

<b>INSTITUTE</b>	<b>FACULTY OF SCIENCE</b>
<b>PROGRAM</b>	<b>MASTER OF SCIENCE (CHEMISTRY)</b>
<b>SEMESTER</b>	<b>3</b>
<b>COURSE TITLE</b>	<b>PRACTICALS-III</b>
<b>COURSE CODE</b>	<b>02CY1507</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 To equip students with the necessary skills to conduct experiments, analyse data, and interpret results accurately and to demonstrate the practical application of theory covered within the scope of Organic Chemistry.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 In order to maintain a safe working environment, students will follow safety protocols and procedures, recognizing potential dangers, reducing risks, and reacting appropriately to crises.
- 2 Students will be able to learn and develop different practical skills in Organic Chemistry.
- 3 Students will use the theoretical knowledge they have learned in lectures to plan experiments, evaluate information, and make decisions in a lab setting.

**Pre-requisite of course:** Students having a background in the science stream with a focus on chemistry.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
0	0	9	0	0	0	75	75
<b>Contents : Unit</b>	<b>Topics</b>						<b>Contact Hours</b>
<b>Total Hours</b>							

**Suggested List of Experiments:**

Contents : Unit	Topics	Contact Hours
1	<b>Essence of Chromatography Experiments</b> 1. Separation of plant pigments using Paper Chromatography. 2. Separation of plant pigments using Thin Layer Chromatography. 3. Separation and isolation of plant pigments using Column Chromatography. 4. Determine quantitatively the amino acids (Cysteine, Theonine, Valine) present in the given mixture by the technique of Ascending Paper Chromatography. 5. Determine quantitatively the amino acids (Cysteine, Glycine, Valine) present in the given mixture by the technique of Descending Paper Chromatography. 6. To determine the R <sub>f</sub> value of given amino acids (Cysteine, Glycine, Valine) by Ascending Paper Chromatography. 7. To determine the R <sub>f</sub> value of given amino acids (Cysteine, Theonine, Valine) by Descending Paper Chromatography. 8. To determine the R <sub>f</sub> value of given amino acids (Alanine, Glycine, Valine) by Circular Paper Chromatography. 9. To determine the R <sub>f</sub> value of given amino acids (Cysteine, Theonine, Valine) by Circular Paper Chromatography. 10. To determine the R <sub>f</sub> value of given inorganic cations (Co <sup>2+</sup> , Cu <sup>2+</sup> and Ni <sup>2+</sup> ) by Descending Paper Chromatography. 11. To determine the R <sub>f</sub> value of given inorganic cations (Co <sup>2+</sup> , Mn <sup>2+</sup> and Zn <sup>2+</sup> ) by Ascending Paper Chromatography. 12. Determine the R <sub>f</sub> values of the inorganic cations (Co <sup>2+</sup> , Cu <sup>2+</sup> and Ni <sup>2+</sup> ) present in the given mixture by the technique of Circular Paper Chromatography. 13. Separation of amino acids by Thin Layer Chromatography. 14. Separation of dyestuffs by Thin Layer Chromatography. 15. Separation of KMnO <sub>4</sub> and K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> by column chromatography	30
2	<b>Medicinal Chemistry Experiments</b> 1. Organic Qualitative Analysis – Identification of Unknown Compounds in a Mixture 2. Synthesis of Aspirin (Acetylsalicylic Acid) React salicylic acid with acetic anhydride in presence of H <sub>2</sub> SO <sub>4</sub> . 3. Preparation of Ibuprofen (Anti-inflammatory Drug) Synthesis through Friedel-Crafts Acylation followed by reduction. 4. Synthesis of Paracetamol (Acetaminophen) Acetylation of p-aminophenol with acetic anhydride. 5. Preparation of Methyl Orange (Azo Dye Synthesis) Diazotization of sulfanilic acid and coupling with dimethylaniline. 6. Synthesis of Malachite Green Dye Condensation of benzaldehyde and dimethylaniline in acidic medium. 7. Preparation of Benzophenone (Friedel-Crafts Acylation) React benzene with benzoyl chloride in presence of AlCl <sub>3</sub> . 8. Synthesis of Benzimidazole (Heterocyclic Compound) React o-phenylenediamine with formic acid. 9. Preparation of Dibenzalacetone (Claisen-Schmidt Condensation) React benzaldehyde with acetone in basic medium. 10. Extraction of Citral (Terpenoid) from Lemongrass Oil 11. Steam distillation and purification of citral from lemongrass. 12. Extraction of caffeine from tea leaves.	30

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	<b>Advanced Organic Chemistry – I</b> 1 Organic Qualitative Analysis of a mixture of organic compounds (mixture of 2 organic compounds) (7 Experiments). 2. To prepare dihydropyridine derivative from benzaldehyde. 3. To prepare benzotriazole from o- phenylenediamine. 4. To prepare 2-methyl benzimidazole from o- phenylenediamine. 5. To prepare Acetanilide from acetophenone 6. To prepare 2-phenyl indole from acetophenone	30
<b>Total Hours</b>		<b>90</b>

### Textbook :

- 1 Vogel's Textbook of Practical Organic Chemistry, A.I. Vogel, A.R. Tatchell, Prentice Hall, 1989
- 2 Textbook of quantitative chemical analysis, G. H. Jeffery J. Bassett J. Mendham R C. Denney, John Wiley & Sons, 1989
- 3 An Advanced Course in Practical Chemistry, A. K. Nad, B. Mahapatra and A. Ghoshal, New Central Book Agency (P) Ltd, 2022

### References:

- 1 Experiments in Organic Chemistry, Experiments in Organic Chemistry, Richard K. Hill, Contemporary Pub Co of Raleigh, 2003
- 2 Comprehensive Organic Chemistry Experiments for the Laboratory Classroom, Comprehensive Organic Chemistry Experiments for the Laboratory Classroom, Carlos A M Afonso; Nuno R Candeias; Dulce Pereira Simão; Alexandre F Trindade, RSC, 2020
- 3 Chromatography: A Laboratory Handbook of Chromatographic and Electrophoretic Methods, Chromatography: A Laboratory Handbook of Chromatographic and Electrophoretic Methods, Van Nostrand Reinhold, Erich Heftmann, 1975
- 4 Thin-Layer Chromatography A Laboratory Handbook, Thin-Layer Chromatography A Laboratory Handbook, Egon Stahl , Springer Berlin, Heidelberg, 2012

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	30.00	30.00	10.00	0.00

### Instructional Method:

- 1 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

**Instructional Method:**

- 2 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
- 3 All students in the laboratory must wear lab coats during lab session.
- 4 During practical and experimental section student must wear shoes to avoid accidents cause by spilling or rush handling of acidic chemicals (Especially during inorganic estimation experiments).
- 5 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

**Supplementary Resources:**

- 1 <http://ocw.mit.edu/courses/chemistry/>
- 2 <https://www.youtube.com/watch?v=FUo428guKt0>
- 3 <https://www.youtube.com/watch?v=qPjGbrd4nJw>
- 4 <https://www.youtube.com/watch?v=3WvrzQceIso>
- 5 <https://www.youtube.com/watch?v=oqSGrRzd0mI>
- 6 <https://www.youtube.com/watch?v=4UH9ciVrCes>
- 7 <https://www.youtube.com/watch?v=0nKiVn1jcqg>
- 8 <https://www.youtube.com/watch?v=zo8-LToVuFk>
- 9 <https://www.youtube.com/@sdchemistryacademy-b.sc.526>