarrow{373K}$
        $\underset{\substack{\text{Methyl} \\ \text{iodide}}}{CH_3I} + \underset{\substack{\text{Isopropyl} \\ \text{alcohol}}}{(CH_3)_2CHOH}$

S100.   Ans. (a)

Sol.   This reaction also proceeds in the same manner. The Br atom of HBr is expected to combine with ethyl group (smaller in size) and not with phenyl group (bigger is size)

Ethoxybenzene + HBr ⟶ Phenol + C₂H₅Br (Bromoethane)