Chemistry Chapter Wise Important Questions for CBSE Board Exam 2022-2023

Chapter : Solution

Multiple-choice questions - 1 mark each

1. The solubility of a substance in a solvent depends on the?
    a) Temperature
    b) Nature of solute and solvent
    c) Pressure
    d) All the above
2. Which law explained the solubility of gasses in a liquid?
    a) Boyle's law
    b) Charles's law
    c) Henry's law
    d) Raoult's law
3. Isotonic solutions are the solutions having the same.
    a) osmotic pressure
    b) surface tension
    c) concentration
    d) Temperature
4. The law stating that the relative lowering of vapor pressure is equal to the mole fraction of a solute in the solution is known as
    a) Henry's law
    b) Raoult's law
5. A plant cell shrinks when it is kept in
    a) Hypotonic solution
    b) Isotonic solution
    c) Hypertonic solution
    d) Pure water

Very short answer type questions – 2 marks each

1. What is meant by 'reverse osmosis?
2. What are 'azeotropes?
3. What are defined colligative properties?
4. What type of intermolecular attractive interaction exists in the pair of methanol
   and acetone?
5. Define the 'mole fraction' of a substance in a solution.

Short answer type questions – 3 marks each

1. Calculate the mass percentage of benzene (C6H6) and carbon tetrachloride (CCl4) if 22 g of benzene is dissolved in 122 g of carbon tetrachloride.
2. Calculate the mole fraction of ethanol and water in a sample of rectified spirit which contains 46% ethanol by mass.
3. What is the relationship between the relative lowering of vapour pressure and mole fraction of solute?
4. State Raoult's law. How is it formulated for solutions of non-volatile solutes?
5. State Henry's law. What is the effect of temperature on the solubility of a gas in a liquid?

Long answer type questions – 5 marks each

1. a) Define the following terms :
   (i) Mole fraction (ii) Van't Hoff factor

   b) Differentiate between molarity and molality for a solution.

   c) Define the terms osmosis and osmotic pressure.

2. State the following :
   (i) Henry's law about partial pressure of a gas in a mixture.
   (ii) Raoult's law in its general form in reference to solutions.
   (b) A solution prepared by dissolving 8.95 mg of a gene fragment in 35.0 mL of water has an osmotic pressure of 0.335 torrs at 25°C.

Assuming the gene fragment is a non-electrolyte, determine its molar mass.

3. H2s, a toxic gas with a rotten egg-like smell, are used for the qualitative analysis. If the solubility of H2s in water at STP is 0.195 m, calculate Henry's law constant.
4. The vapour pressure of pure liquids A and B are 450 and 700 mm Hg respectively, at 350 K. Find out the composition of the liquid mixture if the total vapour pressure is 600 mm Hg. Also, find the composition of the vapour phase.
5. (a) Define the following terms: ..
   (i) Ideal solution (ii) Azeotrope (iii) Osmotic pressure
   (b) A solution of glucose (C6H1206) in water is labelled as 10% by weight. What would be the molality of the solution?
   (Molar mass of glucose = 180 g mol-1

Chapter : Electrochemistry

Multiple-choice questions - 1 mark each

1. Which of the following is given to a fuel cell's cathode?
   a. Hydrogen
   b. Oxygen
   c. Nitrogen
   d. Chlorine
2. Which of the following is the secondary cell?
   a. Lead storage battery
   b. Laclanche cell
3. In Daniell cell
   a) Cu rod is represented by (−ve) electrode
   b) Zn rod is represented by (+ve) electrode
   c) Zn rod as anode and Cu rod as cathode
   d) None of the above
4. The charge required for the reduction of 1 mol of MnO2– to MnO2 is
   a) 4 F

b) 2 F

c) 1 F

d) 3 F

5. The highest electrical conductivity of the following aqueous solutions is of?

a) 0.1 M chloro acetic acid

b) 0.1 M difluoro acetic acid

c) 0.2 M acetic acid

d) 0.1 M fluoro acetic acid

Very short answer type questions – 2 marks each

1. What is the effect of catalyst on:
   (i) Gibbs energy (ΔG) and
   (ii) activation energy of a reaction?
2. Define the following terms :
   (i) Molar conductivity (Λm)

   (ii)The rate constant (k)
3. What are fuel cells? Explain the electrode reactions involved in the working of H2 – O2 fuel cell.
4. What is the role of ZnCl2 in a dry cell?
5. What is meant by limiting molar conductivity?

Short answer type questions – 3 marks each

1. Write the relationship between Gibbs free energy change and cell potential.
2. What is an electrochemical series? How does it predict the feasibility of a certain redox reaction?
3. Calculate the degree of dissociation (α) of acetic acid if its molar conductivity (Λm) is 39.05 S cm2 mol-1
4. Calculate the emf of the following cell at 25°C :

   Fe | Fe2+ (0.001 M) || H+ (0.01 M) | H2(g) (1 bar) | Pt(s)

   E°(Fe2+ | Fe) = -0.44 V, E°(H+ | H2) = 0.00V

5. What is metallic corrosion? Give two examples.

Long answer type questions – 5 marks each

1. Three electrolytic cells A, B, and C containing solutions of ZnSO4, AgNO3 and CuSO4 respectively all connected in series. A steady current of 1.5 amperes was passed through then until 1.45 g of silver was deposited at the cathode of cell B. How long did the current flow? What mass of copper and of zinc were deposited?

2. (a)The conductivity of 0.20 mol L-1 solution of KC1 is 2.48 x 10-2 S cm-1. Calculate its molar conductivity and degree of dissociation (α). Given λ0 (K+) = 73.5 S cm2 mol-1 and λ0 (Cl–) = 76.5 S cm2 mol-1.

(b) What type of battery is a mercury cell? Why is it more advantageous than a dry cell?

3. Draw a labelled diagram of Daniel cell and explain the cell reaction. Or, Draw a labelled diagram of the electrochemical cell and write the cell reaction.

4. Calculate the standard cell potentials of galvanic cells in which the following reactions take place:
   1. 2Cr(s) + 3Cd2+(aq) → Cr3+(aq) + 3Cd
   2. Fe2+(aq) +Ag+(aq) → Fe3+(aq) + Ag(s). Calculate the ∆rG°, and equilibrium constant of the reactions.

5. What is the relationship between Gibbs free energy of the cell reaction in a galvanic cell and the emf of the cell? When will the maximum work be obtained from a galvanic cell?

Chapter : Chemical Kinetics

Multiple-choice questions - 1 mark each

1. For a chemical reaction A→B, it is found that the rate of reaction doubles when the concentration of A is increased four times. The order of the reaction is

a) one
b) two
c) zero
d) half

2. The rate of a reaction is primarily determined by the slowest step. This step is called

a) reaction rate step
b) rate-determining step
c) activation step
d) None

3. The ratio t7/8 : t1/2 for the first order is

(a) 3
(b) 4
(c) 6
(d) 7

4. when the rate of the reaction is equal to the rate constant, the order of the reaction is

a) first order
b) zero order
c) second order
d) third order

5. The rate constant of a reaction depends upon

a) The extent of the reaction
b) the initial concentration of the reactants
c) the time of completion of the reaction
d) temperature

Very short answer type questions – 2 marks each

1. Define 'order of a reaction'

2. A reaction is of second order with respect to a reactant. How will the rate of reaction be affected if the concentration of this reactant is

3. Write two differences between 'order of reaction' and 'molecularity of reaction'.

4. For a zero-order reaction will the molecularity be equal to zero? Explain.

5. How does a change in temperature affect the rate of reaction?

Short answer type questions – 3 marks each

1. A first-order reaction takes 10 minutes for 25% decomposition. Calculate t1/2 for the reaction. (Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021).

2. The rate constant for a first-order reaction is given as 60 s-1. Then find out how much time will it take to reduce the initial concentration of the reactant to its 1/16 th value.

3. The rate of a particular reaction quadruples when the temperature changes from 293 K to 313 K. Calculate activation energy

4. The rate of a gaseous reaction becomes half when the volume of the vessel is doubled. What is the order of reaction?

5. Why does the rate of any reaction generally decrease during the course of the reaction?

Long answer type questions – 5 marks each

1. Write the proper expression for rate law.
   (ii) Find the value of the rate constant and specify its units.
   (iii) What will be the initial rate in experiment 4 for the disappearance of Cl2?

2. Determine the units of the rate constant for first and zero-order reactions. (b) Show that time required for the completion of 99% of the first-order reaction is twice the 90% of completion of the reaction.

3. What happens to the most probable kinetic energy and the energy of activation with an increase in temperature?

4. State and explain the Arrhenius equation. How can we determine the activation energy of a reaction using this equation?

5. What is the effect of temperature on the rate constant of reaction? How can this temperature effect on rate constant be represented quantitatively.

Chapter: d and f block elements

Multiple-choice questions - 1 mark each

1. Zinc and mercury do not show variable valency like d-block elements because

   a. their d-shells are incomplete
   b. they are soft
   c. their d-shells are complete
   d. they have only two electrons in the outermost subshell.

2. The pair that has similar atomic radii is

   a) Sc and Ni
   b) Mn and Re
   c) Ti and Hf
   d) Mo and W

3. Which of the following has a magnetic moment value of 5.9?

   a) Ni2+
   b) Cu2+
   c) Fe2+
   d) Fe3+

4. Which one of the following characteristics of the transition metals is associated with higher catalytic activity?

   a) Colour of hydrate ions
   b) Variable oxidation states
   c) High enthalpy of atomisation
   d) Paramagnetic behaviour

5. Which of the following metal does not form a coloured salt?
   a) Zinc
   b) Bronze
   c) Thorium
   d) Cobalt

Very short answer type questions – 2 marks each

1. What is the electronic configuration of Cr^{3+}?
2. Why are Mn^{2+} compounds more stable than Fe^{2+} towards oxidation to their +3 state?
3. Why is the first ionization enthalpy of 5d series elements higher than that of 3d and 4d series elements?
4. What are interstitial compounds. Give two examples
5. What is the composition of mischmetall?

Short answer type questions – 3 marks each

1. Actionoids show larger number of oxidation states than lanthanoids. Why?
2. Describe the steps of preparation of $KMnO_4$?
3. What is the lanthanoid contraction? What are its causes and consequences?
4. Account for the following:
   a) All Scandium salts are white.
   b) The Ist ionization energy of the 5d series are higher than 3d and 4d transition elements in respective groups.
   c) Ce^{+3} can be easily oxidized to Ce^{+4}.
5. Write any three differences between lanthanoids and actinoids

Long answer type questions – 5 marks each

1. Explain the following :

   i. Transition metals and their compounds generally exhibit a paramagnetic behaviour.

   ii. The chemistry of actinoids is not so smooth as that of lanthanoids.

   iii. The enthalpies of atomization of transition metals are quite high.

2. When chromite ore FeCr2O4 is fused with NaOH in presence of air, a yellow-coloured compound (A) is obtained which on acidification with dilute sulphuric acid gives a compound (B). Compound (B) on reaction with KC1 forms an orange-coloured crystalline compound (C).
   (i) Write the formulae of the compounds (A), (B) and (C).
   (ii) Write one use of the compound (C).

3. A mixed oxide of iron and chromium is fused with sodium carbonate in free access of air to form a yellow-coloured compound (A). On acidification the compound (A) forms an orange coloured compound (B), which is a strong oxidizing agent. Identify compound (A) and (B). Write chemical reactions involved.

Chapter: Coordination Compounds

Multiple-choice questions - 1 mark each

1. Which substance is used to determine the hardness of water using a simple titration?

   a) Na_2(EDTA)
   b) Co (EDTA)
   c) Mg (EDTA)
   d) Fe (EDTA)

2. Which of these statements about [Co(CN)6]3- is true?

   a) It has 4 unpaired electron, high spin
   b) No unpaired electron, high spin

c) No unpaired electron, low spin

d) 4 unpaired electron, low spin

3. Among the ligands NH3, en, CN and CO, the correct order of field strength is

a. en < CN^-< NH_3 < CO

b. CO < NH_3 < en < CN^-

c. NH_3 < en < CN^- < CO

d. CN^- < NH_3 < CO < en

4. The oxidation number of Cr in a [Cr (NH3)2F4]– complex is

a) 2
b) 4
c) 3
d) 6

5. K3[Al(C2O4)3] is called

a) Potassium trioxalato aluminate (III)
b) Potassium tris (oxalate) aluminium.
c) Potassium alumino oxalate
d) Potassium aluminium (III) trioxalate

Very short answer type questions – 2 marks each

1. Write down the IUPAC name of the complex [Co(en)2Cl2]+. What type of isomerism is shown by this complex?
2. Draw the geometrical isomers of complex [Co(en)2Cl2]+.
3. Write the hybridization and shape of [CoF6]3-.
4. What is meant by crystal field splitting energy?
5. Why do compounds having similar geometry have different magnetic moments?

Short answer type questions – 3 marks each

1. Explain the following cases giving appropriate reasons:
   (i) Nickel does not form low-spin octahedral complexes.
   (ii) The n-complexes are known for transition metals only.
2. Write the structures and names of all the stereoisomers of the following compounds:
   (i) [Co(en)3] Cl3
   (ii) [Pt(NH3)2Cl2]
   (iii) [Fe(NH3)4Cl2]Cl
3. Name the following coordination entities and describe their structures :
   (i) [Fe(CN)6]4-
   (ii) [Cr(NH3)4Cl2]+
   (iii) [Ni(CN)4]2-
4. (a)What type of isomerism is shown by the complex [Co(NH3)5 (SCN)]2+?
   (b) Why is [NiCl24]2- paramagnetic while [Ni(CN)4]2- is diamagnetic? (Atomic number of Ni = 28)
   (c) Why are low spin tetrahedral complexes rarely observed?
5. Compare the following complexes with respect to their shape, magnetic behaviour and the hybrid orbitals involved:

   (i) [CoF4]2-
   (ii) [Cr(H2O)2(C2O4)2]–
   (iii) [Ni(CO)4] (Atomic number : Co = 27, Cr = 24, Ni = 28)

Long answer type questions – 5 marks each

1. Using crystal field theory, draw an energy level diagram, write electronic configuration of the central metal atom/ion and determine the magnetic moment value in the following:

   (i) [CoF6]3-, [Co(H2O)6]2+, [Co(CN)6]3-

   (ii) [FeF6]3-, [Fe(H2O)6]2+, [Fe(CN)6]4-

2. Explain the following:
   (i) Low spin octahedral complexes of nickel are not known.
   (ii) The n-complexes are known for transition elements only.
   (iii) CO is a stronger ligand than NH3 for many metals.
3. Write the formulas for the following coordination compounds:
   (i) Tetraamminediaquacobalt (III) chloride

(ii) Potassium tetracyanonickelate (II)
(iii) Tris(ethane-1,2-diamine) chromium(III) chloride
(iv) Amminebromidochloridonitrito-N-platinate (II)
(v) Dichloridobis(ethane-1,2-diamine)platinum(IV) nitrate
(vi) Iron(III) hexacyanoferrate (II)

Chapter: Haloalkanes and Haloarenes

Multiple-choice questions - 1 mark each

1. Which of the following substances has the highest melting point?
   a) Tetrachloromethane
   b) Trichloromethane
   c) Chloromethane
   d) Dichloromethane
2. C – X bond is strongest in
   e) CH3F
   f) CH3I
   g) CH3Cl
   h) CH3Br
3. Which of the following possesses highest melting point?
   i) p-dichlorobenzene
   j) Chlorobenzene
   k) m-dichlorobenzene
   l) o-dichlorobenzene
4. SN1 reaction of alkyl halides leads to
   a) retention of configuration
   b) racemisation

c) inversion of configuration

d) none of these.

5. The reactivity order of halides for dehydrogenation is

a) RF > RCl > RBr > RI

b) RI > RBr > RCl > RF

c) RI > RCl > RBr > RF

d) RF > RI > RBr > RCl

Very short answer type questions – 2 marks each

1. A hydrocarbon C5H12 gives only one mono-chlorination product. Identify the hydrocarbon.

2. Write the structure of an isomer of compound C4H9Br which is most reactive towards SN1 reaction.

3. How are the following conversions carried out?
(i) Benzyl chloride to benzyl alcohol,
(ii) Methyl magnesium bromide to 2-methyl- propan-2-ol.

4. Why is the solubility of haloalkanes in water very low?

5. How will you obtain mono bromobenzene from aniline?

Short answer type questions – 3 marks each

1. Why are aryl halides less reactive towards nucleophilic substitution reactions than alkyl halides?

2. How do you convert the following:
(i) Prop-l-ene to propan-2-ol
(ii) Bromobenzene to 2-bromoacetophenone
(iii) 2-bromobutane to But-2-ene

3. Give reasons for the following:
(i) Benzyl chloride is highly reactive towards the SN1 reaction.
(ii) 2-bromobutane is optically active but 1-bromobutane is optically inactive.
(iii) Electrophilic reactions in haloarenes occur slowly.

4. Write chemical equation when
   methyl chloride is treated with AgNO2.
   bromobenzene is treated with CH3Cl in the presence of anhydrous AlCl3.

5. Explain why:

   a. The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
   b. Alkyl halides, though polar, are immiscible with water?

Long answer type questions – 5 marks each

1. Arrange each set of compounds in order of increasing boiling points.
   (i) Bromomethane, Bromoform, Chloromethane, Dibromomethane.
   (ii) 1-Chloropropane, Isopropyl chloride, 1-Chlorobutane.

2. Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify the major alkene:
   (i) 1-Bromo-1-methylcyclohexane
   (ii) 2-Chloro-2-methylbutane
   (iii) 2,2,3-Trimethyl-3-bromopentane.

3. Some alkyl halides undergo substitution whereas some undergo elimination reactions on treatment with bases. Discuss the structural features of alkyl halides with the help of examples which are responsible for this difference.

Chapter: Alcohol Phenol and Ether

Multiple-choice questions - 1 mark each

1. Dehydration of alcohol is an example of

   a) addition reaction
   b) elimination reaction
   c) substitution reaction
   d) redox reaction

2. How is carbolic acid prepared from benzene diazonium chloride?

   a) alcohol and phenol

b) only phenol

c) phenol and acetone

d) alcohol and acetone

3. Which of the following isomeric alcohols is the most soluble in water?

a) n-Butyl alcohol

b) Isobutyl alcohol

c) sec-Butyl alcohol

d) tert-Butyl alcohol

4. In the reaction of phenol with CHCl3 and aqueous NaOH at 343 K, the electrophile attacking the ring is:

a) CHCl3

b) CHCl2

c) CCl2

d) COCl2

5. Wood spirit is known as acetone

a) methanol

b) ethanol

c) ethyl alcohol

d) benzene

Very short answer type questions – 2 marks each

1. Why is the reactivity of all the three classes of alcohols with conc.HCI and ZnCl2 (Lucas reagent) different?

2. Explain why p-nitrophenol is more acidic than phenol.

3. What happens when phenol is heated with zinc dust?

4. Illustrate the following reactions giving a chemical equation for each :
(i) Kolbe's reaction
(ii) Williamsons synthesis of an ether

5. How will you convert:
   (i) Propene to propan-2-ol?
   (ii) Phenol to 2, 4, 6-trinitrophenol?

Short answer type questions – 3 marks each

1. Write the mechanism of the reaction of HI with methoxybenzene.

2. Explain the mechanism of acid-catalysed hydration of an alkene to form corresponding alcohol.

3. Ethers can be prepared by Williamson synthesis in which an alkyl halide is reacted with sodium alkoxide. Di-tert-butyl ether can't be prepared by this method. Explain.

4. Write the equations involved in the following reactions:
   (i) Reimer – Tiemann reaction
   (ii) Williamson synthesis

5. Explain the mechanism of the following reactions :
   (i) Addition of Grignard's reagent to the carbonyl group of a compound forming an adduct followed by hydrolysis.
   (ii) Acid catalysed dehydration of an alcohol forming an alkene.
   (iii) Acid catalysed hydration of an alkene forming an alcohol.

Long answer type questions – 5 marks each

1. While separating a mixture of ortho and para nitrophenols by steam distillation, name the isomer which will be steam volatile. Give reason.

2. Write the reactions of Williamson synthesis of 2-ethoxy-3-methylpentane starting from ethanol and 3-methylpentan-2-ol.

3. Write the mechanism of hydration of ethene to yield ethanol.

Chapter: Aldehydes Ketones and Carboxylic acids

Multiple-choice questions - 1 mark each

1. Which of the reactions below can result in ketones?
   a) Oxidation of primary alcohols
   b) Oxidation of secondary alcohols
   c) Dehydrogenation of tertiary alcohols
   d) Dehydrogenation of primary alcohols
2. Which of the following compounds doesn't have a carbonyl group in it?
   a) Alcoholic
   b) Aldehyde is a kind of aldehyde.
   c) the ketones
   d) Carboxylic acid
3. Which of the following acids does not form anhydride?
   a) Formic add
   b) Acetic acid
   c) Propionic add
   d) n-butyric acid
4. Methyl ketones are usually characterised through
   a) Tollen's reagent
   b) Iodoform test
   c) Schiff'stest
   d) Benedict solution test.
5. Benzaldehyde can be prepared by the hydrolysis of
   a) Benzal chloride
   b) Benzotri chloride
   c) Benzo nitrile.
   d) Benzyl chloride

Very short answer type questions – 2 marks each

1. Write a test to differentiate between pentan-2-one and pentan-3-one.
2. Arrange the following in decreasing order of their acidic strength and give the reason for your answer. CH3CH2OH, CH3COOH, CICH2COOH, FCH2COOH, C6H5CH2COOH
3. Formaldehyde does not take part in Aldol condensation. Why?
4. Aldehydes and Ketones have lower boiling points than corresponding alcohols. Why?
5. Give a chemical test to distinguish between benzoic acid and phenol.

Short answer type questions – 3 marks each

1. Write the reactions involved in the following reactions:
   (i) Clemmensen reduction
   (ii) Cannizzaro reaction
2. Name the electrophile produced in the reaction of benzene with benzoyl chloride in the presence of anhydrous AlCl3. Name the reaction also.
3. Carboxylic acids contain the carbonyl group but do not show the nucleophilic addition reaction like aldehydes or ketones. Why?
4. Do the following conversions in not more than two steps:
   (i) Benzoic acid to benzaldehyde
   (ii) Ethyl benzene to Benzoic acid
   (iii) Propanone to Propene
5. Give chemical tests to distinguish between the following pairs of compounds :
   (i) Ethanal and Propanal (ii) Phenol and Benzoic acid

Long answer type questions – 5 marks each

1. Arrange the following compounds in an increasing order of their indicated property :
   (i) Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid (acid strength)
   (ii) CH3CH2CH (Br) COOH, CH3CH (Br) CH2COOH, (CH3)2CHCOOH, CH3CH2CH2COOH (acid strength)
   (b) How would you bring about the following conversions:

(i) Propanone to Propene (ii) Benzoic acid to Benzaldehyde
(iii) Bromobenzene to 1-phenylethanol

2. Illustrate the following name reactions :
(i) Hell-Volhard-Zelinsky reaction (ii) Wolff-Kishner reduction reaction
(b) How are the following conversions carried out:
(i) Ethyl cyanide to ethanoic acid (ii) Butan-l-ol to butanoic acid
(iii) Methylbenzene to benzoic acid
Write chemical equations for the involved reactions.

3. A compound A with molecular formula C5H12O on oxidation forms compound B with molecular formulaC5H10O. The compound B gives iodoform test but does not reduce ammoniacal silver nitrate. The compound B on reduction with Zn – Hg/ HCl gives compound C with molecular formulaC5H12. Identify A,B.C & give the chemical reactions involved.

Chapter: Amines

Multiple-choice questions - 1 mark each

1. Which of these substances has a lower melting point than amine?
   a) Alcohol
   b) Carboxylic acid
   c) Phosphine
   d) Ether
2. Which of the following does not react with Hinsberg reagent?
   a) Ethylamine
   b) (CH3)3N
   c) Propan-2-amine
   d) (CH3)2NH
3. Which of the following pair of species will yield carbylamine?
   a) CH3CH2Br and KCN
   b) CH3CH2Br and NH3 (excess)
   c) CH3CH2Br and AgCN
   d) CH3CH2NH2 and HCHO

4. What is the correct name of the compound with two amino groups around a benzene ring at opposite (para) positions?

   a) Benzenediamine

   b) 4-Aminobenzenamine

   c) p-Aminoaniline

   d) Benzene-1,4-diamine

5. The most convenient method to prepare primary (i Amine) amine containing one carbon atom less is

   a) Gabriel phthalmidie synthesis

   b) Reductive amination of aldehydes

   c) Hofmann bromamide reaction

   d) Reduction of isonitriles

Very short answer type questions – 2 marks each

1. What is the role of HNO3 in the nitrating mixture used for the nitration of benzene?

2. What is the best reagent to convert nitrile to primary amine?

3. Why is aniline soluble in aqueous HCI?

4. Give a chemical test to distinguish between ethylamine and aniline.

5. Write the structure of 2-aminotoluene.

Short answer type questions – 3 marks each

1. How would you account for the following:
   (a) Aniline is a weaker base than cyclohexyl amine.
   (b) Methylamine in aqueous medium gives reddish-brown precipitate with FeCl3.

2. Explain the following reactions :
   (a) Gabriel Phthalimide reaction
   (b) Coupling reaction

3. Write the chemical equations involved in the following reactions:
   (i) Hoffmann-bromamide degradation reaction
   (ii) Carbylamine reaction

4. In the following cases rearrange the compounds as directed : (Delhi 2010)
   (i) In an increasing order of basic strength :
   C6H5NH2, C6H5 N(CH3)2, (C2H5)2NH and CH3NH2
   (ii) In a decreasing order of basic strength :
   Aniline, p-nitroaniline and p-toluidine

5. State reasons for the following:
   (i) pKb value for aniline is more than that for methylamine.
   (ii) Ethylamine is soluble in water whereas aniline is not soluble in water.
   (iii) Primary amines have higher boiling points than tertiary amines.

Long answer type questions – 5 marks each

1. (a)Write the structures of main products when aniline reacts with the following reagents:
   (i) Br2 water (ii) HCI (iii) (CH3CO)2O/pyridine
   (b) Arrange the following in the increasing order of their boiling point :
   C2H5NH2, C2H5OH, (CH3)3N
   (c) Give a simple chemical test to distinguish between the following pair of compounds : (CH3)2NH and (CH3)3N

2. Write the structures of main products when benzene diazonium chloride reacts with the following reagents :
   (i) H3PO2 + H2O (ii) CuCN/KCN (iii) H2O
   (b) Arrange the following in the increasing order of their basic character in an aqueous solution :
   C2H5NH2, (C2H5)2NH, (C3H5)3N
   (c) Give a simple chemical test to distinguish between the following pair of compounds :
   C6H5—NH2 and C6H5—NH—CH3

3. A colourless substance 'A' (C6H7N) is sparingly soluble in water and gives a water-soluble compound 'B' on treatment with mineral acid. On reacting with CHCI3 and alcoholic potash, 'A' produces an obnoxious smell due to compound 'C' formation. The reaction of 'A' with benzene sulphonyl chloride gives compound 'D', which is soluble in alkali. With NaNO2 and HCI, 'A' forms compound 'E', which reacts with phenol in an alkaline medium to give' F' orange dye. Identify compounds 'A' to 'F'.

Chapter: Biomolecules

Multiple-choice questions - 1 mark each

1. Name the simplest amino acid

    a) Alanine
    b) Tyrosine
    c) Glycine
    d) Asparagine

2. Haemoglobin has

    a. Primary structure
    b. Tertiary structure
    c. Quaternary structure
    d. Secondary structure

3. Which is a reducing sugar?

    a. Sucrose
    b. β-methyl galactosidase
    c. Galactose
    d. Gluconic acid

4. Sucrose is also called as
    a) Invert sugar
    b) Dextrose
    c) Laevose
    d) Milk sugar
5. Which among the following is not a polysaccharide?
    a) Lactose
    b) Glycogen
    c) Starch
    d) Dextrin

Very short answer type questions – 2 marks each

1. Write the name of linkage joining two amino acids.

2. Name one oil soluble vitamin which is a powerful antioxidant and give its one natural source.

3. Which of the two components of starch is water soluble?

4. Name the products of hydrolysis of sucrose.

5. Define a 'Peptide linkage'.

Short answer type questions – 3 marks each

1. State clearly what are known as nucleosides and nucleotides.

2. What is essentially the difference between a-form of glucose and p-form of glucose?

3. Explain what is meant by the following :
   (i) peptide linkage
   (ii) pyranose structure of glucose

4. Write the main structural difference between DNA and RNA. Of the four bases, name those which are common to both DNA and RNA.

5. (a) Name the only vitamin which can be synthesized in our body. Name one disease that is caused due to the deficiency of this vitamin.
   (b) State two functions of carbohydrates.

Long answer type questions – 5 marks each

1. Differentiate between fibrous proteins and globular proteins. What is meant by the denaturation of a protein?

2. What is essentially the difference between a-glucose and P-glucose? What is meant by pyranose structure of glucose?

3. What is the basic structural difference between starch and cellulose?