

**LABORATORY PLAN (LP)****Academic Year: 2026-27**

Date: 01/07/2026

Institute Name &amp; Code: K. K. Wagh Polytechnic, Nashik-3 (0078)

Class: SYCH

Program and Code: Chemical Engineering (CH)

Course Index: CO306

Course Name: Chemistry For Chemical Engineers

Course Code &amp; Abbr.: 313016(CCE)

Total Hrs: 30 Semester: III<sup>rd</sup> Scheme: K

Name of Faculty: Mrs. A. B. Shaikh

- 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 and Examination Scheme:**

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Paper Duration	Assessment Scheme										
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	L					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
													Max	Min	Max	Min	Max	Min	Max	Min	
313016	CHEMISTRY FOR CHEMICAL ENGINEERS	CCE	DSC	2	-	2	2	6	3	-	-	-	-	-	25	10	25 @	10	25	10	

Abbreviations: CL- Class Room 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

- Laboratory Learning Outcome (LLO)**

LLO No.	Title of LLO
LLO 1.1	Plot a graph of Freundlich isotherm.
LLO 1.2	Find the value of adsorption constant K and slope n.
LLO 2.1	Plot a graph of Freundlich isotherm.
LLO 3.2	Find the value of adsorption constant K and slope n.
LLO 3.1	Plot a graph of Langmuir isotherm.
LLO 3.2	Find the value of adsorption constant K and slope n.
LLO 4.1	Plot a graph of Langmuir isotherm.
LLO 4.2	Find the value of adsorption constant

LLO 5.1	Select the raw material for Lyophobic Sol.
LLO 6.1	Select the raw material for Lyophilic Sol.
LLO 7.1	Find the melting point & Eutectic temperature.
LLO 8.1	Select the raw material to find partition coefficient.
LLO 9.1	Find the purity of a given solid compound.
LLO 10.1	Find the purity of a given liquid compound.
LLO 11.1	Measure the physical constant of a given chemical substance.
LLO 11.2	Detect the element like N,H & S in a given chemical substance.
LLO 11.3	Detect the functional group of chemical substance.
LLO 12.1	Measure the physical constant of a given chemical substance
LLO 12.2	Detect the element like N,H & S in a given chemical substance.
LLO 12.3	Detect the functional group of chemical substance.
LLO 13.1	Measure the physical constant of a given chemical substance.
LLO 13.2	Detect the element like N,H & S in a given chemical substance.
LLO 13.3	Detect the functional group of chemical substance.
LLO14.1	Measure the physical constant of a given chemical substance.
LLO14.2	Detect the element like N,H & S in a given chemical substance.
LLO14.3	Detect the functional group of chemical substance.
LLO15.1	Measure the physical constant of a given chemical substance.
LLO15.2	Detect the element like N,H & S in a given chemical substance
LLO15.3	Detect the functional group of chemical substance.
LLO16.1	Measure the physical constant of a given chemical substance.
LLO16.2	Detect the element like N,H & S in a given chemical substance.
LLO16.3	Detect the functional group of chemical substance.

● **COs, Practical Laboratory Learning Outcome (LLOs) and Mapping:**

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Name of Experiments/Assignment/ Sheet/ Job/ Project Activity	Planned Dates		Actual Date of conduction	Remark/ Assessment Date with Staff sign
				From	To		
1	CO1	LLO 1.1 LLO 1.2	* Determine Freundlich Adsorption Isotherm of Acetic acid on Activated Charcoal.	A-02/07/26	A-09/07/26		
				B-04/07/26	B-11/07/26		
				C-07/07/26	C-14/07/26		
2	CO1	LLO2.1 LLO2.2	Determine Freundlich Adsorption Isotherm of Oxalic acid on Activated Charcoal.	A-09/07/26	A-16/07/26		
				B-11/07/26	B-18/07/26		
				C-14/07/26	C-21/07/26		
3	CO1	LLO 4.1 LLO 4.2	Determine Langmuir Adsorption Isotherm of Acetic acid on Activated charcoal.	A-16/07/26	A-23/07/26		
				B-18/07/26	B-25/07/26		
				C-21/07/26	C-28/07/26		
4	CO1	LLO 4.1 LLO 4.2	*Determine Langmuir Adsorption Isotherm of Oxalic acid on Activated charcoal.	A-23/07/26	A-30/07/26		
				B-25/07/26	B-01/08/26		
				C-28/07/26	C-04/08/26		
5	CO2	LLO 5.1	Prepare Lyophobic Sol of Ferric hydroxide	A-30/07/26	A-06/08/26		
				B-01/08/26	B-08/08/26		
				C-04/08/26	C-11/08/26		

PR. No	Relevant COs	Practical - Laboratory Learning Outcome (LLO)	Name of Experiments/Assignment/ Sheet/ Job/ Project Activity	Planned Dates		Actual Date of conduction	Remark/ Assessment Date with Staff sign
6	CO2	LLO 6.1	*Prepare Lyophilic Sol (Colloids) of Starch.	A-06/08/26	A-13/08/26		
				B-08/08/26	B-22/08/26		
				C-11/08/26	C-18/08/26		
7	CO2	LLO 8.1	*Find the Partition Coefficient (K) .	A-13/08/26	A-20/08/26		
				B-22/08/26	B-29/08/26		
				C-18/08/26	C-25/08/26		
8	CO3	LLO 9.1	*Determine melting point of an organic compound. (p-toluidine, naphthalene, oxalic acid, ?-naphthol, resorcinol, benzoic acid.)	A-20/08/26	A-27/08/26		
				B-29/08/26	B-05/09/26		
				C-25/08/26	C-01/09/26		
9	CO3	LLO 10.1	Determine the boiling point of an organic compound. (acetone, methyl acetate, acetic acid, xylene )	A-27/08/26	A-03/09/26		
				B-05/09/26	B-12/09/26		
				C-01/09/26	C-08/09/26		
10	CO4	LLO 11.1 LLO 11.2 LLO 11.3	*Determine the given Organic Compound by Organic Qualitative Analysis: (Chlorobenzene /Alpha or Beta naphthalene).	A-03/09/26	A-10/09/26		
				B-12/09/26	B-19/09/26		
				C-08/09/26	C-15/09/26		
11	CO4	LLO 14.1 LLO 14.2 LLO 14.3	*Determine the given Organic Compound by Organic Qualitative Analysis: (Methanol/Ethanol)	A-10/09/26	A-17/09/26		
				B-19/09/26	B-26/09/26		
				C-15/09/26	C-22/09/26		
12	CO5	LLO 16.1 LLO16.2 LLO16.3	*Determine the given Organic Compound by Organic Qualitative Analysis: (Benzoic acid/Acetic acid)	A-17/09/26	A-24/09/26		
				B-26/09/26	B-03/10/26		
				C-22/09/26	C-29/09/26		
13	---	---	Practical Beyond Syllabus	A-24/09/26	A-01/10/26		
				B-03/10/26	B-10/10/26		
				C-29/09/26	C-06/10/26		

- **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

- **Laboratory Equipment / Instruments / Tools / Software required**

Sr. No.	Equipment Name with Broad Specifications	Relevant LLO Number
1	Conical Flask (250ml)	1,2,3,4,5,6,7,8
2	Burette (50ml), Pipette (25ml)	1,2,3,4,5,6,7,8
3	Burette Stand	1,2,3,4,5,6,7,8,9,10
4	Water bath	1,2,3,4,9,10
5	Test Tubes	11,12,13,14,15,16
6	Filter Paper	11,12,13,14,15,16
7	Test tube holder	11,12,13,14,15,16
8	Crucible (50 ml)	11,12,13,14,15,16
9	Separating funnel (250ml)	8
10	Thiele Tube (Diameter of tube:25mm, length 150 mm)	9,10
11	Capillary tube	9,10,11
12	Fusion Tube	9,10,11,12,13,14,15,16
13	Melting Point Apparatus: Two Melting Standards 49 degree Celsius and 238 degree Celsius Power Cord	9,10,11,12,13,14,15,16
14	Thermometer (0 to 100 degree Celsius and 0 to 360 degree Celsius)	9,10,11,12,13,14,15,16
15	Beakers(50ml, 100ml and 500 ml)	All
16	Glass Rod	All
17	Glass Bottles (500 ml)	All
18	Weighing Balance (Digital Display, 300 g, Sensitivity. 0.01 g)	All

- **References:**

- **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 & Portal**

<b>Sr. No</b>	<b>Link / Portal</b>	<b>Description</b>
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-">https://youtu.be/sq_qod2UNVI?si=ht4erQ5pBbm2e-</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_NVyXl_kAPHXbz">https://youtu.be/2LywAiZBQW4?si=mo_NVyXl_kAPHXbz</a>	NPTEL video: Phase Rule

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