

- i. A first order reaction has a rate constant $k = 3.01 \times 10^{-3} \text{ s}^{-1}$. How long it will take to decompose half of the reactant?
 - a. 2.303 s
 - b. 23.03 s
 - c. 230.3 s
 - d. 2303 s
- ii. The rate constant for a first order reaction is $7.0 \times 10^{-4} \text{ s}^{-1}$. If initial concentration of reactant is 0.080 M, what is the half-life of reaction?
 - a. 990 s
 - b. 79.2 s
 - c. 12375 s
 - d. $10.10 \times 10^{-4} \text{ s}$
- iii. For the half-life period of a first order reaction, which one of the following statements is generally false?
 - a. It is independent of initial concentration.
 - b. It is independent of temperature.
 - c. It decreases with the introduction of a catalyst.
 - d. It increases with increase of temperature
- iv. The rate of a first order reaction is $0.04 \text{ mol L}^{-1} \text{ s}^{-1}$ at 10 minutes and $0.03 \text{ mol L}^{-1} \text{ s}^{-1}$ at 20 minutes after initiation. Calculate the half life of the reaction.

UNIT-VIII (d & f- BLOCK ELEMENTS)

Multiple choice questions:

- Q1.** The number of unpaired electrons in gaseous species of Mn^{3+} , Cr^{3+} and V^{3+} respectively are and the most stable species is:
- a. 4, 3 and 2; V^{3+}
 - b. 3, 3 and 2; Cr^{3+}
 - c. 4, 3 and 2; Cr^{3+}
 - d. 3, 3 and 3; Mn^{3+}
- Q2.** Fe^{3+} ion is more stable than Fe^{2+} ion because:
- a. more the charge on the atom, more is its stability
 - b. configuration of Fe^{2+} is $3d^5$ while Fe^{3+} is $3d^5$
 - c. Fe^{2+} has a larger size than Fe^{3+}
 - d. Fe^{3+} ions are coloured hence more stable
- Q3.** Which one of the following is called green vitriol?
- a. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
 - b. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
 - c. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - d. CaSO_4

Assertion – Reason type questions:

- a. Both assertion and reason are correct and reason is the correct explanation of assertion.
- b. Both assertion and reason are correct but reason is not a correct explanation of the assertion.
- c. Assertion is correct but reason is incorrect.
- d. Assertion is incorrect but reason is correct.

Q4. Assertion: Cuprous ion (Cu^+) has unpaired electrons while cupric ion (Cu^{2+}) does not.

Reason: Cuprous ion (Cu^+) is colourless whereas cupric ion (Cu^{2+}) is blue in the aqueous solution.

Q5. Assertion: Transition metals show variable valency.

Reason: Transition metals have a large energy difference between the ns^2 and $(n-1)d$ electrons.

Subjective type questions:

Q6. Which metal in the first transition series exhibits a +1 oxidation state most frequently and why?

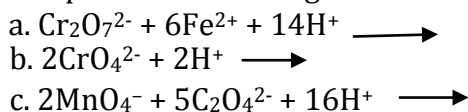
Q7. How does the colour of $\text{Cr}_2\text{O}_7^{2-}$ change when treated with an alkali?

Q8. Give reasons for the following statements:

- a. Transition metals and their compounds are generally found to be good catalysts.
- b. Metal-metal bonding is more frequent for the 4d and the 5d series of transition

- c. Actinoid contraction is greater than lanthanoid contraction.
 d. The E^{θ} value for the Mn^{3+}/Mn^{2+} couple is much more positive than that for Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} .
 e. Transition elements exhibit higher enthalpies of atomization.

Q9. Complete the following chemical equations:



Q10. Read the following passage and answer the questions that follow:

The f-block elements are those in which the differentiating electrons enters the (n-2)f orbitals. There are two series of f-Block elements corresponding to filling of 4f and 5f-orbitals. The series of 4f-orbitals is called lanthanides. Lanthanides show different oxidation states depending upon stability of f^0 , f^7 and f^{14} configurations, though the most common oxidation states are +3. There is a regular decrease in the size of lanthanides ions with increase in atomic number which is known as lanthanides contraction.

The following questions are multiple choice questions. Choose the most appropriate answer:

- i. The atomic number of three lanthanides elements X, Y and Z are 65, 68 and 70 respectively, their Ln^{3+} electronic configuration is:
 a. $4f^8, 4f^{11}, 4f^{13}$ b. $4f^{11}, 4f^8, 4f^{13}$ c. $4f^0, 4f^2, 4f^{11}$ d. $4f^3, 4f^7, 4f^9$
- ii. lanthanoide contraction is observed in:
 a. Gd b. At c. Xe d. Te
- iii. Write general electronic configuration of lanthanoids.
 iv. Can lanthanum ion ($Z=57$) exist in +4 oxidation state?

UNIT-IX (COORDINATION COMPOUNDS)

Multiple choice questions:

Q1. According to Werner's theory of coordination compounds:

- a. Primary valency is ionisable.
 b. Secondary valency is ionisable.
 c. Primary and secondary valencies are ionisable.
 d. Neither primary nor secondary valency is ionisable.

Q2. Ammonia acts as a very good ligand but ammonium ion does not form complexes because:

- a. NH_3 is a gas while NH_4^+ is in liquid form.
 b. NH_3 undergoes sp^3 hybridisation while NH_4^+ undergoes sp^3d hybridisation.
 c. NH_4^+ ion does not have any lone pair of electrons.
 d. NH_4^+ ion has one unpaired electron while NH_3 has two unpaired electrons.

Q3. The ligand $N(CH_2CH_2NH_2)$ is:

- a. bidentate b. tridentate c. tetradentate d. pentadentate

Assertion – Reason type questions:

- a. Both assertion and reason are correct and reason is the correct explanation of assertion.
 b. Both assertion and reason are correct but reason is not a correct explanation of the assertion.
 c. Assertion is correct but reason is incorrect.
 d. Assertion is incorrect but reason is correct.

Q4. Assertion: Toxic metal ions are removed by the chelating ligands.

Reason: Chelate complexes tend to be more stable.

Q5. Assertion: $[Cr(H_2O)_6]Cl_2$ and $[Fe(H_2O)_6]Cl_2$ are reducing in nature.

Reason: Unpaired electrons are present in their d-orbitals.

Subjective type questions:

Q6. On the basis of crystal field theory explains why Co (III) forms a paramagnetic octahedral complex with weak field ligands whereas it forms a diamagnetic octahedral complex with strong field ligands. Why?

- Q7.** Give the electronic configuration of the following complexes on the basis of Crystal Field Splitting theory: $[\text{CoF}_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Cu}(\text{NH}_3)_6]^{2+}$.
- Q8.** $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is blue in colour while CuSO_4 is colourless. Why?
- Q9.** 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:
- $[\text{CoF}_6]^{3-}$, $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Co}(\text{CN})_6]^{3-}$
 - $[\text{FeF}_6]^{3-}$, $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Fe}(\text{CN})_6]^{4-}$
- Q10. Read the following passage and answer the questions that follow:**
 Coordination compounds are formulated and named according to the IUPAC system. There are few rules for naming coordination compounds. In ionic complex, the cation is named first and then the name of the anion will be done. In the coordination entity, the ligands are named first and then the central metal ion. When more than one type of ligands are present, they are named in alphabetical order of preference with any consideration of charge.
 The following questions are multiple choice questions. Choose the most appropriate answer:
- The IUPAC name of $[\text{Ni}(\text{CO})_4]$ is:
 - tetra carbonyl nickel(II)
 - tetra carbonyl nickel(0)
 - tetra carbonyl nickelate (II)
 - tetra carbonyl nickelate(0)
 - The IUPAC name of the complex $[\text{Pt}(\text{NH}_3)_3\text{Br}(\text{NO}_2)\text{Cl}]\text{Cl}$ is:
 - Triamminechlorobromonitro platinum(IV) chloride
 - Triamminebromonitrochloro platinum(IV) chloride
 - Triamminebromidochloronitro platinum(IV) chloride
 - Ttriamminenitrochlorobromo platinum(IV) chloride
 - Write hybridisation and shape of the complex $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$.
 - Predict the magnetic nature of tris-(ethane-1,2-diamine)cobalt(III) ion.

UNIT- X (HALOALKANES AND HALOARENES)

Multiple choice questions:

- Q1.** Which of the following sequence of reactions (reagents) can be used for conversion of $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$ into $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2$?
- SOCl_2 ; H_2O
 - SO_2Cl_2 ; alc. KOH
 - $\text{Cl}_2/h\nu$; H_2O
 - SOCl_2 ; alc. KOH
- Q2.** Alkyl halides are immiscible in water though they are polar because:
- they react with water to give alcohols.
 - they cannot form hydrogen bonds with water.
 - C -X bond cannot be broken easily.
 - they are stable compounds and are not reactive.
- Q3.** Reaction of trans-2-phenyl-1-bromocyclopentane on reaction with alcoholic KOH produces:
- 4-phenylcyclopentane
 - 2-phenylcyclopentene
 - 1-phenylcyclopentene
 - 3-phenylcyclopentene

Assertion – Reason type questions:

- Both assertion and reason are correct and reason is the correct explanation of assertion.
 - Both assertion and reason are correct but reason is not a correct explanation of the assertion.
 - Assertion is correct but reason is incorrect.
 - Assertion is incorrect but reason is correct.
- Q4. Assertion:** Phosphorous chlorides are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohol.

Reason: Phosphorous chlorides give pure alkyl halides.

- Q5. Assertion:** Aryl halides undergo nucleophilic substitution reactions with ease.

Reason: The carbon halogen bond in aryl halides has partial double bond character.

Subjective type questions:

- Q6.** An organic compound 'A' having molecular formula C_4H_8 on treatment with dil. H_2SO_4 , gives 'B'.

'B' on treatment with conc. HCl and anhydrous $ZnCl_2$, gives 'C' and on treatment with sodium ethoxide gives back 'A'. Identify the compounds 'A', 'B' and 'C' and write the equations involved.

Q7. How do you convert the following:

- Chlorobenzene to Biphenyl
- Propene to Propen-2-ol
- Propene to 1-Iodopropane
- 1-Bromo propane to 2-Bromo propane

Q8. What happens when:

- n-butyl chloride is treated with alcoholic KOH.
- bromobenzene is treated with Mg in the presence of dry ether.
- chlorobenzene is subjected to hydrolysis.
- methyl bromide is treated with Na in the presence of dry ether.

Q9. Give the products and explain the mechanisms of the following reactions:

- $CH_3CH_2Br + OH^- \longrightarrow$
- $(CH_3)_3C-Br + OH^- \longrightarrow$
- $n-BuBr + KOH \longrightarrow$

Q10. Read the following passage and answer the questions that follow:

An alkyl halide with β hydrogen atoms when reacted with a base or a nucleophile has two competing routes: Substitution (S_N1 and S_N2) and elimination. Which route will be taken up depends upon the nature of the alkyl halide, strength and size of the base/nucleophile and reaction conditions, Thus, bulkier nucleophile prefers to act as a base and abstracts a proton rather than approaching a tetravalent carbon atom (steric reasons) and vice-versa.

- Isopropyl bromide on heating with concentrated solution of alcoholic (ethanolic) KOH predominantly gives:
 - Propene
 - Propan-2-ol
 - Propan-1-ol
 - Isopropyl ethyl ether
- 2-Bromopropane is separately heated with aq. CH_3CO_2Na or with CH_3CH_2ONa/CH_3CH_2OH , the major product obtained in each case respectively are:
 - Propene, isopropyl ethyl ether
 - Isopropyl acetate, propene
 - Isopropyl acetate, isopropyl ethyl ether
 - Propene in both the cases
- 2-Bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is:
 - 2-Ethoxypentane
 - Pentene-1
 - cis-Pentene-2
 - trans-Pentene-2
- Give reasons why?
 - C-Cl bond length in chlorobenzene is shorter than C-Cl bond in CH_3Cl .
 - The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.

UNIT-XI (ALCOHOLS, PHENOLS AND ETHERS)

Multiple choice questions:

- Q1.** The most suitable reagent for the conversion of primary alcohol into aldehyde with the same number of carbon atoms is:
- acidified $K_2Cr_2O_7$
 - alkaline $KMnO_4$
 - pyridinium chlorochromate
 - CrO_3
- Q2.** Williamson synthesis is an example of _____.
- Nucleophilic addition
 - Electrophilic addition
 - Electrophilic substitution
 - Nucleophilic substitution reaction
- Q3.** An ether is more volatile than alcohol having the same molecular formula. This is due to:
- intermolecular hydrogen bonding in alcohols
 - dipolar character of ethers
 - alcohols having resonance structures
 - intermolecular hydrogen bonding in ethers

Assertion – Reason type questions:

- Both assertion and reason are correct and reason is the correct explanation of assertion.
- Both assertion and reason are correct but reason is not a correct explanation of the assertion.

- c. Assertion is correct but reason is incorrect.
- d. Assertion is incorrect but reason is correct.

Q4. Assertion: In Lucas test, 3° alcohols react immediately.

Reason: An equimolar mixture of anhydrous ZnCl_2 and conc. HCl is called Lucas reagent.

Q5. Assertion: p-nitrophenol is more acidic than phenol.

Reason: Nitro group helps in the stabilization of the phenoxide ion by dispersal of negative charge due to resonance.

Subjective type questions:

Q6. Give one chemical test each to distinguish between the following pairs of compounds:

- a. Phenol and Benzoic acid
- b. 1-Propanol and 2-Propanol

Q7. How would you obtain:

- a. Picric acid (2, 4, 6-trinitrophenol) from phenol
- b. 2-Methylpropene from 2-methylpropanol?

Q8. Give reasons for the following:

- a. Phenol is more acidic than methanol.
- b. The C-O-H bond angle in alcohols is slightly less than the tetrahedral angle ($109^\circ 28'$).
- c. $(\text{CH}_3)_3\text{C-O-CH}_3$ on reaction with HI gives $(\text{CH}_3)_3\text{C-I}$ and $\text{CH}_3\text{-OH}$ as the main products and not $(\text{CH}_3)_3\text{C-OH}$ and $\text{CH}_3\text{-I}$.
- d. The boiling points of alcohols decrease with increase in branching of the alkyl chain.
- e. Phenol does not give protonation reaction readily.
- f. Phenylmethyl ether reacts with HI to give Phenol and Methyl iodide and not Iodobenzene and Methyl alcohol.

Q9. Name the reagents used in the following reactions:

- a. Benzyl alcohol to benzoic acid.
- b. Dehydration of propan-2-ol to propene.
- c. Butan-2-one to butan-2-ol.
- d. Bromination of phenol to 2,4,6-tribromophenol.
- e. Butan-2-one to Butan-2-ol.

Q10. Read the following passage and answer the questions that follow:

Both symmetrical and unsymmetrical ethers can be prepared by Williamson synthesis which involves the reaction between an alkyl halide and an alkoxide ion. The reaction occurs by $\text{S}_{\text{N}}2$ mechanism. Therefore, for good yields of ethers, the alkyl halide must be primary while the alkoxide may be derived from 1°, 2° or 3° alcohols. Since 2° and 3° alkyl halides prefer to undergo elimination rather than substitution reactions, therefore, they are not suitable starting materials in Williamson synthesis. Likewise, vinyl and aryl halides being unreactive do not undergo Williamson synthesis. The reverse process involving the cleavage of ethers to give back the original alkyl halide and the alcohol can be carried out by heating the ether with HI at 373 K. If one group is methyl and the other is a 1° or a 2° alkyl group, the reaction occurs by $\text{S}_{\text{N}}2$ mechanism. Because of steric hindrance, the I^- ion attacks the smaller alkyl group leading to the formation of alkyl iodide and the alcohol derived from the bulkier alkyl group. If, however, one group is methyl and the other is a tert-alkyl group, the reaction occurs by $\text{S}_{\text{N}}1$ mechanism and the alkyl halide is derived from the more stable carbocation.

i. Which of the following reagents when heated will give a good yield of an ether?

- a. Isopropyl bromide and sodium iso-propoxide
- b. Isopropyl bromide and sodium ethoxide
- c. Bromobenzene and sodium phenoxide
- d. Sodium tert-butoxide and ethyl bromide

ii. Which of the following ethers can be prepared by Williamson synthesis?

- a. Benzyl methyl ether
- b. Methyl vinyl ether
- c. Divinyl ether
- d. Diphenyl ether

iii. How can allyl phenyl ether be prepared?

iv. Name the product formed when benzyl ethyl ether reacts with HI .

UNIT- XII (ALDEHYDES, KETONE AND CARBOXYLIC ACIDS)

Multiple choice questions:

- Q1.** The increasing order of the rate of HCN addition to compounds, A–D is:
A: HCHO; B: CH₃COCH₃; C: PhCOCH₃ and D: PhCOPh
- a. A < B < C < D
b. D < B < C < A
c. D < C < B < A
d. C < D < B < A
- Q2.** Which of the following presents the correct order of the acidity in the given compounds?
- a. FCH₂COOH > ClCH₂COOH > BrCH₂COOH > CH₃COOH
b. CH₃COOH > BrCH₂COOH > ClCH₂COOH > FCH₂COOH
c. FCH₂COOH > CH₃COOH > BrCH₂COOH > ClCH₂COOH
d. BrCH₂COOH > ClCH₂COOH > FCH₂COOH > CH₃COOH
- Q3.** A liquid was mixed with ethanol and a drop of concentrated H₂SO₄ was added. A compound with a fruity smell was formed. The liquid was:
- a. HCHO
b. CH₃COCH₃
c. CH₃COOH
d. CH₃OH

Assertion – Reason type questions:

- a. Both assertion and reason are correct and reason is the correct explanation of assertion.
b. Both assertion and reason are correct but reason is not a correct explanation of the assertion.
c. Assertion is correct but reason is incorrect.
d. Assertion is incorrect but reason is correct.
- Q4. Assertion:** Cannizzaro reaction is given by formaldehyde and benzaldehyde.
Reason: Both the compounds lack of α -hydrogen atom.
- Q5. Assertion:** Carboxylic Acids undergo halogenation in presence of red phosphorus.
Reason: Formic acid and benzoic acid do not undergo halogenation in presence of red phosphorus.

Subjective type questions:

- Q6.** Account for the following statements.
- a. Carboxylic acids do not give the characteristic reactions of carbonyl group.
b. Fluorine is more electronegative than chlorine but p-fluorobenzoic acid is a weaker acid than p-chlorobenzoic acid.
c. Benzoic acid is a stronger acid than acetic acid.
d. Methanal is more reactive towards nucleophilic addition reaction than ethanal.
e. Aromatic carboxylic acids do not undergo Friedel-Crafts reaction.
f. pK_a value of 4-nitrobenzoic acid is lower than that of benzoic acid.
- Q7.** Write the equations involved in the following reactions:
- a. Wolff-Kishner reduction
b. Etard reaction.
- Q8.** Give simple chemical tests to distinguish between the following pairs of compounds.
- a. Propanal and Propanone
b. Butanal and Butan-2-one
c. Benzoic acid and Phenol.
- Q9.** Write products when (CH₃)₃C-CHO reacts with the following:
- a. Zinc amalgam and dilute hydrochloric acid.
b. Concentrated sodium hydroxide solution.
c. Semicarbazide and a weak acid.

Q10. Read the following passage and answer the questions that follow:

Due to electronegativity difference between carbon and oxygen atoms, the C=O group undergoes nucleophilic addition reactions which are governed by electrophilicity of the carbonyl carbon and the steric hindrance in the transition state. Further, since the α -hydrogens of aldehydes and ketones are weakly acidic, they readily form enolate ions on treatment with dilute aqueous bases. These enolate ions, in turn, can participate in nucleophilic addition reactions leading to the formation of aldols which subsequently undergo acid-catalysed dehydration to form α, β unsaturated carbonyl compounds. Cross aldol condensations between two aldehydes is not of any synthetic utility unless one of the aldehydes does not contain α -hydrogen/s. If one of the aldehydes used is benzaldehyde, the initially formed aldol undergoes dehydration, in situ, to form

a, β -unsaturated carbonyl compounds. Aldehydes which do not contain a hydrogen/s can add a hydroxide ion to form an anion which acts as a hydride donor to another molecule of the same aldehyde giving a mixture of an alcohol and the corresponding carboxylate ion. Such self oxidation-reduction or disproportionation reactions between two different aldehydes, one of which is always formaldehyde, leads to oxidation of formaldehyde and reduction of the other aldehyde.

- i. The correct order of increasing reactivity towards nucleophilic addition reactions is:
- benzaldehyde < p-tolualdehyde < acetophenone < p-nitrobenzaldehyde
 - acetophenone < p-tolualdehyde < benzaldehyde < p-nitrobenzaldehyde
 - benzaldehyde < acetophenone < p-nitrobenzaldehyde < p-tolualdehyde
 - p-nitrobenzaldehyde < p-tolualdehyde < acetophenone < benzaldehyde
- ii. The least reactive compound towards nucleophilic addition reactions is:
- Propanone
 - 3-Pentanone
 - 2-Pentanone
 - 2, 4-Dimethylpentan-3-one
- iii. Aldol condensation between which of the following two compounds followed by dehydration gives methyl vinyl ketone?
- Formaldehyde and acetone
 - Formaldehyde and acetaldehyde
 - Two molecules of acetaldehyde
 - Two molecules of acetone
- iv. Give a chemical test to distinguish between ethanal and propanal.

UNIT-XIII (AMINES)

Multiple choice questions:

- Q1.** $C_4H_{11}N$ on reaction HNO_2 , forms a tertiary alcohol. Thus, $C_4H_{11}N$ is:
- primary amine
 - secondary amine
 - tertiary amine
 - quaternary ammonium salt
- Q2.** When aniline is heated with conc. H_2SO_4 at 455-475 K, it forms _____.
- Aniline hydrogen sulphate
 - m-Aminobenzenesulphonic acid
 - Benzenesulphonic acid
 - Sulphanilic acid.
- Q3.** When ethylamine is treated with CH_3MgBr , the product is:
- CH_3CH_3
 - CH_4
 - $CH_3CH_2CH_3$
 - $CH_3CH_2CH_2CH_3$

Assertion – Reason type questions:

- Both assertion and reason are correct and reason is the correct explanation of assertion.
 - Both assertion and reason are correct but reason is not a correct explanation of the assertion.
 - Assertion is correct but reason is incorrect.
 - Assertion is incorrect but reason is correct.
- Q4. Assertion:** Hoffmann's bromamide reaction is given by primary amines.
Reason: Primary amines are more basic than secondary amines.
- Q5. Assertion:** Acetanilide is less basic than aniline.
Reason: Acetylation of aniline results in the decrease of electron density of nitrogen.

Subjective type questions:

- Q6.** Account for the following:
- Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.
 - Diazonium salts of aromatic amines are more stable than those of aliphatic amines.
 - The amino group in aniline acts as a powerful activator and ortho and para director towards electrophilic substitution reaction.
- Q7.** How will you convert the following:
- Ethanamine into methanamine
 - Aniline into 1, 3, 5-tribromobenzene
 - Aniline into 4-Bromoaniline
 - Nitrobenzene to Phenol.
 - Aniline to Chlorobenzene.
- Q8.** Distinguish between the following pairs of compounds:
- Aniline and N-methyl aniline
 - $(CH_3)_2NH$ and $(CH_3)_3N$

Q9. What is Gabriel phthalimide synthesis? For what purpose is it used? Give equation to explain your answer.

Q10. Read the following passage and answer the questions that follow:

Amines are classified as primary, secondary and tertiary amines. Primary amines cannot be obtained by ammonolysis of alkyl halide because we will get mixture of 1°, 2° and 3° amines. Cyanides, on reduction give primary amines where as isocyanides on reduction give secondary amines. Nitro compounds, on reduction also give primary amines. Primary amines react with CHCl_3 and KOH to form foul smelling isocyanide. They react with HNO_2 and liberate N_2 gas. They react with Hinsberg's reagent to form salt soluble in KOH . Secondary amine form yellow oily compounds with HNO_2 and salt formed with $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$, is insoluble in KOH . 3° amines form salt soluble in water with HNO_2 but does not react with $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$. Diazonium salts are prepared by reaction of Aniline with NaNO_2 and conc. HCl at $0-5^\circ\text{C}$. Aromatic diazonium salts are more stable because phenyl diazonium ion is stabilized by resonance. Benzene diazonium chloride can be used to prepare halo benzene, phenol, nitro benzene, benzene, *p*-hydroxy azo benzene (azo dye) and large number of useful compounds.

i. Acid anhydrides on reaction with primary amines give :

- a. amide b. imide c. secondary amine d. imine

ii. The gas evolved when methyl amine reacts with nitrous acid is :

- a. NH_2 b. N_2 c. H_2 d. C_2H_6 .

iii. Write the isomer of $\text{C}_3\text{H}_9\text{N}$ which does not react with Hinsberg reagent.

iv. CH_2NH_2 , on heating with CHCl_3 and KOH gives 'X'. Identify 'X'.

UNIT- XIV (BIOMOLECULES)

Multiple choice questions:

Q1. The term anomer of glucose refers to:

- a. isomers of glucose that differ in configuration at carbons one and four (C-1 and C-4)
b. a mixture of (D)-glucose and (L)-glucose
c. enantiomers of glucose
d. isomers of glucose that differ in configuration

Q2. The secondary structure of a protein refers to:

- a. fixed configuration of the polypeptide backbone
b. α -helical backbone
c. hydrophobic interactions
d. sequence of α -amino acids

Q3. Glucose does not react with:

- a. NH_2OH b. NaHSO_3
c. $\text{C}_6\text{H}_5\text{NHNH}_2$ d. HCN

Assertion – Reason type questions:

- a. Both assertion and reason are correct and reason is the correct explanation of assertion.
b. Both assertion and reason are correct but reason is not a correct explanation of the assertion.
c. Assertion is correct but reason is incorrect.
d. Assertion is incorrect but reason is correct.

Q4. Assertion: D(+) - Glucose is dextrorotatory in nature.

Reason: 'D' represents its dextrorotatory nature.

Q5. Assertion: Alpha amino acids exist as internal salt in solution as they have amino and carboxylic acid groups in near vicinity.

Reason: H^+ ion given by carboxyl group is captured by amino group having lone pair of electrons.

Subjective type questions:

Q6. Distinguish between the following:

- a. starch and cellulose
b. amylose and amylopectin

- c. starch and Glycogen
- d. α helix and β sheet structure
- e. fibrous and globular protein

Q7. Explain glycosidic linkage with an example.

Q8. What are nucleic acids? Mention the functions of nucleic acids.

Q9. Draw the Haworth structure of sucrose, maltose and lactose. Classify them as reducing or non reducing sugar. Justify your answer.

Q10. Read the following passage and answer the questions that follow:

When a protein in its native form, is subjected to physical changes like change in temperature or chemical changes like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. This is called denaturation of protein. The denaturation causes change in secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curdling of milk, formation of cheese when an acid is added to milk.

i. Mark the wrong statement about denaturation of proteins.

- a. The primary structure of the protein does not change.
- b. Globular proteins are converted into fibrous proteins.
- c. Fibrous proteins are converted into globular proteins.
- d. The biological activity of the protein is destroyed.

ii. α -helix and β -pleated structures of proteins are classified as:

- | | |
|-----------------------|-------------------------|
| a. primary structure | b. secondary structures |
| c. tertiary structure | d. quaternary structure |

iii. Cheese is a_____.

- | | |
|----------------------|-----------------------|
| a. globular protein | b. conjugated protein |
| c. denatured protein | d. derived protein |

iv. Differentiate between globular and fibrous proteins.