



CHEMISTRY HSSC-II

SECTION – A (Marks 17)

26

Time allowed: 25 Minutes

Version Number 1 8 4 6

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- Br^{-1} reduces H_2SO_4 to form:
A. S B. H_2S C. SO_2 D. SO_3
- Which one of the following will NOT produce nitrite on heating?
A. LiNO_3 B. NaNO_3 C. KNO_3 D. RbNO_3
- In the reaction with aqueous copper (II) complex; $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$, NH_3 acts as a ligand as well as:
A. An acid B. A base C. A salt D. A nucleophile
- The correct name of the complex ion, $[\text{Zn}(\text{NH}_2-\text{CH}_2-\text{CH}_2-\text{NH}_2)_3]^{2+}$ is:
A. Tri ethylene di ammine zinc (II) B. Tri ethylene di ammine zincate (II)
C. Tris ethylene di ammine zinc (II) D. Tris ethylene di ammine zincate (II)
- SH is the functional group present in the organic compounds known as:
A. Sulphides B. Hydrogen sulphides
C. Sulphones D. Thiols
- The electrophile in the aromatic sulphonation reaction of benzene is:
A. H_2SO_4 B. HSO_4^{-1} C. SO_3 D. SO_2
- The Meta directing group among the following is:
A. $-\text{NH}_2$ B. $-\text{OCH}_3$ C. $-\text{COOH}$ D. $-\text{OH}$
- Which one of the following reducing agents reduces the aromatic nitro compounds to amines?
A. Sn/HCl B. Br_2/KOH C. $\text{Na}/\text{NH}_3(\text{liq})$ D. NaBH_4
- The alcohol with greater reactivity with respect to the cleavage of its O-H bond is?
A. CH_3OH B. Pri-alcohol C. Sec-alcohol D. Ter-alcohol
- Ethers can be prepared by the reaction of alkyl halides with:
A. Cu_2O B. Na_2O C. Ag_2O D. PbO
- The reagent which is used to distinguish between aldehydes and alcohols is:
A. Hydroxyl amine B. Hydrazine
C. Phenyl hydrazine D. 2,4-dinitro phenyl hydrazine
- Which one of the followings will NOT give iodoform test on reaction with I_2/NaOH ?
A. Acetaldehyde B. Acetone C. 1-propanol D. 2-propanol
- Reduction of carboxylic acids with LiAlH_4 results in the formation of:
A. Pri-alcohols B. Sec. Alcohols C. Ter. alcohols D. Aldehydes
- Which one of the following is NOT a disaccharide?
A. Sucrose B. Maltose C. Glactose D. Lactose
- Nail polish remover is composed of:
A. Acetic acid and Acetone B. Acetone and ethyl alcohol
C. Acetone and ethyl acetate D. Ethyl alcohol and ethyl acetate
- The industrial smog contains smoke mixed with:
A. O_3 B. SO_2 C. SO_3 D. CO_2
- The technique which is used to determine the position of carbon atoms in an organic compound is:
A. IR spectroscopy B. UV spectroscopy
C. NMR spectroscopy D. Mass spectrometry



CHEMISTRY HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Sections B, C and D comprise pages 1 – 2. Answer any seven parts each from Section 'B', 'C' and any two questions from Section 'D' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21)

Chapters 13, 14, 21 – 24

Q. 2 Answer any SEVEN parts. All part carry equal marks. (7 x 3 = 21)

- (i) Why the salts of Li are slightly covalent whereas those of other alkali metals are ionic?
- (ii) Why the tetrahalides of carbon are not hydrolysed whereas these of Si, Ge and Sn are easily hydrolysed?
- (iii) Write down the reactions of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ with:
 - a. NH_3
 - b. CO_3^{2-}
 - c. SCN^-
- (iv) What is d-d transition? How is it responsible for the colour of transition metal complexes?
- (v) Write down three differences between DNA and RNA.
- (vi) What is the storage polysaccharide? Describe its types.
- (vii) What are the Vat dyes? How are they used? Give an example.
- (viii) Write down three harmful effects of acid rain.
- (ix) Describe the role of chlorofluoro carbons in destroying the ozone layer.
- (x) Write down two differences between CW-NMR spectrometer and FT-NMR spectrometer.

SECTION – C (Marks 21)

Chapters 15 – 20

Q. 3 Answer any SEVEN parts. All part carry equal marks. (7 x 3 = 21)

- (i) Write down three reasons which give the importance of functional groups for the organic compounds.
- (ii) Write down the mechanism for the electrophilic nitration reaction of benzene.
- (iii) Write down any two differences between structural isomerism and stereo isomerism?
- (iv) How will you prepare Ethyl Amine from an alkyl halide, a nitrile and an amide?
- (v) Write down any three differences between E_1 and E_2 reactions.
- (vi) How is phenol prepared from?
 - a. Aniline
 - b. Chlorobenzene
- (vii) Give the reactions of following alcohols with the mixture of $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 :
 - a. 2 – Propanol
 - b. 2 – Methyl – 2 – Butanol
- (viii) How does acetone react with dil. NaOH, H-CN, $\text{NH}_2\text{-NH}_2$?
- (ix) Write down the mechanism of acid catalysed nucleophilic addition of H – CN to acetaldehyde.
- (x) Give the reactions of acetic anhydride with H_2O , $\text{C}_2\text{H}_5\text{OH}$ and NH_3 .

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

(Chapters 15 – 20)

- Q. 4**
- a. What are Grignard reagents? How are they prepared? Write down the mechanism for the reaction of a Grignard reagent with an ester. (01+02+04)
- b. How will you convert: (06)
- i. Butanone into acetic acid.
 - ii. 2 – Butyne into Cis – 2 – Butene
 - iii. Ethyl chloride into Ethene

(Chapters 13, 14, 21 – 24)

- Q. 5**
- a. Define polymers. How are they classified? Explain each type giving an example. (01+01+06)
- b. Explain why transition metals: (1.5+02+1.5)
- i. Possess high binding energies
 - ii. Show variable oxidation states
 - iii. Form substitutional alloys

(Chapters 15 – 20)

- Q. 6**
- a. Write down the mechanism of acid catalysed esterification of carboxylic acids. What is the order of reactivity of alcohols in these reactions? Write down one other method for the preparation of same ester. (04+01+01)

(Chapters 13, 14, 21 – 24)

- b. Define inert pair effect. How does it explain the stability of +2 and +4 oxidation states in elements of group – IV A? (01+06)

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SECTION – A (Marks 17)

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Version Number 1 8 5 1

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- Which one is **NOT** correct order of stability of oxidation states of group IV A elements?
A. $\text{Ge}^{+4} > \text{Sn}^{+4}$ B. $\text{Sn}^{+4} > \text{Pb}^{+4}$ C. $\text{Ge}^{+4} > \text{Ge}^{+2}$ D. $\text{Pb}^{+4} > \text{Pb}^{+2}$
- The **ONLY** alkaline earth metal which reacts with alkalis is:
A. Be B. Mg C. Ca D. Ba
- The coordination number of Zinc in the complex ion $[\text{Zn}(\text{NH}_2-\text{CH}_2-\text{CH}_2-\text{NH}_2)_3]^{2+}$ is:
A. 3 B. 4 C. 5 D. 6
- Which one of the followings can be used to distinguish between Fe^{+2} and Fe^{+3} ions?
A. MnO_4^- B. CrO_4^{2-} C. $\text{Cr}_2\text{O}_7^{2-}$ D. SCN^-
- The reagent used to detect phosphorus present in an organic compound is:
A. Ammonium Meta Vanadate B. Ammonium Molybdate
C. Ammonium Phospho Molybdate D. Ammonium chloride
- Geometrical isomerism is shown by:
A. Lactic acid B. Tartaric acid C. 1-Butene D. 2-Butene
- 2,3-Dimethyl-2-butene on reaction with $\text{O}_3/\text{H}_2\text{O}$ gives:
A. Acetaldehyde B. Acetone C. Acetic acid D. Ethyl alcohol
- Which one of the following is a poor leaving group in SN-reactions?
A. F^- B. Cl^- C. Br^- D. I^-
- The **MORE** acidic compound among the followings is:
A. CH_3COOH B. H_2CO_3 C. $\text{C}_6\text{H}_5\text{OH}$ D. $\text{C}_2\text{H}_5\text{OH}$
- The alcohol with greater reactivity with respect to the cleavage of its C-O bond is?
A. CH_3OH B. Pri-alcohol C. Sec-alcohol D. Ter-alcohol
- Sarett reagent is:
A. $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ B. CrO_3/NaOH
C. $\text{CrO}_3/\text{Pyridine}$ D. $\text{KMnO}_4/\text{H}_2\text{SO}_4$
- An Acetal is produced when acetaldehyde reacts with:
A. A ketone B. An alcohol C. An ether D. An ester
- Acetamide can be prepared by heating:
A. Ethyl amine B. Ammonium acetate
C. Ethyl nitrile D. Nitro ethane
- Which one of the followings is **NOT** present in RNA?
A. Adenine B. Guanine C. Cytosine D. Thymine
- Which dye is used in boot polish?
A. Malachite green B. Congo red
C. Methyl orange D. Bismarck brown
- Peroxy Acetyl Nitrate (PAN) is a secondary pollutant which affects:
A. Lungs B. Eyes C. Nose D. Skin
- In IR spectrum of an organic compound, a strong peak at 1720cm^{-1} is due to:
A. O – H bond B. C – H bond C. C = O bond D. N – H bond



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SECTION – B (Marks 21)

Chapters 13, 14, 21 – 24

Q. 2 Answer any SEVEN parts. All part carry equal marks. (7 x 3 = 21)

- (i) Justify that NaCl is non-conductor in solid but is conductor in molten state, whereas AlCl_3 is non-conductor in solid as well as in molten state.
- (ii) Write down the reactions of a normal oxide, a per oxide and a super oxide with H_2O .
- (iii) Write down two advantages of Potassium dichromate as oxidizing agent in redox titrations.
- (iv) Prove that NH_3 acts as a base as well as a ligand in its reaction with aqueous copper (II) complex; $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$
- (v) Write down three major biochemical roles played by lipids in human body.
- (vi) Describe the effect of temperature on enzymatic activity.
- (vii) Define commodity chemicals, speciality chemicals and fine chemicals.
- (viii) What is the role of tetra-ethyl lead in minimizing the air pollution?
- (ix) Write down the basic principle of spectroscopy.
- (x) What is TMS? Why is it used in NMR spectroscopy? How is it related to the chemical shift?

SECTION – C (Marks 21)

Chapters 15 – 20

Q. 3 Answer any SEVEN parts. All part carry equal marks. (7 x 3 = 21)

- (i) How will you perform a single test for the presence of both the nitrogen and sulphur in an organic compound by using its lassaigne's solution.
- (ii) Write down the reactions of propene with $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$, $\text{O}_3/\text{H}_2\text{O}$.
- (iii) What are the Meta directing groups? Give the reason for their directional effect in the electrophilic substitution reactions of benzene.
- (iv) Write down three methods for the preparation of alkyl halides from Ethyl alcohol.
- (v) Why do elimination reactions take place parallel to the nucleophilic substitution reactions?
- (vi) Write down the mechanism for the reaction of a primary alcohol with HCl in the presence of ZnCl_2 catalyst.
- (vii) Describe Kolbe-Schmitt reaction of phenol.
- (viii) Write down the reaction of CH_3CHO with NaHSO_3 . How can acetaldehyde be regenerated from the product? Give an application of this reaction.
- (ix) Why aldehydes are more reactive than ketones with respect to their nucleophilic addition reactions?
- (x) How will you convert acetic acid into ethyl acetate, ethyl alcohol and acetone?

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

(Chapters 15 – 20)

- Q. 4**
- a. Define SN_1 reactions. Write down the mechanism of this reaction. How will you support this mechanism by giving Kinetic and Stereo chemical evidences. (01+03+03)
- b. How will you convert Benzene into Benzoic acid, Glyoxal, Maleic anhydride. (06)

(Chapters 13, 14, 21 – 24)

- Q. 5**
- a. What is an inhibitor? Differentiate between irreversible and reversible inhibitors. Also describe the types of reversible inhibitors by giving examples. (01+03+04)
- b. Describe the trend in the nature of hydroxides of elements of 3rd period. (05)

(Chapters 15 – 20)

- Q. 6**
- a. What is iodoform test? Write down two applications of this test by giving chemical equations. (02+04)

(Chapters 13,14, 21-24)

- b. Justify the following facts about halogens: (03+02+02)
- i. HF is a weaker acid than other hydrogen halides.
- ii. Bond enthalpy of F_2 is less than that of Cl_2 .
- iii. I^- is stronger reducing agent than Br^- .

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