

Lecture Plan

Name of the college: Government College of Arts, Science & Commerce, Sankhali, Goa		
Name of Faculty: Dr. Sagar Narayan Patil	Subject: Concepts in Organic and Analytical Chemistry	
Paper code: CHC-201	Program/Course: S.Y.BSc.	Division:
Academic year: 2026 - 2027	Semester: III	Total Lectures: 15
Credits: 3+1		
Course Objectives: • To understand the preparation of aromatic compounds, organic halides, alcohols, phenols and carbonyl compounds. • To study the reactions of aromatic compounds, organic halides, alcohols, phenols and carbonyl compounds. • To understand scope and importance of analytical chemistry and to interpret steps involved in chemical analysis. • To study concepts of data analysis for determining central tendency and dispersion. • To study classical methods of analysis inclusive of principles and instrumentation of UV – Visible spectrophotometry and solvent extraction.		
Expected Course Outcome: At the end of the course students will be able to: CO-1: State and explain fundamental concepts, definitions, and reactions related to key organic compounds and analytical techniques including gravimetric and titrimetric analysis, solvent extraction, and UV-Visible spectroscopy. CO-2: Describe the basic principles, preparation methods, and reactions of key organic compounds, and describe the fundamental concepts of analytical techniques such as gravimetric and titrimetric analysis, solvent extraction, and UV-Visible spectroscopy. CO-3: Apply the concepts of organic chemistry to synthesize and solve problems related to the preparation and reactions of key organic compounds, to apply analytical procedures, statistical tools, spectroscopic methods to perform qualitative and quantitative analysis of chemical substances and analytical techniques. CO-4: Analyze the chemical behavior of major organic functional groups and apply analytical techniques to interpret data, evaluate accuracy and precision, and differentiate instrumental and classical approaches in chemical analysis.		
Learning Outcome: At the end of the course students will be able to: LO1: define and explain fundamental concepts and reactions of key organic compounds, and describe basic analytical techniques such as		

gravimetric analysis, titrimetric analysis, solvent extraction, and UV-Visible spectroscopy.

LO2: describe the methods for the preparation and reactions of selected organic compounds and explain the theoretical basis of analytical methods including gravimetric and titrimetric techniques, solvent extraction, and UV-Visible spectroscopy.

LO3: apply knowledge of organic synthesis and reaction mechanisms to solve problems, and carry out analytical experiments using classical and instrumental methods. Use statistical tools to interpret qualitative and quantitative data accurately.

LO4: analyze the behavior of organic functional groups in chemical reactions and interpret data from analytical techniques to evaluate the accuracy, precision, and suitability of classical versus instrumental analysis methods.

Month	Lectures From	Lectures To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise /Assignment	ICT Tools	Reference books
June	19-06-2026	30-06-2026	01	1. Alkyl and Aryl Halides Alkyl Halides: IUPAC Nomenclature (examples upto 5 Carbons), Preparation: from alkenes and alcohols.		Smart board, Power point presentation, Google classroom	[1-5]
July	01-07-2026	13-07-2026	02	Alkyl and Aryl Halides Reactions: hydrolysis, nitrite & nitro formation. Types of Nucleophilic Substitution (S_N1 & S_N2) reactions (mechanism without stereochemistry).		Smart board, Power point presentation, Google classroom	[1-5]
July	14-07-2026	21-07-2026	02	Alkyl and Aryl Halides Types of Nucleophilic Substitution (S_N1 & S_N2) reactions (mechanism without stereochemistry).		Smart board, Power point presentation, Google classroom	[6-9]
July	27-07-2026	28-07-2026	01	Aryl Halides : Preparation: (chloro, bromo and iodobenzene): Sandmeyer reaction.	ISA I	Smart board, Power point presentation, Google classroom	[6-9]
August	03-08-2026	11-08-2026	02	Reactions (Chlorobenzene): Aromatic nucleophilic substitution S_NAr -mechanism (replacement by $-OH$ group to give phenol and effect of nitro substituent). Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).		Smart board, Power point	[6-9]

						presentation, Google classroom	
August	17-08-2026	31-08-2026	02	2. Alcohols, Phenols, Ethers and Carbonyl Compounds Alcohols: IUPAC Nomenclature (examples upto 5 Carbons), Preparation of 1°, 2° and 3° alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO_4).	ISA II	Smart board, Power point presentation, Google classroom	[6-9]
September	01-09-2026	15-09-2026	02	Phenols: Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: nitration, halogenation and sulphonation. Ethers (aliphatic and aromatic): Williamson's synthesis of ethers. Cleavage of ethers with HI.		Smart board, Power point presentation, Google classroom	[6-9]
September	21-09-2026	29-09-2026	01	Aldehydes and ketones (aliphatic and aromatic): (acetaldehyde, acetone, benzaldehyde and acetophenone) Preparation: from alcohols and acid chlorides. Reactions— with HCN, ROH, NH_3 , 2,4-DNP, NH_2OH , Iodoform test. Aldol condensation-only reaction for preparation of chalcone.	ISA III	Smart board, Power point presentation, Google classroom	[6-9]

October	05-10-2026	05-10-2026	01	Sample paper , mock tests, structural problems		Smart board, Power point presentation, Google classroom	[6-9]
October	06-10-2026	14-10-2026	01	Revision		Smart board, Power point presentation, Google	
						classroom	

References:

- [1] Graham Solomons, T.W., Fryhle, C.B. and Snyder, S. A., Organic chemistry, 12th ed., John Wiley & Sons, UK, 2016.
- [2] McMurry, J., Fundamentals of organic chemistry, 7th ed., Cengage Learning India Edition, Noida, India, 2013.
- [3] Sykes, P., A guide book to mechanism in organic chemistry, 6th ed., Longman Scientific & Technical, England, UK, 1985.
- [4] Morrison, R.T., Boyd, R.N. and Bhattacharjee, S. K., Organic Chemistry, 7th ed., Pearson, Bangalore, India, 2010.
- [5] Bahl, A. and Bahl, B. S., Advanced Organic Chemistry, S. Chand, New Delhi, India, 2012.
- [6] B. K. Sharma. Instrumental Methods of Chemical Analysis, 5th ed. Goel Publishing House, Meerut. 2004.
- [7] K. Raghuraman, D. V. Prabhu, C. S. Prabhu and P. A. Sathe, Basic principles in Analytical Chemistry, 5th edition, Shet Publications Pvt. Ltd.
- [8] G. Chatwal and S. Anand, Instrumental Methods of Chemical Analysis, 5th edition Himalaya publication. 2003.
- [9] H. Willard, L. Meritt and J.A. Dean. Instrumental Methods of Analysis, 7th edition, HCBs publication. 2004.

* Assessment Rubrics	
Component	Max Marks
ISA	15
Practical	25
Semester End Exam	60