

Sri Venkateswara University, Tirupati

**Syllabus for Chemistry (Minor) in consonance with Curriculum frame work
(W.E.F. AY-2026-27)**

COURSE STRUCTURE (for Semesters VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	IV	2	Organic Chemistry	3	3
			Organic Qualitative Analysis	2	1


(BOS chairman)
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SEMESTER-IV
COURSE 2: ORGANIC CHEMISTRY

Theory	Credits: 3	3 hrs/week	Total: 45 hrs
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I. LEARNING OBJECTIVES:

1. To understand the structural theory behind reactivity in organic chemistry.
2. To classify hydrocarbons and understand the preparation and reactions of alkenes and alkynes.
3. To explain aromaticity and interpret mechanisms of key organic reactions.
4. To explore the structure, preparation, and substitution reactions of benzene.
5. To understand the structure, reactivity, and mechanisms of halogenated organic compounds, alcohols and phenols

II. COURSE OUTCOMES:

At the end of the course, the student will be able to:

1. Study Inductive effect, Mesomeric effect, hyper conjugation and its applications.
2. Explain the preparation and chemical properties of alkenes, alkynes and benzene.
3. Analyze and apply Huckel's rule to benzenoid and non-benzenoid aromatic compounds.
4. Analyze the reactivity and reaction mechanisms of alkyl halides, alcohols and phenols.
5. Differentiate between Markownikoff and Antimarkownikoff addition, SN1 and SN2 mechanisms.

III. SYLLABUS:

UNIT-1: STRUCTURAL THEORY IN ORGANIC CHEMISTRY (9 h)

Functional groups in organic chemistry, Types of bond fission; Electrophiles, Nucleophiles- (definition and examples), Reactive intermediates- carbocations, carbanions & free radicals- (definition, structure and examples). Inductive effect and its applications: (a) Basicity of amines and (b) Acidity of carboxylic acids, Resonance or Mesomeric effect and its application: (a) Acidity of phenol, and (b) Acidity of carboxylic acids. Hyper conjugation and its application to the stability of carbonium ions.

UNIT-2: UNSATURATED HYDROCARBONS (ALKENES & ALKYNES) (9 h)

Alkenes: Preparation of alkenes by dehydration of alcohols, Saytzeff and Hofmann eliminations, Electrophilic Additions of H₂O, HX to alkene, Markownikoff and Anti-markownikoff addition, Ozonolysis, Diels-Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.

Alkynes: : Preparation of alkynes by double dehydrohalogenation of dihalides, Kolbe electrolysis of dicarboxylic acid salts, Additions of H₂O, HX to alkynes, acidity and alkylation of terminal alkynes.

UNIT-3: BENZENE AND ITS REACTIVITY

(9 h)

Structure of Benzene, Preparation: polymerisation of acetylene and decarboxylation, Properties: Electrophilic aromatic substitution- Nitration, Friedel-Craft's alkylation and Friedel- Craft's acylation with mechanisms.

UNIT-4: AROMATICITY AND ALKYL HALIDES

(9h)

Aromaticity: Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Alkyl halides: Nucleophilic substitution reactions – SN1 and SN2 mechanisms with energy profile diagrams, Comparison of SN1 and SN2 reactions.

UNIT-5: ALCOHOLS AND PHENOLS

(9 h)

Alcohols: Preparation of 1°, 2°, 3°-alcohols from Grignard's reagent, Chemical properties: substitution of –OH by using PCl₅, PCl₃, SOCl₂ and HX / ZnCl₂, Oxidation of alcohols with PCC and PDC, Pinacol-Pinacolone rearrangement with mechanism.

Phenols: Preparation from diazonium salt, Reimer-Tiemann and Kolbe–Schmidt reaction with mechanism.

IV. REFERENCES:

1. R.N. Morrison, R.N. Boyd, Organic Chemistry, Pearson Education, 7th edition, 2010.
2. Peter Sykes, Guide book to Mechanism in Organic Chemistry, 6th edition, 1985.
3. S.P. Singh, O. Prakash, Reaction mechanism in organic chemistry, Laxmi Publications, 2017.
4. P.Y. Bruice, Organic Chemistry, 8th Edition, Pearson, 2017.
5. V.K. Ahluwalia, P. Bhagat, R. Aggarwal, R. Chandra, Intermediate for Organic Synthesis, I.K. International. 2005.
6. T.W.G. Solomons, C.B. Fryhle, S.A. Snyder, Organic Chemistry, 12th Edition, Wiley, 2016.

V. PROPOSED ACTIVITIES:

1. Mechanism writing exercises- Electrophilic aromatic substitution, electrophilic additions.
2. Group quiz on aromaticity and reactive intermediates.
3. Concept mapping-Properties of alkane, alkene, alkyne, benzene.

VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

SEMESTER-IV
COURSE 2: ORGANIC QUALITATIVE ANALYSIS

Practical

Credits: 1

2 hrs/week

I. LEARNING OBJECTIVES:

1. To identify functional groups in unknown organic compounds using systematic analysis.
2. To determine the physical constants of organic compounds accurately.
3. To prepare suitable solid derivatives to confirm the presence of functional groups.
4. To apply laboratory safety protocols and precise techniques during analysis.

II. COURSE OUTCOMES:

At the end of the course, the student will be able to

1. Proper use of glassware, equipment and chemicals in the laboratory.
2. Systematically analyze unknown organic compounds to identify functional groups.
3. Determine melting point or boiling point of organic compounds to assess purity.
4. Prepare derivatives for confirmation of functional groups.

III. SYLLABUS:

Systematic Qualitative Analysis of organic compounds for functional group identification including the determination of melting point and boiling point with suitable derivatives: Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

IV. REFERENCES:

1. F.G. Mann, B.C. Saunders, Practical Organic Chemistry, Pearson Education, 2009.
2. B.S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, Vogel's Textbook of Practical Organic Chemistry, Pearson, 2012.
3. V.K. Ahluwalia, R. Aggarwal, (2004), Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press, 2004
4. V.K. Ahluwalia, S. Dhingra, (2004), Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press, 2004.

V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voce.

4- Year UG Honours MINOR

Syllabus

(2026-27)

Semester- IV

Model Question Paper

Time : 3hrs

Marks:75

Part-A

Answer any Five Questions. Each Question carries 3 Marks.

5x3=15

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Answer the following questions. Each question carries 12 Marks

5x12=60

11. a) Unit-I
(Or)
b) Unit-I

12. a) Unit-II
(Or)
b) Unit-II

13. a) Unit-III
(Or)
b) Unit-III

14. a) Unit-IV
(Or)
b) Unit-IV

15. a) Unit-V
(Or)
b) Unit-V