

CH-321 Advanced Organic Chemistry

Credit Hours: 2-1

Prerequisite: Nil

Course Objectives

1. Students will acquire knowledge and understanding about aliphatic, aromatic substitution reactions and oxidation and reduction reactions.

Course Contents

2. Determination of reaction mechanism. Identification of products, intermediates and trapping of intermediates; isotopic labeling and isotopic effects; catalysis; stereochemical and kinetic studies.

3. Organic Reactions and their Mechanism. Detailed mechanism of aliphatic/Aromatic reactions including addition, substitution and elimination reactions. Mechanisms of reactions including electrophilic and nucleophilic substitutions, (SN1, SN2, SNi, SN1', SN2', SNi' and E1, E2, E1cB mechanisms effect of substituents on orientation and reactivity.

4. Oxidation-reductions Reactions: Common oxidizing and reducing reagents.

Course Outcomes

5. After completion of this course, students will have idea regarding the types of organic reactions and how these reactions proceed through their mechanisms.

Relevant Experiments

6. Performance of weight-variation, friability, disintegration and dissolution tests on solid dosage forms. Assays (UV methods) of marketed drug molecules like ofloxacin, cetirizine dihydrochloride, esomeprazole magnesium, and pantoprazole sodium etc.

7. Experiments involving aromatic substitution, oxidation/reduction reactions. (5 labs)

8. Pericyclic reactions, nitration of nitrobenzene to meta-dinitrobenzene, reduction of meta-dinitrobenzene to meta-nitroaniline, sulphonation of aniline, oxidation of benzaldehyde, oxidation of cyclohexanol to cyclohexanone. (7 labs)

9. Preparation of benzoic acid and benzyl alcohol from benzaldehyde using Cannizzaro's reaction. (3 labs)

Recommended Books:

1. Smith, M. B., March's Advanced Organic Chemistry: Reactions,

Mechanisms, and Structure, 7th ed., John-Wiley & Sons, Inc., (2013).

2. R.Brucker and M. Harmata, Reaction mechanisms, reaction, stereochemistry and synthesis, Springer Verlag (2010).

3. M.G.Moloney, Reaction mechanism at a glance: a stepwise approach to problemsolving in Organic Chemistry, Blackwell Science, Oxford (2000).

4. Robert, T. M. and Robert, N. B., Organic Chemistry, 6th ed., Prentice Hall, New Jersey, (1992).

5. Tse-Lok, H., Symmetry: A Basis for Synthesis Design, John-Willey & Sons, Inc., New York, (1995).

6. Sykes, P., A Guide Book to Mechanism in Organic Chemistry, 6th ed., Pearson Education, (1986).

7. Solomons, T. W. G. and Fryhle, C. B., Organic Chemistry, 10th ed., John- Wiley & Sons, Inc., (2011).

8. Carey, F. A. and Giuliano, R. M., Organic Chemistry, 9th ed., McGraw-Hill Education, (2013).

9. Bruice, P. Y., Organic Chemistry, 7th ed., Pearson Education, Ltd., (2013).32

10. Ansari, F. L., Qureshi, R. and Qureshi, M. L., Electrocyclic Reactions: From Fundamentals to Research, Wiley-VCH, Germany, (1999).

11. Kürti, L. and Czako, B., Strategic Applications of Named Reactions in Organic Synthesis: Background and Detailed Mechanisms, Elsevier Inc., (2005).

12. Pavia, D. L., Kriz, G. S., Lampman, G. M. and Engel, R. G., A Microscale Approach to Organic Laboratory Techniques, 5th ed., Brooks/Cole Laboratory Series, Cengage Learning, (2013).

13. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., Tatchell, A. R., Vogel's Textbook of Practical Organic Chemistry, 5th edition, Longman, UK, (1989).

14. Mohan, J., Organic Analytical Chemistry: Theory and Practice, 1st ed. Alpha Science Int. Ltd. New Delhi, India, (2003).

15. Tse-Lok, H., Symmetry: A Basis for Synthesis Design, John-Willey & Sons, Inc., New York, (1995).

16. Sykes, P., A Guide Book to Mechanism in Organic Chemistry, 6th ed., Pearson Education, (1986).

17. Mayo, D. W., Pike, R. M. and Forbes, D. C., Micro-scale Organic

Laboratory with Multistep and Multiscale Syntheses, 5th ed., John-Wiley & Sons, Inc., (2011).

18. Gilbert, J. C. and Martin, S. F., *Experimental Organic Chemistry: A Miniscale and Microscale Approach*, 5th ed., Brooks/ Cole Cengage Learning, (2010).

19. Carey, F. A. and Giuliano, R. M., *Organic Chemistry*, 9th ed., McGraw-Hill Education, (2013).

20. Smith, M. B., *March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure*, 7th ed., John-Wiley & Sons, Inc., (2013).

21. Kürti, L. and Czakó. B., *Strategic Applications of Named Reactions in Organic Synthesis: Background and Detailed Mechanisms*, Elsevier Inc., (2005).

