

ST. XAVIER'S COLLEGE (AUTONOMOUS)

AHMEDABAD

**Chemistry Syllabus
for
Four-Year Undergraduate Programme
as per
National Education Policy (NEP-2020)
(Semester I)**



(EFFECTIVE FROM JUNE 2023)

ST. XAVIER'S COLLEGE (Autonomous), AHMEDABAD
Chemistry
Theory syllabus

PROGRAMME SPECIFIC OUTCOMES

A student completing this program will be able to

PSO1: Knowledge: Apply the principles of analytical, organic, inorganic and physical chemistry to solve basic chemical problems locally and globally

PSO2: Laboratory skills: Employ classical and modern laboratory techniques in the performance and documentation of experiments, suitable for a chemical industry or a chemistry graduate program.

PSO3: Environmental concern: Practice environmentally benign chemistry

PSO4: Employability/future prospects: Develop problem-solving skills and aptitude that are highly valuable to employers and entrepreneurship skills for self-employment

PSO5: Scientific communication: Have effective written and oral scientific communication skills, especially the ability to transmit complex technical information in a clear and concise

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Syllabus of Semester – I of the following department under Faculty of Science based on Under Graduate Curriculum Framework - 2023 to be implemented from the Academic Year 2024-25.

FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

Course	Title	Content	Hours/week	Credit
DSC-1 (Theory)				
DSC-1 (Lab)				
Minor-1 (Theory)	GENERAL ASPECTS OF INDUSTRIAL CHEMISTRY	UNIT-1 Unit Operation -1 UNIT-2 Industrial Aspects of Organic and Inorganic chemistry	2 hrs	2
Minor-1 (Lab)	GENERAL ASPECTS OF INDUSTRIAL CHEMISTRY	Practical's based as per Theory Syllabus	4 hrs	2
SEC				
MDC (Theory)				
AEC	English	(To be offered by the concerned subject Department)		
VAC		(To be offered by the concerned subject Department)		

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FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

BSc. (Hons.) Chemistry
Category – IV

Minor Course – 1: GENERAL ASPECTS OF INDUSTRIAL CHEMISTRY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

For Industrial Chemistry Students

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Perquisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
IC 1101: General Aspects of Industrial Chemistry	2 (30 hr)	0	0	10 + 2 from a recognized board in any stream	Nil

LEARNING OUTCOME(LO)

On completion of this course, the student will be able-

- LO 1.** – To learn about different Unit Operations and Renewable sources.
- LO 2.**- To learn about basic calculation of compounds, chemical reaction and some application.

COURSE OUTCOME(CO)

CO-1: Basic knowledge of chemistry is important for higher study in the subject.

CO-2: The students could pursue a career in chemistry, Industrial chemistry and Post-graduation in the field of Chemistry.

CO-3: Various aspects of organic, inorganic and physical chemistry can help for the research Specialization at higher study.

II. Course Content

UNIT-1 Unit Operation -1

[Prerequisites or topics for Self Study: Get information about unit operation and separation technique]

[A] Distillation and Absorption: Introduction, Batch and Continuous distillation, separation of Azeotropes, plate column and packed columns, Introduction, equipment, packed columns, spray columns, bubble columns, mechanically agitated contactors.

[B] Heat Transfer and Fluid Flow:-

Heat Exchanger and Extraction: Introduction, Shell and Tube type heat exchanger, Refrigeration cycle, finned tube heat exchangers, plate heat exchanger, Spray and Jet extraction Tower, Ejectors

UNIT-2 Industrial Aspects of Organic and Inorganic chemistry

[Prerequisites or topics for Self Study: Get information about basic chemicals and techniques]

[A] Nomenclature of basic chemicals and Renewable Natural resources: : Generic names, Trade names of some basic chemicals, Carbohydrates from Food- Manufacturing Process, Properties, Modification, Uses of Cellulose and Starch

[B] Fuel Chemistry:

1. **Fuel:** Types of Fuel, Advantages and Disadvantages of Fuel, Combustion of fuels, Calorific value
2. **Petroleum:** Composition of Crude Petroleum, Natural gas, Fractionation of crude oil, cracking, reforming, hydro forming and Isomerization.

[C] Material Balance calculations: Introduction to Material balance with and without chemical reactions: Limiting Reactant, Conversion yield, recycling or bypass operation.

III. Teaching methodologies: Apart from the conventional black board teaching, other modes of teaching that will be adopted are power points, problem solving, and group discussion. Assignments will be designed such that students inculcate the habit of reading reference books and science journals. The use of smart boards for teaching will also be promoted to enable more interaction based teaching.

IV. Reference books: IC - : General Aspects of Industry (Theory)

- (1) "Chemical Engineering" by J. M. Coulson and J. F. Richardson, 4th Edition/5th Edition
- (2) "Introduction to Chemical Engineering" by Walter L. Badger and Julius T. Bancherd, McGraw – Hill Publications.
- (3) "Industrial Chemistry" by B. K. Sharma, GOEG Publishing House, Meerut.
- (4) "Chemical Calculations" by G. D. Tulsi and P. L. Soni.
- (5) "Organic Chemistry" by Morrison and Boyd, 6th Edition, Prentice – Hall of India Pvt. Ltd.

Pedagogy:

1. Lecture method with teaching aids.
2. Audio-Visual Teaching mode with Projector Method.
3. Dialogue and context-based class.
4. Assignments, Learning seminar, Class Test

MODE OF EVALUATION:

Evaluation will be divided in two parts.

ASSESSMENT	MARKS
INTERNAL	
Attendance	05
Assignment	05
Continuous Internal Assessment I and II	15
TOTAL	25 marks
EXTERNAL	
End Semester Exam	25 marks

Students will prepare and present (in pairs) a Submission related to the topic of Assignment on allotted areas. These Submission will be ~~given~~ in form of PPT/ Hand written notes etc. Points for evaluation: Presentation (20%) + Content (20%) + explanation (20%) + Creativity (20%) + Overall impression (20%).

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Syllabus of Semester –II of the following departments under Faculty of Science based on Under Graduate Curriculum Framework - 2023 to be implemented from the Academic Year 2023-24.

FACULTY OF SCIENCE

BSC. (HONS.) CHEMISTRY INDUSTRIAL CHEMISTRY (MINOR)

SEMESTER - II

Minor Course – 1: General Aspects of Industrial Chemistry

For Industrial Chemistry Students

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Perquisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
IC – 2101: Selected Topics in Industrial Chemistry	0	0	2 (60 hr)	10 + 2 from a recognized board in any stream	Nil

Learning Out Comes:-

LO-1: Students will learn the titration method to measure the temporary and permeant hardness of water samples and learn about crystallization.

LO-2: Students will understand about characteristic of carbohydrates and know about their application in food stuff.

Course Outcomes:

CO1: To understand the general properties of water and get knowledge about the hardness, TDS and acidity.

CO2: Get knowledge from the unit operation techniques like distillation, crystallization estimation and decoloration.

1. Determination of Normality of NaOH using standard solution of HCl
2. Purification of compounds by recrystallization and Calibration of thermometer.
3. To determine the amount of TDS in water sample.
4. Determination of Total, Permanent and temporary Hardness of water using EDTA.
5. Decolourisation and crystallization of impure naphthalene using charcoal.
6. To study the characteristic of carbohydrates in pure form and detection of their presence in the given food stuffs.
7. Study of simple reactions of fats, proteins and carbohydrates and detection of their presence in given foodstuffs.
8. Preparation of petroleum jelly.
9. Purification by distillation.
10. Estimation of Calcium in Chalk.
11. To determine the strength of copper sulphate solution iodometrically
12. To determine the strength of HCL by pH meter.

Reference Books: Industrial Chemistry (practical)

- (1) "Quantitative Chemical Analysis" by Daniel C. Harris, 7th Ed.
- (2) "General Chemistry: A Lab Manual" by Slowinski Wolsey.