

## Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP)

Academic Year: 2026-27 (ODD)

**Institute Code and Name:** 0078- K. K. Wagh Polytechnic, Nashik**Semester:** Third**Programme and Code:** Chemical Engineering (CH)**Course Index:** 306**Course and Code:** Chemistry for Chemical Engineers(CCE) 313016**Name of Faculty:** Mrs. A. B. Shaikh**CLASS:** SYCH**INDUSTRY EXPECTED OUTCOME**

The aim of this course is to help the student to attain the following industry identified outcome through various teaching learning experiences: Select the suitable organic compounds for various processes in Chemical Industries.

**COURSE LEVEL LEARNING OUTCOMES (COS)**

- CO306.1 - Apply the adsorption principle in the operations of purification and separation.
- CO306.2 - Apply the colloidal system and phase diagram concepts.
- CO306.3 - Identify the nomenclature and structure of organic compounds.
- CO306.4 - Identify the various preparation techniques and characteristics of Aliphatic & Aromatic compounds.
- CO306.5 - Identify the various properties and methods of preparation for alcohols, phenols, and carboxylic acids.

**TEACHING-LEARNING & ASSESSMENT SCHEME**

Course Code	Course Title	Abbr	Course Category	Learning Scheme						Credits	Paper Duration	Assessment Scheme									
				Actual Contact Hrs/Week			SLH	NLH	Theory				Based on LL & TSL Practical				Based on SL		Total Marks		
				C	T	L			FA-TH			SA-TH	Total		FA-PR		SA-PR			SLA	
													Max	Min	Max	Min	Max	Min		Max	Min
313020	CHEMISTRY FOR CHEMICAL ENGINEERS	CCE	DSC	2	-	2	2	6	3	-	-	-	-	-	25	10	25@	10	25	10	75

**Total IKS Hrs for Sem.:** 1 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, \*# On Line Examination , @\$ Internal Online Examination

**THEORY LEARNING OUTCOME (TLO)**

TLO No.	Title of TLO
TLO 1.1	Explain the concept and mechanism of adsorption.
TLO 1.2	Enlist the types of adsorptions.
TLO 1.3	Explain the adsorption isotherm.
TLO 1.4	Enlist the applications of adsorption in process industries.

<b>TLO 2.1</b>	Enlist the types of colloidal system
<b>TLO 2.2</b>	Explain the methods of preparation of colloids
<b>TLO 2.3</b>	Explain the concept of phase rule.
<b>TLO 2.4</b>	Calculate the degree of freedom of given system
<b>TLO 2.5</b>	State the concept of phase diagram for different systems.
<b>TLO 2.6</b>	State the Concept of Nerst Distribution law.
<b>TLO 3.1</b>	Explain the concept of Hybridization.
<b>TLO 3.2</b>	Classify organic compounds based on functional groups.
<b>TLO 3.3</b>	Explain the IUPAC Nomenclature for Organic Compounds.
<b>TLO 4.1</b>	Identify the methods of preparations and chemical reactions of Alkanes.
<b>TLO 4.2</b>	TLO 4.2 Identify the methods of preparations and chemical reactions of Alkenes.
<b>TLO 4.3</b>	TLO 4.3 Identify the methods of preparations and chemical reactions of Alkynes.
<b>TLO 4.4</b>	TLO 4.4 Identify the methods of preparations and chemical reactions of Aromatic compounds.
<b>TLO 5.1</b>	Identify the methods of preparations and chemical reactions of Alcohols.
<b>TLO 5.2</b>	TLO 5.2 Identify the methods of preparations and chemical reactions of Phenols.
<b>TLO 5.3</b>	TLO 5.3 Identify the methods of preparations and chemical reactions of Carboxylic acids.

#### SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	1	1	1	1	2	2	2	--
CO2	2	1		1	1	1	2	1	2	--
CO3	2	-	1	1	2	1	2	2	2	--
CO4	2	-	1	1	2	1	2	3	2	--
CO5	2	-	1	1	2	1	2	3	3	--

Legends :- High:03, Medium:02,Low:01, No Mapping: -

\*PSOs are to be formulated at institute level

**Teaching Plan (TP)**

**Academic Year:** 2024-25

**Program:** Chemical Engineering

**Course:** Chemistry For Chemical Engineers (CCE)

**Name of faculty:** Mrs. A. B. Shaikh

**Institute Code:** 0078

**Course Code:** 313016

**Semester:** Third (CH-3K)

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
<b>Unit - I Manufacturing of Acid and Alkali</b>								
1 (04)	CO-1	TLO 1.1	1.1 Adsorption: Definition,example, Mechanism of adsorption	1	01/07/2026		Blackboard, Books, media, PPT	
		TLO 1.2	1.2 Types of adsorptions Physical adsorption, chemical adsorption, difference between physical & chemical adsorption <b>MKCL Quiz 1</b>	1	01/07/2026			
		TLO 1.3	2.1 Adsorption isotherm: • Freundlich adsorption isotherm. • Langmuir adsorption isotherm	1	08/07/2026			
		TLO 1.4	1.4 Application of adsorption <b>MKCL Quiz 2</b>	1	08/07/2026			
<b>Unit - II Heterogeneous System</b>								
2(06)	CO-2	TLO 2.1	2.1 Colloids: Definition. Types of colloidal system: • Lyophilic. • Lyophobic colloids (solution)	1	15/07/2026		Blackboard, Books, media, PPT	

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			Characteristics & its comparison					
		TLO 2.2	2.2 Methods of preparation of colloids. • Dispersion method	1	15/07/2026			
		TLO 2.3	2.3 Phase rule: Statement, Phase components. <b>MKCL Quiz 3</b>	1	22/07/2026			
		TLO 2.4	2.4 Degree of freedom.	1	22/07/2026			
		TLO 2.5	2.5 Derivation of phase rule, phase diagram for water system, sulphur system.	1	29/07/2026			
		TLO 2.6	2.6 Nerst Distribution Law (concept) and its application. <b>MKCL Quiz 4</b>	1	29/07/2026			
<b>Unit - III Chemistry of Organic Compounds</b>								
3(06)	CO-3	TLO 3.1	3.1 Chemical bonding in Carbon atom, and Hybridization: sp, sp <sup>2</sup> and sp <sup>3</sup> and characteristics of chemical compounds.	2	05/08/2026 to 05/08/2026		Blackboard, Books, media, PPT	
		TLO 3.2	3.2 Classification based on functional group: Hydrocarbons, Alcohol, carboxylic acid, Ether, Esters, aldehyde, ketone. <b>MKCL Quiz 5</b>	2	12/08/2026 to 12/08/2026			
		TLO 3.3	3.3 Nomenclature of Organic Compounds: Common/trivial names and IUPAC Nomenclature. <b>MKCL Quiz 6</b>	2	19/08/2026 to 19/08/2026			
<b>Unit - IV Aliphatic &amp; Aromatic Compounds</b>								
4(07)	CO-4	TLO 4.1	4.1 Aliphatic Compounds: Alkanes, Alkenes and Alkynes	2	26/08/2026 To		Blackboard, Books,	

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			Alkanes: Isomerism in alkanes. Methods of Preparation: <ul style="list-style-type: none"> <li>• From unsaturated hydrocarbons,</li> <li>• Wurtz Coupling reaction.</li> </ul> Chemical reactions <ul style="list-style-type: none"> <li>• Halogenation of alkanes</li> <li>• Combustion</li> <li>• Pyrolysis.</li> </ul> Physical properties and uses.		26/08/2026		media, PPT	
		<b>TLO 4.2</b>	4.2 Alkenes: Isomerism in alkenes Methods of Preparation: <ul style="list-style-type: none"> <li>• By elimination reaction (dehydrohalogenating of alkyl halides, dehydration of alcohols)</li> <li>• Addition reactions</li> </ul> Chemical reactions: <ul style="list-style-type: none"> <li>• Addition of hydrogen halides (Markovnikov's rule and anti- Markovnikov's rule)</li> <li>• Addition of sulphuric acid</li> <li>• Oxidation.</li> </ul> Physical properties and uses. <b>MKCL Quiz 7</b>	3	02/09/2026 to 09/09/2026			<b>1 extra</b>
		<b>TLO 4.3</b>	4.3 Alkynes: Isomerism Methods of Preparation: <ul style="list-style-type: none"> <li>• By dehydrohalogenation of vicinal dihalides.</li> </ul> Chemical Reactions: <ul style="list-style-type: none"> <li>• Addition of dihydrogen.</li> <li>• Addition of halogens.</li> <li>• Addition of hydrogen halides. Physical properties and uses.</li> </ul>	2	09/09/2026 to 16/09/2026			
		<b>TLO 4.4</b>	4.4 Aromatic compounds: Introduction, IUPAC nomenclature; benzene; resonance aromaticity. Methods of preparation of benzene: <ul style="list-style-type: none"> <li>• From aromatic acids</li> <li>• By hydrolysis of sulphuric acid with</li> </ul>	2	16/09/2026 To 23/09/2026			

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			superheated steam. Chemical Reactions: • Mechanism of electrophilic substitution-nitration, sulphonation, halogenation, Friedel Craft alkylation. Physical properties and uses . <b>MKCL Quiz 8</b>					
<b>Unit - V Alcohols, Phenols and Carboxylic acids</b>								
5(07)	CO-5	TLO5.1	5.1 Alcohols: Nomenclature, Classification of alcohols Methods of preparation: • By Grignard synthesis of alcohol. • Reduction of ethylene oxide. Chemical reactions: • With hydrogen halides • With active metals. • With carboxylic acids. Physical properties and uses.	2	23/09/2026 To 30/09/2026		Blackboard, Books, media, PPT	
		TLO 5.2	5.2 Phenols: Nomenclature Methods preparation: By hydrolysis of diazonium salt. Chemical reactions: Acidic nature of phenol. Formation of ethers (Williamson Synthesis). Kolbe reaction. Reimer-Tiemann reaction Physical properties and Uses. <b>MKCL Quiz 9</b>	3	30/09/2026 to 07/10/2026			
		TLO 5.3	5.3 Carboxylic acids: Nomenclature, acidic nature. Methods of preparation:	2	14/10/2026 to 14/10/2026			

Chap No. (Alloted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			From primary alcohol Alkylbenzenes. Physical properties and Uses Chemical reactions: Conversion to acid chloride. Conversion into esters. Reduction to alcohols. <b>MKCL Quiz 10</b>  <b>Beyond Syllabus Topic.</b>	1	21/10/2026			

## ASSESSMENT METHODOLOGIES/TOOLS

### A. Formative assessment (Assessment for Learning) (FA-TH)

- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering
  - 60% weightage is to process
  - 40% weightage to product

### B. Summative Assessment (Assessment of Learning) (SA-TH)

- Continuous Assessment based on Process and Product related performance indicators. Each practical will be assessed considering
  - 60% weightage to Process
  - 40% weightage to Product

## SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No.	Author	Title of Book	Publication
1	B. S. Bahal, G. D. Tuli, Arun Bahal	Essential of Physical Chemistry	S. Chand ISBN -13 ,978-8121905466
2	B.R.Puri, L.R.Sharma, Madan s, Puthania	Principles of Physical Chemistry	S. Chand Publication ISBN -13 978-9382956013
3	Morrison Boyd & Bhattacharjee	Organic Chemistry	Pearson Education ISBN 9788131704813
4	Bahl Arun, Bahl B.S.	A Textbook of Organic Chemistry	S. Chand ISBN -13 ,978-9352531967

## LEARNING WEBSITES & PORTALS

Sr. No	Link / Portal	Description
1	<a href="https://www.coursera.org/learn/physical-chemistry">https://www.coursera.org/learn/physical-chemistry</a>	Introduction to Physical Chemistry
2	<a href="https://www.coursera.org/learn/basic-chemistry">https://www.coursera.org/learn/basic-chemistry</a>	Introduction to Organic Chemistry
3	<a href="https://www.coursera.org/learn/high-throughput">https://www.coursera.org/learn/high-throughput</a>	Physical Chemistry
4	<a href="https://www.digimat.in/nptel/courses/video/104106119/L06.htm">https://www.digimat.in/nptel/courses/video/104106119/L06.htm</a>	NPTEL Video :Introduction to Organic Chemistry { Alkanes,Cycloalkanes}
5	<a href="https://youtu.be/0UfMcbSOteo?si=AATnwjIgOckCs6hQ">https://youtu.be/0UfMcbSOteo?si=AATnwjIgOckCs6hQ</a>	NPTEL/IISER Video on Applications of Organic Compounds in various fields.
6	<a href="https://youtu.be/sq_qod2UNVI?si=ht4erQ5pBbm2e-_U">https://youtu.be/sq_qod2UNVI?si=ht4erQ5pBbm2e-_U</a>	Swayam Video on Basic Principles of Organic Chemistry
7	<a href="https://youtu.be/Cc5NltNuOBE?si=UuntFcxfyGBmFXH6">https://youtu.be/Cc5NltNuOBE?si=UuntFcxfyGBmFXH6</a>	Swayam Video on Organic compounds :Structure,reactions,preparations
8	<a href="https://youtu.be/2LywAiZBQW4?si=mo_NVyXI_kAPH">https://youtu.be/2LywAiZBQW4?si=mo_NVyXI_kAPH</a>	NPTEL video: Phase Rule

**Note :** Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

Mrs. A. B. Shaikh  
(Name & Signature of Staff)

Dr. P. S. Bhandari  
(Name & Signature of HOD)