

Branch Name:	B.Sc. Chemistry
Program Code:	SC203
Course Name:	Industrial Chemistry-I
Course Code:	2SC1030522
Pre-requisite Course:	Fundamentals of Chemistry (up to S.Y.B.Sc.)

Course Objectives:

1. To meet the growing demand of Advanced Courses in Industrial chemistry.
2. To help the colleges to update and modernize their laboratories.
3. To redesign the courses the special emphasis on local requirements, environment, to link the courses with requirements of the industries and research.
4. Comprehension of principles of industrial chemistry and learning of current applications.
5. The primary goal of this course is to make students aware of how chemical process can be designed, developed and employed in a sustainable manner.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme(Marks)				
Lecture(L)	Tutorial(T)	Practical(P)	Credit	Theory (Marks)		Practical(Marks)		Total(Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	-	2	3 5	1 5	-	-	50

Subject Contents:

Sr. No	Topic	Lectures	Weightage
1	Unit Processes in manufacturing of Organic Chemicals-I ❖ Nitration: Introduction, nitrating agents, mechanism and nitration of paraffin hydrocarbons - benzene to nitrobenzene, m-dinitrobenzene, chlorobenzene to o- & p-nitro chlorobenzenes. Acetanilide to p-nitro acetanilide, toluene, continuous Vs batch nitration. ❖ Halogenation: Introduction, reagents for halogenations, halogenations of aromatic side chain and nuclear halogenations, commercial manufacture of chlorobenzene, chloral, monochloroacetic acid and chloromethanes ❖ Alkylation: Introduction, types of alkylation, alkylating agents, mechanism of alkylation reactions, manufacture of phenyl ethyl alcohol and ethyl benzene.	16	50%
2	Unit Processes in manufacturing of Organic Chemicals-II ❖ Sulphonation: Introduction, sulphonating agents, chemical and physical factors in sulphonation, mechanism of sulphonation, commercial sulphonation of benzene, naphthalene, alkyl benzene, batch Vs continuous sulphonation. ❖ Oxidation: Introduction, types of oxidation reactions, oxidizing agents, mechanism of oxidation, liquid phase oxidation and vapour phase	16	50%

	oxidation, commercial manufacture of benzoic acid, maleic anhydride, phthalic anhydride, acetaldehyde, acetic acid. ❖ Esterification: Introduction, Hydrodynamics and kinetic of Esterification Reactions, Esterification by organic acids, Esterification of carboxy acid derivatives, Commercial manufacture of Ethyl acetate.		
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Course Outcomes:

- ❖ Have solid foundations in the fundamentals of industrial chemistry.
- ❖ Are capable to use this knowledge for designing experiments related to industrial chemistry.
- ❖ Are capable to identify chemical problems and explore new areas of research in industrial chemistry.
- ❖ Are capable to use up to date library searching and retrieval methods to obtain information about novel chemical process and issues related to industrial chemistry.

Reference Books:

1. Austin, G.T., Shreve's Chemical Process Industries, 5th Edition, McGraw Hill Publication, 1975.
2. Groggins, P.H. "Unit processes in Organic synthesis" Tata McGraw Hill Education Private Limited 5th ed. 1995.
3. Chemical Process Principles: (Part I), Haugen, Watson and Regatz (Asia Pub. House).
4. Chemistry of Engineering Materials by C. V. Agrawal (Tara Publication).

List of Open Source Software/learning website:

1. <https://swayam.gov.in>
2. <https://nptel.ac.in>
3. <http://onlinelibrary.wiley.com>
4. https://en.wikipedia.org/wiki/Main_Page

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn fundamentals of unit processes.	Learning
CLO2	Understand basic concepts of nitration, halogenation, alkylation for manufacturing of chemicals.	Understanding & evaluating
CLO3	Understand basic concept of sulphonation, oxidation, esterification for manufacturing of chemicals.	Understanding & evaluating
CLO4	Students will demonstrate an advanced level of knowledge in industrial chemistry.	Applying

Mapping of CLOs with POs

Course Learning Outcomes	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CLO1	H	M	M	M	H	M	H	L	M
CLO2	H	L	M	M	M	H	H	M	M
CLO3	H	L	M	M	M	H	H	M	M
CLO4	M	H	L	M	M	H	H	M	M

H: High, M: Medium, L: Low