



SECOND-YEAR OF MASTER OF SCIENCE CHEMISTRY REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: TWO STEP PREPARATIONS AND
COMBINED SPECTRAL ANALYSIS
SEMESTER-IV,
W.E.F. 2024-2025

**RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY
AND
APPROVED BY THE ACADEMIC COUNCIL**

Devrukh Shikshan Prasarak Mandal's

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra,
India

Academic Council Item No: _____

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Chemistry
Name of the Class	:	Second Year
Semester	:	Four
No. of Credits	:	02
Title of the Course	:	Two Step Preparations and Combined Spectral Analysis
Course Code	:	S613CHP
Name of the Vertical in adherence to NEP 2020	:	Compulsory major
Eligibility for Admission	:	Chemistry Graduate learner seeking Admission to Post Graduate Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra.
Passing Marks	:	40%
Mode of Assessment	:	Summative at the end of semester
Level	:	PG
Pattern of Marks Distribution for TE and CIA	:	100%
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024-2025
Ordinances /Regulations (if any)	:	

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for Second Year of Master of Science in Chemistry

(With effect from the academic year 2024-2025)

SEMESTER-IV

Paper No.– IV

**Course Title: Two Step Preparations and
Combined Spectral Analysis**

No. of Credits - 02

Type of Vertical: Compulsory major

COURSE CODE: S613CHP

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to...

Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Apply	Write plane of preparation and reaction parameters of organic reactions.
CLO-02	Analyse	Report mass and melting points.
CLO-03	Evaluate	Estimate the purity of organic compounds by TLC and spectral data of organic compounds (UV, IR, PMR, CMR and Mass spectra).
CLO-04	Create	Perform purification procedures for synthesized compounds.

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SEMESTER-IV

Paper No.– IV

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Combined Spectral Analysis**

No. of Credits - 02

Type of Vertical: Compulsory major

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COURSE CONTENT			
Module No.	Content	Credits	No. of Lectures
1	<p>Practicals:</p> <p>Two steps preparations</p> <ul style="list-style-type: none">○ Acetophenone → Acetophenone phenyl hydrazine → 2-phenyl indole.○ 2-naphthol → 1-phenyl azo-2-naphthol → 1-amino-2-naphthol.○ Cyclohexanone → cyclohexanone oxime → Caprolactum.○ Hydroquinone → hydroquinone diacetate → 2,5-dihydroxyacetophenone.○ 4-nitrotoluene → 4-nitrobenzoic acid → 4-aminobenzoic acid.○ o-nitroaniline → o-phenylene diamine → Benzimidazole.○ Benzophenone → benzophenone oxime → benzanilide.○ o-chlorobenzoic acid → N-phenyl anthranilic acid → acridone.○ Benzoin → benzil → benzilic acid.○ Phthalic acid → phthalimide → anthranilic acid.○ Resorcinol → 4-methyl-7-hydroxy coumarin → 4-methyl-7-acetoxy coumarin.	02	30

	<p>○ Anthracene → anthraquinone → anthrone.</p> <p>Learning points</p> <p>1) Students are expected to know (i) the planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including MSDS (ii) the possible mechanism, expected spectral data (IR and NMR) of the starting material and final product.</p> <p>2) Students are expected to purify the product by recrystallization, measure its mass or volume, check the purity by TLC, determine physical constant and calculate percentage yield.</p>		
2	<p>Combined spectral identification: Interpretation of spectral data of organic compounds (UV, IR, PMR, CMR and Mass spectra).</p> <p>A student will be given UV, IR, PMR, CMR, and Mass spectra of a compound from which preliminary information should be reported within first half an hour of the examination without referring to any book/reference material. The complete structure of the compound may then be elucidated by referring to any standard text-book/reference material etc.</p>	2	30
	Total	4	60

Access to the Course

The course is available for all the students who have admitted for second year of master of science.

Method of Assessment:

Vocational Skill Courses, Skill Enhancement Courses and the courses having laboratory session shall be assessed at the end of each semester.

Reference

1. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis- V.K. Ahluwalia and Renu Aggarwal, Universities Press India Ltd., 2000
2. Advanced Practical Organic Chemistry – N. K. Vishnoi, Third Addition, Vikas Publishing House PVT Ltd
3. Systematic Laboratory Experiments in Organic Synthesis- A. Sethi, New Age International Publications
4. Systematic Identification of Organic compounds, 6th edition, R. L. Shriner, R. C. Fuson and D.Y. Curtin Wiley, New York.
5. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham, ELBS
6. Experiments and Techniques in Organic Chemistry, D. Pasto, C. Johnson and M. Miller, Prentice Hall.
7. Macro-scale and Micro-scale Organic Experiments, K. L. Williamson, D.C. Heath.
8. Systematic Qualitative Organic Analysis, H. Middleton, Adward Arnold.
9. Handbook of Organic Analysis- Qualitative and Quantitative, H. Clark, Adward Arnold.
10. Vogel's Textbook of Practical Organic Chemistry, Fifth edition, 2008, B.S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell, Pearson Education.
11. Laboratory Manual of Organic Chemistry, Fifth edition, R K Bansal, New Age Publishers.
12. Organic structures from spectra, L. D. Field, S. Sternhell, John R. Kalman, Wiley, 4th ed. 2011.