



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – NOVEMBER 2024

UCH 2501 – CHEMISTRY OF HYDROCARBONS



Date: 09-11-2024

Dept. No.

Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A - K1 (CO1)

Answer ALL the Questions -

(10 x 1 = 10)

1. Match the following

- | | | | |
|----|-----------------|----|---------------|
| a) | Homolysis | – | Huckel's rule |
| b) | Alkane | – | $AlCl_3$ |
| c) | Oxidising agent | -- | Free radical |
| d) | Lewis acid | – | $KMnO_4$ |
| e) | Aromaticity | – | C_nH_{2n+2} |

2. True or False

- | | |
|----|---|
| a) | Tertiary carbanion is more stable than primary carbanion. |
| b) | The main source of alkane is fossil fuels. |
| c) | Alkenes are commonly known as paraffins. |
| d) | Electrophilic additions in alkynes are faster than in alkenes. |
| e) | All the six carbon atoms and all the six hydrogen atoms lie in different planes in benzene. |

SECTION A - K2 (CO1)

Answer ALL the Questions

(10 x 1 = 10)

3. Choose the correct answer

- | | |
|----|---|
| a) | Free radicals are _____.
(i) long lived (ii) long lived and can be isolated
(iii) short lived (iv) short lived and cannot be isolated |
| b) | Photochemical halogenation of alkanes is an example of _____.
(i) electrophilic addition (ii) free radical substitution
(iii) nucleophilic addition (iv) electrophilic substitution |
| c) | Which of the following does not come under the organic addition reaction?
(i) Halogenation (ii) Hydrohalogenation (iii) Hydration (iv) Dehydration |
| d) | Acetylene does not react with _____.
(i) Na (ii) HCl (iii) NaOH (iv) Ammoniacal $AgNO_3$ |
| e) | Nitration of benzene is a/an _____.
(i) electrophilic addition (ii) free radical substitution
(iii) nucleophilic addition (iv) electrophilic substitution |

4. Fill in the blanks

- | | |
|----|--|
| a) | In a free radical, the carbon atom carrying unpaired electron is _____ hybridised. |
| b) | _____ is a Gilman's reagent. |
| c) | Ethylene burns in air with luminous smoky flame to form _____. |
| d) | The acidic nature of H –atom in acetylene is due to _____. |
| e) | _____ is the attacking electrophile in sulphonation of benzene. |

SECTION B - K3 (CO2)

Answer any TWO of the following

(2 x 10 = 20)

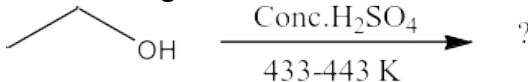
5. Elaborate the following with suitable examples.
(i) Resonance effect (ii) Steric effect (iii) Keto-enol tautomerism
6. a) Discuss the synthesis of carbon tetrachloride from methane with a suitable mechanism. (5)
b) Explain Dieckman's ring closure reaction. (5)
7. Predict suitable reactions for the following conversions.
i) Propene \longrightarrow 1,2- dibromopropane
ii) Ethyl alcohol \longrightarrow ethane
iii) Ethane \longrightarrow ethene
iv) Propene \longrightarrow 2-bromopropane
8. Discuss the mechanism of chlorination and nitration of benzene.

SECTION C – K4 (CO3)

Answer any TWO of the following

(2 x 10 = 20)

9. a) What are carbonium ions? Explain the stability of 1°, 2° and 3° carbonium ions. (5)
b) Write various possible structural formula of alkanes with molecular formula, C₄H₁₀. (5)
10. Illustrate the importance, mechanism and limitations of Wurtz reaction in the synthesis of alkanes with examples.
11. a) Explain 1,2- and 1,4- addition of bromine with 1,3-butadiene. (5)
b) Complete the following reaction with suitable mechanism. (5)

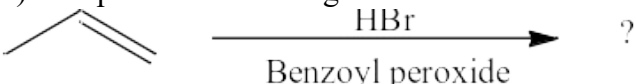

12. a) Describe the modern theory of aromaticity on naphthalene and anthracene. (5)
b) Discuss the Haworth's synthesis of anthracene. (5)

SECTION D – K5 (CO4)

Answer any ONE of the following

(1 x 20 = 20)

13. a) Compare the following aromatic amines in the increasing order of the basic strength and justify the answer.
(i) Ethylamine (ii) Diethylamine (iii) Aniline (iv) Triphenyl amine . (5)
b) Enumerate the postulates of Bayer's strain theory and write its limitations. (10)
c) Complete the following reaction with suitable mechanism. (5)


14. a) Explain the Friedel Craft's alkylation and acylation reactions with mechanism. (10)
b) Justify that -NH₂, -OCH₃ and halogens are ortho, para orienting groups. (10)

SECTION E – K6 (CO5)

Answer any ONE of the following

(1 x 20 = 20)

15. a) Classify the ring opening reactions of cycloalkanes. (10)
b) Outline the mechanism of hydroboration-oxidation of propylene. (10)
16. a) Illustrate the mechanism of Diel's Alder reaction with any two examples. (10)
b) Explain the mechanism of Haworth's synthesis of naphthalene. (10)
