

(ii) Write four general properties of alkaloids. Mention a chemical test that is helpful in structure elucidation of an alkaloid. Draw the structure of nicotine and show how the nature of nitrogen atoms has been established. $2+1+1+1=5$

(f) (i) Name the type of hygrine alkaloid and its biological source. 2

(ii) Write two medicinal importances each of hygrine and reserpine. $2+2=4$

(iii) How is cocaine used as medicine? 2

(iv) What is Emde's modification? 2

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2024

CHEMISTRY
(Honours Core)

Paper : CHE-HC-4026

(Organic Chemistry-III)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : $1 \times 7 = 7$

- (a) Write *aciform* structure of nitromethane.
- (b) The aliphatic diazonium compounds are unstable, why?
- (c) What is special isoprene rule?
- (d) Mention *one* medicinal importance of nicotine.

Contd.

(e) Arrange the following compounds in increasing order of aromatic character : Thiophene, pyrrole, benzene, furan

(f) Mention two adverse effects of PAN on living organisms.

(g) What class of alkaloid does nicotine belong to?

Answer **any four** of the following questions : $2 \times 4 = 8$

(a) Write the products formed in each of the following reactions :

(i) Cyanoethane is reduced with $LiAlH_4$

(ii) Nitrobenzene is heated with a mixture of conc. HNO_3 and conc. H_2SO_4

(b) Mention two synthetic applications of diazonium salts with their chemical reactions.

(c) Explain why Naphthalene gives 1-Naphthalene sulphonic acid at low temperature and 2-Naphthalene sulphonic acid at high temperature.

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(d) Write down the different steps involved in Bischler-Napieralski reaction leading to synthesis of isoquinoline.

(e) How can you show that

(i) α -terpineol is a 3° alcohol

(ii) geraniol has *E*-configuration

(f) What product is formed in each case when citral is allowed to react with

(i) $NaOH(aq)$

(ii) $KHSO_4$

3. Answer **any three** questions from the following : $5 \times 3 = 15$

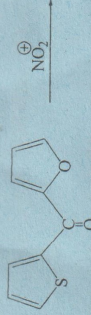
(a) Mention two nitrating agents employed in direct nitration of arenes? Explain the reaction mechanism of nitration of benzene. The 2,4,6-trinitrophenol is known as Picric acid although it does not contain a carboxyl group — why? $2+2+1=5$

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Contd.

(b) Explain the role of resonance effect on basic properties of aliphatic amines with special reference to isomers of nitroanilines. Explain with appropriate structures, why N,N-dimethylpicramide is more basic than picramide. 3+2=5

(c) Why does electrophilic substitution of Furan usually take place at C-2 position? Write Paal-Knorr synthesis of Furan. Write the product(s) of the following reaction. (structure and name). 2+2+1=5

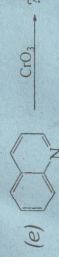
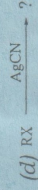
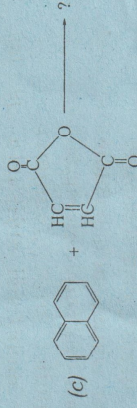
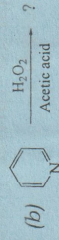
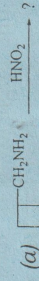


(d) Write the different products when anthracene is reacted with the following reactants: 1×5=5

- Sodium in THF
- Sodium in amyl alcohol
- Hydrogen gas over Ni
- $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$
- HNO_3 in glacial acetic acid

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(e) Write the product of the following reactions: 1×5=5



4. Answer **any three** questions from the following: 10×3=30

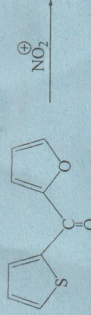
- Discuss the structural difference between nitroalkanes and alkyl nitriles. Discuss how one can be distinguished from the other. Mention *two* chemical tests. 2+3=5

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Contd.

(b) Explain the role of resonance effect on basic properties of aliphatic amines with special reference to isomers of nitroanilines. Explain with appropriate structures, why N,N-dimethylpicramide is more basic than picramide. 3+2=5

(c) Why does electrophilic substitution of Furan usually take place at C-2 position? Write Paal-Knorr synthesis of Furan. Write the product(s) of the following reaction. (structure and name). 2+2+1=5



(d) Write the different products when anthracene is reacted with the following reactants: 1×5=5

- Sodium in THF
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- Hydrogen gas over Ni
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(ii) Elaborate the mechanism of diazotization of aniline. Mention one application of diazotization reaction. What happens when an aliphatic primary amine is diazotized? 3+1+1=5

(b) (i) Elaborate isocyanide test for amines with appropriate mechanism. How can reaction be stopped from further release of poisonous gas? Write the reaction. 3+1+1=5

(ii) Why do aliphatic nitro compounds dissolve in aqueous alkali? Write the mechanism of Nef reaction. 2+3=5

(c) (i) Explain why the electrophilic substitution in naphthalene takes place mainly at the 1-position? 2

(ii) How will you prepare 2-nitronaphthalene starting from naphthalene? 2

(iii) Write Haworth synthesis for phenanthrene. 3

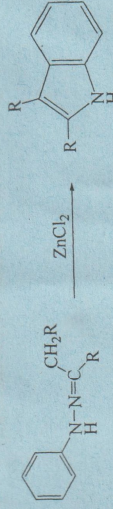
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(iv) Explain the peri-hydrogen interaction in particularly in sulphonation of naphthalene. 3

(d) (i) Give reasons for the following: 2+1+2=5

- Furan shows Diels-Alder cycloaddition
- Pyrrole readily polymerizes in presence of mineral acids
- Pyridine is less reactive in compare with benzene towards electrophiles.

(ii) Write the steps involved in the following conversion. Also mention the name of the synthesis. 4+1=5



(e) (i) How many carbon atoms are present in sesqui and a diterpene? Write a synthesis of geraniol. What products will be formed on ozonolysis of geraniol? 1+3+1=5

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Contd.