

# GUJARAT TECHNOLOGICAL UNIVERSITY

## COURSE NAME : ORGANIC-CHEMISTRY

### 1. RATIONALE :

This subject provides the basic knowledge of organic compounds and organic chemistry. This subject gives clarity to the students regarding the knowledge of aromatic, aliphatic and heterocyclic compounds with their structural formulas in detail. This subject is of tremendous use in Textile as well as chemical Industries. For the study of " Chemistry of dye stuff & Intermediates" it is a essential subject.

### 2. SCHEME OF TEACHING

Topic No.	Name of Topic	No. of Hours		
		Lect.	Pract.	Total
1.	Basic concepts of Organic chemistry	05	--	05
2.	Purification of organic compounds	05	04	09
3.	Detection and estimation of elements	05	06	11
4.	Study of saturated & unsaturated hydrocarbon	04	--	04
5.	Study of aliphatic compound	07	06	13
6.	Study of aromatic compounds	07	06	13
7.	Carbohydrates	05	--	05
8.	Brief study of unit processes	04	06	10
<b>Total</b>		<b>42</b>	<b>28</b>	<b>70</b>

### 3. TECHNOLOGY RELATED SKILLS AND ENABLING OBJECTIVES (TRS & EOs):

**TRS:1 Understand the basic concept of organic chemistry: (Topic 1)**

EOs

1.1 Know the classification of organic compounds.

1.2 understand the functional groups of organic compounds.

1.3 Understand the nomenclature of organic compounds.

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## **TRS:2 Explain saturated and unsaturated hydrocarbons: (Topic 2)**

EOs

- 2.1 Understand preparation, properties and uses of saturated hydro carbons.
- 2.2 Understand preparation, properties and uses of unsaturated hydrocarbons.

## **TRS:3 Prepare aliphatic compounds: (Topic 3)**

EOs

- 3.1 Differentiate aliphatic and aromatic compounds.
- 3.2 Describe various aliphatic compounds.

## **TRS:4 Prepare aromatic compounds: (Topic 4)**

EOs

- 4.1 Know the specific properties of aromatic compound.
- 4.2 Describe various aromatic compound.

## **TRS:5 Understand the various carbohydrates: (Topic 5)**

EOs

- 5.1 Classify the carbohydrates.
- 5.2 Explain various carbohydrates.

## **TRS:6 Know the different unit processes: (Topic 6)**

EOs

- 6.1 Classify the unit processes.
- 6.2 Define various unit processes.
- 6.3 Enlist suitable agents used for each unit process.

## **4. COMMUNICATION SKILLS:**

1. Explain salient features of Organic compounds.
2. Counsel people in work situation.
3. Convince persons about the products.
4. Take down lecture notes.
5. Write an assignment. (Classroom, Library, home)

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6. Organize & co-ordinate group discussion.

## 5. TOPICS AND SUBTOPICS:

### TOPIC - 1 BASIC CONCEPT OF ORGANIC CHEMISTRY:

- 1.1 Introduction
- 1.2 Classification of organic compounds.
- 1.3 Differentiate organic & inorganic compounds.
- 1.4 functional group & homologous series.
- 1.5 IUPAC system of nomenclature.
- 1.6 Isomerism.
  - 1.6.1 Structural Isomerism
    - Position Isomerism
    - Chain Isomerism
    - Mesomerism Isomerism
    - Functional Isomerism
  - 1.6.2 Geometrical Isomerism

### TOPIC -2 PURIFICATION OF ORGANIC COMPOUNDS

3 hrs.

- 2.1 Crystallization
- 2.2 Fractional crystallization
- 2.3 Sublimation
- 2.4 Distillation
  - 2.4.1 Simple distillation
  - 2.4.2 Fractional distillation
  - 2.4.3 Distillation under reduced pressure
  - 2.4.4 Steam distillation
- 2.5 Tests of purification

### TOPIC - 3 DETECTION AND ESTIMATION OF ELEMENTS

5 hrs.

- 3.1 Detection of C,H,N, halogens, S & P
- 3.2 Estimation of C & H
- 3.3 Estimation of Nitrogen by Duma's method and Kjeldahl's method
- 3.4 Estimation of halogens, sulphur and phosphorous by Cariu's method
- 3.5 Problems based on methods of estimation

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## **TOPIC - 4 STUDY OF SATURATED & UNSATURATED HYDROCARBON:**

- 4.1 Definition of saturated & unsaturated hydrocarbon.
- 4.2 Preparation, properties & uses of the following compounds.
  - Alkanes.
  - Alkenes.
  - Alkynes.

## **TOPIC - 5 STUDY OF ALIPHATIC COMPOUNDS: (Preparation, Properties & Uses.)**

- 5.1 Formaldehyde & Acetaldehyde.
- 5.2 Acetone & Ethanol.
- 5.3 Acetic Acid & Oxalic Acid.
- 5.4 Ethyl Acetate & Diethylether.
- 5.5 Ethyl Amine, Acetylene

## **TOPIC - 6 STUDY OF AROMATIC COMPOUNDS: ( Preparation, Properties & Uses of the following Aromatic compounds.)**

- 6.1 Benzene, Toluene & Xylene.
- 6.2 Nitrobenzene & Aniline.
- 6.3 Phenol & Benzaldehyde
- 6.4 Benzoic Acid & Salicylic Acid.

## **TOPIC - 7 CARBOHYDRATES:**

- 7.1 Classification of carbohydrates.
- 7.2 Preparation, Properties and Uses of the following carbohydrates:
  - a) Glucose
  - b) Starch
  - c) Cellulose

## **TOPIC - 8 BRIEF STUDY OF VARIOUS UNIT PROCESSES:**

- 8.1 Study of the following unit processes:
  - a) Sulphonation
  - b) Nitration
  - c) Amination
  - d) Halogenation

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e) Diazotization

8.2 Reagents used for above unit processes.

## 6. LABORATORY EXPERIENCES:

1. Practical are to be performed based on the organic spotting of the following compounds.

- i) Acetic Acid & Benzoic Acid
- ii) Aniline & Nitrobenzene
- iii) Benzene & Acetone
- iv) Chloroform & Phenol
- v) Ether & Ester
- vi) Glucose & Glycerine
- vii) Ethyl alcohol

2. Purification of a given organic compound by crystallisation

3. Purification of a given organic compound by Distillation

4. Preparation of some compounds such as

- i) Nitrobenzene from Benzene
- ii) Acetamide from Aniline

## 7. REFERENCES :

Sr.No.	Name of books	Authors
1.	A Textbook of organic chemistry	P.L.Soni
2.	A Textbook of organic chemistry	Bahl & Tuly
3.	A Textbook of organic chemistry	O.P.Agrawal
4.	A Textbook of organic chemistry	B.S. Bahl & Arun Bahl

## 8. SUPPORT FACULTY :

### POLYTECHNIC :

1. Prof. R.D.Patel Lecturer in Chem. R.C.T.I. Ahmedabad
2. „ R.G. Patel Lecturer in Textile Processing R.C.T.I. Ahmedabad

### G.T.U. OFFICER:

1. Shri.U. Y. Nanavati
2. Shri T.A. Raval