

2023
B.A./B.Sc.
Fourth Semester
CORE – 9
CHEMISTRY
Course Code: CHC 4.21
(Organic Chemistry - III)

Total Mark: 70
Time: 3 hours

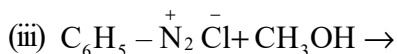
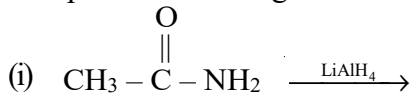
Pass Mark: 28

Answer the following questions.

UNIT-I

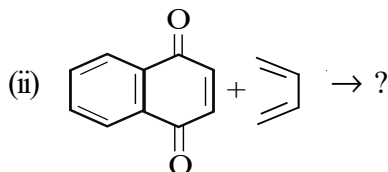
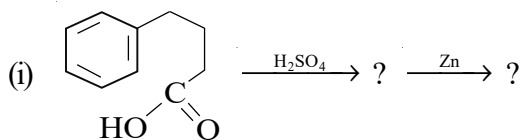
1. (a) Nitro compounds are acidic in nature. Explain. 2
(b) Complete the following reactions: 1×4=4
- (i) $\text{CH}_3 - \text{CH}_3 + \text{HNO}_3 \xrightarrow{400^\circ\text{C}}$
(ii) $\text{CH}_3 - \text{CH}_2 - \text{Br} + \text{AgNO}_2 \rightarrow$
(iii) $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{HNO}_2 \rightarrow$
(iv) $\text{R}_3\text{C} - \text{NH}_2 + 3[\text{O}] \xrightarrow{\text{KMnO}_4}$
- (c) Complete the following reactions: 1×4=4
- (i) $\text{R}_2\text{CH} - \text{NO}_2 + \text{Br}_2 \xrightarrow{\text{NaOH}}$
(ii) $\text{R} - \text{CH}_2 - \text{CH}_2 - \text{NO}_2 \xrightarrow{\text{Ni/H}_2}$
(iii) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2 \xrightarrow{\text{LiAlH}_4}$
(iv) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2 + \text{H}_2\text{O} \xrightarrow{\text{acid}}$
- (d) Complete the following reactions: 1×4=4
- (i) $\text{CH}_3 - \text{CH}_2 - \text{I} + \text{AgCN} \rightarrow$
(ii) $\text{CH}_3 - \text{CH}_2 - \text{I} + \text{NaCN} \rightarrow$
(iii) $\text{CH}_3 - \text{CH}_2 - \text{NC} + 2\text{H}_2 \xrightarrow{\text{Pt}}$
(iv) $\text{CH}_3 - \text{Mg} - \text{Br} + \text{Cl} - \text{CN} \rightarrow$
2. (a) Write short notes on the following with chemical reactions:
- (i) Carbylamine reaction 2½×2=5
(ii) Hoffmann elimination

- (b) How are 1°, 2° and 3° aliphatic amines distinguished by Hinsberg reagent? Explain with chemical reaction. 4½
- (c) Secondary aliphatic amine is a stronger base than primary aliphatic amine. Explain. 1½
- (d) Complete the following reactions: 1×3=3



UNIT-II

3. (a) Draw and explain the molecular orbital structure of naphthalene. 5
- (b) Naphthalene, phenanthrene and anthracene are aromatic compounds. Explain on the basis of Huckel's rule and give their resonance structures. 6
- (c) Electrophilic substitution reactions in anthracene occurs preferentially at 9 and 10 positions. Explain. 3
4. (a) How are naphthalene, anthracene and phenanthrene synthesised by Haworth synthesis? Give their reactions stepwise. 3+3+3=9
- (b) Complete the following reactions. 2½×2=5



UNIT-III

5. (a) Explain the following name reactions with their mechanisms:
- (i) Paal-Knorr synthesis of furan 3½×4=14
- (ii) Hantzsch pyrrole synthesis

- (iii) Madelung synthesis of indole
- (iv) Knorr-quinoline synthesis

6. (a) Pyridine is less reactive towards electrophilic substitution reactions. Explain. 3½
- (b) The electrophile substitution reactions in pyridine preferentially occurs at 3 positions. Explain. 3½
- (c) Electrophilic substitution reactions in indole preferentially occurs at 3-positions. Explain. 3½
- (d) Pyridine ring of quinoline does not undergo electrophilic substitution reactions; whereas, electrophilic substitution occurs at 5 or 8 positions of benzene ring of quinoline. Explain. 3½

UNIT-IV

7. (a) What are alkaloids? Discuss their occurrence. 4
- (b) How are alkaloids isolated? Describe with its flow-sheet diagram. 4
- (c) Write a note on structural features of alkaloids. 5
- (d) Give the medicinal importance of cocaine. 1
8. (a) Discuss the degradation of alkaloids by Hoffmann's exhaustive methylation method. 6
- (b) Determine and elucidate the structure of hygrine. 6
- (c) Give any one method of synthesis of hygrine. 2

UNIT-V

9. (a) What are terpenes and terpenoids? How do they differ from each other? 3
- (b) What is isoprene? Draw its structure. 2
- (c) What is isoprene rule? Explain with some examples. 3
- (d) Determine the structure of terpenoids. 6
10. (a) Discuss about the structure elucidation of neral or citral. 6
- (b) Give the following synthesis with their stepwise reactions: 2×4=8
- (i) Barbier, Bouveault and Tiemann synthesis of citral
 - (ii) Arens and Van Drop synthesis of citral
 - (iii) Perkin Junior synthesis of alpha-terpineol
 - (iv) Alder and Voget synthesis of alpha-terpineol