

Subject Code:01CH1306

Subject Name: Engineering Chemistry-II

B.Tech. Year: 2 (Semester III)

Objective: To learn various reaction mechanisms, preparation and properties of organic compounds that will be a precursor for the study on Chemical Reaction Engineering.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to:

1. Understand the basic chemistry of organic compound.
2. Compare the physical and chemical properties of various organic compound and their derivatives.
3. Learn the laboratory scale preparation method of various organic compound and their derivatives.
4. Apply the various concepts in processing of chemical industries viz., food, oils, fats, waxes and dyes.

Pre-requisite of course: None

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (I)	CSE (C)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1.	Basic introduction to organic chemistry: Reactive intermediates– carbocations, carbanions, carbon radicals, carbenes; their generation. Structure activity relationship in organic molecules: Use of bond length and bond energies to explain the reactivity of functional groups. Acidity & basicity values for organic molecules such as alkynes, alcohols, acids, ketones, amines	9
2.	Introduction, Preparation and Properties of Aliphatic compound: Aliphatic compounds; Alkane, Alkene, Alkyne, Aliphatic alcohol, Aliphatic halides, Aliphatic carboxylic acid and its derivatives.	10
3.	Introduction, Preparation and Properties of Aromatic compound: Aromatic hydrocarbons, Aromatic halogen compounds, Phenol, Nitro and amino aromatic compound, Heteroaromatic compounds	10



4.	Oils, Fats, Waxes and Dyes Introduction to Lipids Fatty Acids, Saturated and Unsaturated Fatty Acids, Cis and Trans Unsaturated Fatty Acids Waxes: Introduction Extraction of Oils, Fats and Waxes Physical and Chemical Reactions of Oils, Fats and Waxes Analysis of Oils, Fats and Waxes Uses of Oils, Fats and Waxes Dyes: Color Sensation Color and Chemical Constitution: Chromophore-Auxochrome Theory, Nomenclature, Classification and Synthesis of Dyes	9
	Total Hours	38

List of Experiments:

1. Qualitative analysis of Primary and secondary alcohol.
2. Qualitative analysis of carboxylic acid group.
3. Qualitative analysis of halides.
4. Determination of unsaturated aliphatic hydrocarbon.
5. Determination of aldehydes and ketones.
6. Qualitative analysis of phenol.
7. Analysis of oils.
8. Analysis of fats.
9. Preparation of any dye.
10. Separation of volatile liquid components by distillation.
11. Separation of two immiscible liquid by separating funnel.
12. Determination of sulfur content in organic compound.
13. Determination of nitrogen content in organic compound.
14. Determination of distribution coefficient of benzoic acid between water and toluene.

References:

1. "A textbook of organic chemistry", Tewari, K. S., & Vishnoi, N. K, Vikas Publishing House, 1976.
2. "Textbook of organic chemistry", Soni, P. L., Sultan Chand, 1983.
3. "Organic Chemistry", McMurry, J. E., & Learning, C., Hybrid Edition. Brooks/Cole, 2012.
4. "Practical organic chemistry", Vogel, A. I., Longmans, 2, 1956.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective



teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
25%	25%	20%	20%	10%	-

Instructional Method:

- The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Design Based Problems (DP)/ Open Ended project (OEP) :

In the beginning of the session, subject faculty will allot an OEP / DP to the students. Students will be free to choose a topic of their choice which will be relevant to the syllabus and they will either prepare a working model/ report / presentation / poster on their topic.

Web Resources:

- <https://nptel.ac.in/courses/104106119>
- <https://nptel.ac.in/courses/104103071>