



University of Kerala

Discipline	CHEMISTRY				
Course Code	UK2DSCCHE103				
Course Title	ESSENTIALS OF ORGANIC CHEMISTRY				
Type of Course	DSC				
Semester	2				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	5. Higher secondary level science knowledge 6. First semester DSC (chemistry) offered by UoK (preferable)				
Course Summary	The course covers the fundamentals of organic chemistry, stereochemistry, bioinorganic chemistry, medicinal chemistry, and practical organic qualitative analysis techniques. Students learn about the reactivity of organic compounds, stereochemical principles, biological roles of metals, pharmacognosy, and analytical methods for organic compound identification and purification.				

Detailed Syllabus:

Module	Unit	Content	Hrs
		ESSENTIALS OF ORGANIC CHEMISTRY	75
I		BASICS OF ORGANIC CHEMISTRY, SEPARATION AND PURIFICATION OF ORGANIC COMPOUNDS	9
	1	Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications	2
	2	Dipole moment; Organic acids and bases; their relative strength.	1
	3	Homolytic and heterolytic fission with suitable examples. Curly arrow rules; Electrophiles and Nucleophiles; Nucleophilicity and basicity	2
	4	Types, shape and relative stability of carbocations, carbanions, free radicals and carbenes. Introduction to types of organic reactions - Addition, Elimination and Substitution reactions.	1
	5	General principles involved in the separation of precipitates, standards of purity, mixed melting point and boiling point	1
	6	Purification of solid organic compounds – extraction, use of immiscible solvents, solvent extraction, crystallization, fractional crystallization, sublimation, desiccants, vacuum drying. Purification of liquids – distillation, vacuum distillation, fractional distillation	2
II		INTRODUCTION TO STEREOCHEMISTRY	9

	7	Optical Isomerism: Chirality and elements of symmetry; DL notation and Enantiomers	2
	8	Optical isomerism in glyceraldehydes, lactic acid and tartaric acid	2
	9	Diastereoisomers and mesocompounds	1
	10	Cahn-Ingold-Prelog rules – R-S notations for optical isomers with one and two asymmetric carbon atoms	2
	11	Racemic mixture, resolution and methods of resolution	2
III	CHROMATOGRAPHY		9
	12	Outline study of Adsorption and partition chromatography	2
	13	Principle and applications of column, paper, thin layer, ion- exchange and gas chromatography	3
	14	Principle and applications of HPL, Rf and Rt value of various chromatographic techniques	2
	15	Paper chromatographic separation of amino acids and sugars Separation of a mixture of dyes by column chromatography. Principle and applications of TLC	2
IV	PHYTOCHEMICALS, CRUDE DRUGS AND MEDICINAL CHEMISTRY		18
	16	Pharmacognacy – Scope and importance, scheme for pharmacognotic studies of crude drugs	2
	17	Phytochemicals. Crude drugs: Morphological, pharmacological and chemical classification	2
	18	Processing of drugs: Method of preparation – decoction, maceration and infusion	2
	19	Methods of drug evaluation: Moisture content, volatile content, solubility, optical rotation, ash values and extracting, spectroscopic analysis, chromatographic method and foreign organic matter (Mention only)	4
	20	Carbohydrates, glycosides (saponin glycosides and cardiac glycosides), alkaloids (quinoline, isoquinoline, indole alkaloids and steroidal alkaloids) volatiles oils and phenols (Mention its sources, important compounds in each class and therapeutic importance)	4
	21	Chemo therapy- Drugs-Classification based on application. Elementary study of analgesics, antipyretics, antibiotics, antimalarials. sulphadrgugs, mode of action of sulphadrgugs. Synthesis of aspirin and paracetamol	4
V	PRACTICALS: ORGANIC QUALITATIVE ANALYSIS		30
	22	Section A: Organic Qualitative Analysis (Any 5 compounds with different functional groups are compulsory) Systematic analysis with a view to identify the organic compound (aromatic – aliphatic, saturated – unsaturated, detection of elements and detection of functional groups) – polynuclear hydrocarbons, alcohols, phenols, halogen compounds, nitro compounds, amino compounds, aldehydes, ketones, carboxylic acids, amides, urea, thiourea and esters. Only monofunctional compounds are to be given.	15

	23	<p>Section B (Open ended: Any 3 experiments are to be conducted - May be selected from the list or the teacher can add experiments)</p> <ol style="list-style-type: none"> 1. Preparation of derivatives of above analysed organic compounds 2. Identification of Carbohydrates: Glucose, fructose, sucrose and starch. 3. TLC - Separation and identification- Determination of R_f value of o-and p-nitroanilines, o- and p-chloroanilines, p-chlorophenol and p-nitrophenol, p-chloroaniline and p-nitroaniline, benzil and o-nitroaniline or any two amino acids. 4. Preparation of Soap 5. Determination of total fatty acid present in given sample of soap. 6. Determination of total alkali present in given sample of soap 7. Preparation of liquid detergent 8. Preparation of solid detergents 9. Preparation of phenyl. 	15
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References

1. S M Khopkar, *Analytical chemistry*.
2. Gurdeep Chatwal, *Chemistry of natural products Vol. 1*.
3. P.L Soni, H.M. Chowla, *Text Book of Organic Chemistry*.
4. I.L. Finar, *Organic Chemistry Vol 1 & 2*.
5. Arun Bahl & B S Bahl, *Text Book of Organic Chemistry*.
6. *Elementary practical organic chemistry. Part 2: Qualitative Organic analysis.* von A. I. Vogel. Longmans, Green & Co. Ltd., London.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the fundamentals of organic chemistry	U	PSO-1
CO 2	Apply the principles in purification of organic compounds	Ap	PSO-2
CO 3	Discuss the stereochemistry of organic compounds	U	PSO-1
CO 4	Get insight to the emerging area of phytochemistry	U	PSO-5
CO 5	Apply the principles of isolation of drugs	Ap	PSO-5
CO 6	Discuss the influence of bioinorganic compounds in our life	U	PSO-3
CO 7	Discuss the methods of preparation of drugs	U	PSO-4 & 5
CO 9	Demonstrate the extraction of medicines used in daily life	Ap	PSO-5

CO 10	Apply the principles in analytical chemistry to identify the organic compounds	Ap	PSO-2
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R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: ESSENTIALS OF ORGANIC CHEMISTRY

Credits: 3:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/ PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	CO-1	PO-1 PSO-1	U	C	L	
2	CO 2	PO-3 PSO-2	Ap	P	L	
3	CO 3	PO-1 PSO-1	U	C	L	
4	CO 4	PO-3 PSO-5	U	M	L	
5	CO 5	PO-3 PSO-5	Ap	P	L	
6	CO 6	PO-2 PSO-3	U	C	L	
7	CO 7	PO-1 PSO-4 & 5	U	P	L	
8	CO 8	PO-6 PSO-5	Ap	P		P
9	CO 9	PO-3 &6 PSO-2	Ap	M		P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
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CO 1	2	-	-	-	-	2	-	-	-	-	-	-	-
CO 2	-	2	-	-	-	-	-	2	-	-	-	-	-
CO 3	2	-	-	-	-	2	-	-	-	-	-	-	-
CO 4	-	-	-	-	2	-	-	2	-	-	-	-	-
CO 5	-	3	-	-	-	-	3	-	-	-	-	-	-
CO 6	-	-	3	-	-	-	2	-	-	-	-	-	-
CO 7	-	-	-	2	2	2	-	-	-	-	-	-	-
CO 8	-	-	-	-	3	-	-	-	-	-	3	-	-
CO 9	-	3	-	-	-	-	-	3	-	-	3	-	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	√	√		√
CO 2	√	√		√
CO 3	√	√		√
CO 4	√			√
CO 5	√			√
CO 6	√			√
CO 7	√			√
CO 8		√	√	
CO 9	√			√