

GUJARAT TECHNOLOGICAL UNIVERSITY
CHEMICAL TECHNOLOGY (36)
UNIT PROCESSES IN ORGANIC SYNTHESIS
SUBJECT CODE: 2143607
B.E. IVth SEMESTER

Type of Course: Chemical Technology

Prerequisite: Studied subject (**Unit Processes In Organic Synthesis**). Basic knowledge of chemistry.

Rationale: The main objective of this subject is to study the Unit Processes and their applications in chemical industries.

Unit Processes In Organic Synthesis (Teaching and Examination Scheme):

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE Viva(V)	PA (I)		
3	0	3	6	70	30	30	20	150

L-Lectures; T-Tutorial/Teacher Guided Student Activity; P-Practical; C-Credit; ESE-End Semester Examination; PA-Progressive Assessment

Content:

Sr. No.	Topic	Teaching Hours	Module Weightage %
1	Nitration: Introduction, Nitrating Agents, Aromatic Nitration, Nitration of Paraffin hydrocarbons, Nitrate Esters, N-Nitro Compounds, Process Equipment for Technical Nitration, Batch Nitration, Continuous Nitration, Mixed acid compositions, DVS calculations. Commercial manufacture of some important compounds.	06	10
2	Amination by Reduction and Ammonolysis: Introduction & Definitions, Different methods of Reduction. Aminating agents, Catalysts used in amination reaction. Commercial manufacture of some important compounds.	06	10
3	Halogenation : Introduction, Chlorination, Bromination, Fluorination, Iodination. Commercial Manufactures of some important compounds.	06	10
4	Sulfonation & Sulfation: Introduction, Sulfonating & Sulfating agents, Sulfonation of Aromatic Compounds. Commercial manufacture of some important compounds	06	10
5	Oxidation : Introduction-Types of oxidation reactions, Oxidizing agents. Liquid phase oxidation, Vapour phase oxidation. Commercial manufacture of some important compounds.	06	10

6	Hydrogenation: Introduction and scope, Catalysts for hydrogenation reaction. Commercial manufacture of some important compounds including latest developments.	06	10
7	Alkylation: Introduction, Types of alkylation, alkylating agents, thermodynamic and mechanism of alkylation reactions, Commercial manufacture of some important compounds	06	10
8	Esterification: Introduction, Esterification of organic acids, Esterification by addition to unsaturated compounds. Commercial manufacture of some important compounds.	06	10
9	Hydrolysis: Scope, Hydrolyzing agents. Materials susceptible to hydrolysis. Equipments for hydrolysis	06	10
10	Polymerization: Introduction, Chemistry of polymerization reactions, Methods of polymerization. Solution properties of polymers. Polymerization practice.	06	10

Suggested Specification table with Marks (Theory):

Unit No	Unit Title	Distribution of Theory Marks (%)			
		R Level	U Level	A Level	Total
1	Nitration	8	1	1	10
2	Amination	8	1	1	10
3	Halogenation	8	1	1	10
4	Sulfonation & Sulfation	8	1	1	10
5	Oxidation	8	1	1	10
6	Hydrogenation	8	1	1	10
7	Alkylation	8	1	1	10
8	Esterification:	8	1	1	10
9	Hydrolysis	8	1	1	10
10	Polymerization	8	1	1	10

Legends: R: Remembrance; U: Understanding; A: Application and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Unit Process in Organic Synthesis – P.H.Groggins.
2. Dryden's Outlines of Chemical Technology – M.Gopal
3. Shreve's Chemical Process Industries
4. Industrial Chemistry – B.K.Sharma
5. To get an introductory knowledge of Chemical Industry and Unit Processes.
6. To be able to apply this knowledge in Pharma, Dyes & Pigments, Polymer, Rubber and Glass and Ceramics industries

7. To build a bridge between theoretical and practical concept used in industry

Course Outcomes:

List of Open Source Software/learning website:

- 1) Literature available on internet
- 2) Delnet

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.