

LESSON PLAN (CONSOLIDATED)
SUBJECT: CHEMISTRY
GRADE: XI

Chapter Number and Title of Chapter	12 ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES
No. of Periods	Total: 14 periods (approx. 40 min each)
Learning Objectives	The learners will be able to • Describe reasons for tetravalency of carbon and shapes of organic molecules; • Construct structures of organic molecules in various ways; • Categorize the organic compounds with reference to various functional groups and name them, according to IUPAC system of nomenclature and also, illustrate the structures from given names; • Comprehend the concept of organic reaction mechanism; • Analyze the influence of electronic displacements on structure and reactivity of compounds; • Identify various techniques used for purification of organic compounds; • Compose the chemical reactions involved in the qualitative analysis of organic compounds and summarize the principles involved in their analysis.
Teaching Aids / Resources	• Videos (Teaching and Explanation) • Scientific Apparatus • Interactive whiteboards • PPT • Demonstration • Concept Map • Additional Resources URL (Web links)
Previous Knowledge/ Curiosity Questions	• Even though carbon has two unpaired electrons, still it is tetravalent in nature. Why? • Why carbon interacts with other elements like oxygen? • What is Catenation? • IUPAC Name of $\text{CH}_3\text{-CH}_2\text{-CH}_3$ is -----. • What is Benzene? • What do you mean by an isomer? • How can you separate alcohol and water? • We know that leaf has a lot of pigments; can you suggest any way to separate them?
Announcement of the topic	On finding the students unable to answer the last question, The teacher would announce that today we will begin with the chapter- Organic Chemistry – Some Basic Principles and Techniques , in which we will encounter various methodologies and techniques to deal with organic compounds.

Teaching Methodology/ Strategy	Transaction would proceed in the following manner- Suggestive Methodologies: Brain Storming / Curiosity Questioning • What is organic chemistry? • Even though carbon has two unpaired electrons, still it is tetravalent in nature. Why? • How can you separate alcohol and water? • We know that leaf has a lot of pigments; can you suggest any way to separate them? Active learning- Content Based Experiments like Crystallization, Sublimation, Simple Distillation etc.; PPT; Simulations and Videos; Scientific apparatus; Field trips; Demonstration; Enquiring and Researching; Concept Mapping; Charts; Assignments; Mind Maps. Group learning- Group Discussions; Think- Pair- Share; Peer conferencing; Presentations; Hands on Training; Simulations; Interaction with Collaboration. Questioning- Content Based Questions after each topic; Practical Based Question; Apparatus Handling Techniques. Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom.
Content Obligatory Vocabulary (Keywords)	Sigma and pi bond; Complete, Hybridisation; Condensed and Bond-line Structural Formulas; Wedge-and-dash representation; Acyclic and Alicyclic Compounds; Benzenoid and Non- Benzenoid Compounds; IUPAC Naming; Isomerism; Homolytic and Heterolytic Fission; Nucleophile and Electrophiles; Carbocation; Carbanion and Free Radicals; Inductive Effect; Resonance; Electromeric Effects; Hyperconjugation; Purification Methods; Qualitative Analysis; Quantitative Analysis- Dumas Method, Kjeldahl Method, Carius Method
Learning Concepts/ Teaching Points	• Proper explanation of the content with examples and practice questions. • Clarity of Concept from experiments conducted. • Knowledge of Scientific Apparatus and their handling. • Content related Activities.
Hard Spots/ Focus Spots	<u>TOPIC- QUANTITATIVE ANALYSIS</u> Challenge: Although, the students are able to understand the Qualitative Analysis really well but find the difficulty in Understanding the Quantitative Analysis specifically for Nitrogen involving Dumas's Method and Kjeldahl's Method since, very less explanation has been provided in the textbook. Also, the apparatus involved In Kjeldahl's Method is quite cumbersome and thus cannot be demonstrated in laboratory.

Experiential Content	• Demonstrations on Scientific Apparatus; • Laboratory Demonstrations involving experiments such as- (1) Crystallization involving impure sample of Blue Vitriol (CuSO_4) (2) Qualitative Analysis- Preparation of Lassaigne's Extract • Content based Videos and Simulations; • Worksheets
Subject Enrichment Activities for Internal Assessment	• Presentations by Students • Assignments • Evaluation of Hands on Experience on Scientific Apparatus • Identification of Parts of Apparatus • Qualitative Analysis • Oral Question- Answer session.
Recapitulation :	In this chapter, we have learnt some basic concepts of organic compounds, which are formed due to covalent bonding. The nature of the covalent bonding in organic compounds can be described in terms of Hybridisation. Organic compounds can be represented by various structural formulas. The three dimensional representation of organic compounds on paper can be drawn by wedge and dash formula. Organic compounds can be classified on the basis of their structure or the functional groups they contain.. The naming of the organic compounds is carried out by following a set of rules laid down by the International Union of Pure and Applied Chemistry (IUPAC). A covalent bond may be cleaved in Heterolytic or Homolytic fashion. The inductive, resonance, electromeric and hyperconjugation effects may help in the polarization of a bond making certain carbon atom or other atom positions as places of low or high electron densities. Organic reactions can be broadly classified into following types; substitution, addition, elimination and rearrangement reactions. Purification, qualitative and quantitative analysis of organic compounds are carried out for determining their structures.
Assignment:	• MCQ type- questions • VSA type- questions • Long answer type- questions • NCERT questions • NCERT Exemplar questions Upon completion of the chapter, the students will be able to answer the following questions- 1. State the hybridization of each carbon in Ethanal. 2. Write the condensed formula and Bond- line formula for- $\text{OHCH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ 3. Give an example each for Benzenoid and Non- Benzenoid Compounds. 4. Derive the structure for the following compounds- (i) Hex-3-enal (ii) 6-Chloroheptanal (iii) 4-Hydroxypentanoic acid (iv) 2- Fluoro- 4-methylanisole 5. Discuss the stability of 1°, 2° and 3° carbocation on the basis of hyperconjugation. 6. Differentiate between Resonance Effect and Inductive effect. 7. Which of the two: $\text{O}_2\text{NCH}_2\text{CH}_2\text{O}^-$ or $\text{CH}_3\text{CH}_2\text{O}^-$ is expected to be more stable and why?

	8. Discuss the chemistry of Lassaigne's test. 9. Discuss the principles of the following purification techniques. (i) Crystallization (ii) Distillation (iii) Chromatography Homework: The students will solve NCERT back exercise and questions from the question bank with the help of their teacher in their notebooks.
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LESSON PLAN (PERIOD -WISE)
SUBJECT: CHEMISTRY
GRADE: XI

PERIOD- 1

Chapter Number and Title of Chapter	12 ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES
Topic	METHODS OF PURIFICATION OF ORGANIC COMPOUNDS (12.8)
Period Number	1 (approx. 40 min each)
Learning Objectives	The learners will be able to • Explore the techniques of purification of organic compounds such as Sublimation and Crystallization. • Comprehend the basic underlying principles of the above mentioned techniques. • Analyze differences between various purification methods and their applications.
Teaching Aids / Resources	• Videos (Teaching and Explanation) • PPT • Concept Map • Additional Resources URL (Web links) • Scientific Apparatus • Interactive whiteboards • Demonstrations
Previous Knowledge/ Curiosity Questions	• What is the color of Copper Sulphate crystals? • Identify the shown apparatus. Eg- Beaker, Tripod Stand, Glass Rod, Spatula etc. • What is Sublimation? • Give an example from daily life, of a substance which can sublime. • What is Crystallization?
Announcement of topic	On finding the students unable to answer any of the above mentioned questions, the teacher will announce that Students, today we will learn some basic techniques used for purification in Organic Chemistry- Sublimation and Crystallization.

Teaching Methodology/ Strategy	Transaction would proceed in the following manner- Suggestive Methodologies: Brain Storming / Curiosity Questioning • What is the color of Copper Sulphate crystals? • Identify the shown apparatus. Eg- Beaker, Tripod Stand, Glass Rod, Spatula etc. • What is Sublimation? • Give an example from daily life, of a substance which can sublime. Active learning- Content Based Experiments like Crystallization, Sublimation; PPT; Simulations and Videos; Scientific apparatus; Enquiring and Researching; Concept Mapping; Charts; Assignments; Mind Maps. Group learning- - Group Discussions; Think- Pair- Share; Peer conferencing; Presentations; Hands on Training; Simulations; Interaction with Collaboration. Questioning- Content Based Questions after each topic; Practical Based Question; Apparatus Handling Techniques. Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom.
Content Obligatory Vocabulary (Keywords)	Sublimation and Crystallization, Crystallization point.
Learning Concepts/ Teaching Points	• Proper explanation of the content with examples and practice questions. • Clarity of Concept from experiments conducted. • Knowledge of Scientific Apparatus and their handling. • Content related Activities.
Hard Spots/ Focus Spots	Students might find difficulty in analyzing and identifying the crystallization point.
Experiential Content	Experiment- Crystallization of pure copper sulphate from an impure sample of blue vitriol.
Subject Enrichment Activities for Internal Assessment	• Presentations by Students • Assignments • Evaluation of Hands on Experience on Scientific Apparatus • Identification of Parts of Apparatus
Recapitulation :	The principles and examples related to Sublimation and Crystallization will be recapitulated.
Assignment:	• MCQ type- questions • VSA type- questions • Long answer type- questions • NCERT questions Upon the completion of this topic, the students will be able to answer the following questions -

	1. Discuss the underlying principle of Recrystallisation. 2. What type of solvent should be chosen during the recrystallisation of an organic compound? 3. Benzoic acid is an organic compound and can be purified when crystallized from hot water. What are the characteristic differences in properties of benzoic acid and impurities for such a solution? 4. What is the principle of sublimation method?
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PERIOD- 2

Chapter Number and Title of Chapter	12 ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES
Topic	METHODS OF PURIFICATION OF ORGANIC COMPOUNDS (12.8)
Period Number	2 (approx. 40 min each)
Learning Objectives	The learners will be able to • Explore the techniques of purification of organic compounds such as Simple Distillation, Fractional Distillation, Steam Distillation and Distillation under reduced pressure. • Comprehend the basic underlying principles of the above mentioned techniques. • Analyze differences between various purification methods and their applications.
Teaching Aids / Resources	• Videos (Teaching and Explanation) • PPT • Concept Map • Additional Resources URL (Web links) • Scientific Apparatus • Interactive whiteboards • Demonstrations
Previous Knowledge/ Curiosity Questions	• Can you separate two miscible liquids? • What is Simple Distillation? • Can you guess the meaning of Fractional Distillation? • What is the use of a condenser? • If two liquids A and B having different boiling points are boiled, which liquid will evaporate first?
Announcement of topic	On finding the students unable to answer any of the above mentioned questions, the teacher will announce that Students, today we will learn some other basic techniques used for purification in Organic Chemistry- Simple Distillation, Fractional Distillation, Steam Distillation and Distillation under reduced pressure.
Teaching Methodology/ Strategy	Transaction would proceed in the following manner- Suggestive Methodologies: Brain Storming / Curiosity Questioning • Can you separate two miscible liquids? • What is Simple Distillation? • Can you guess the meaning of Fractional Distillation? • What is the use of a condenser?

	Active learning- Content Based Experiments like Extraction; PPT; Simulations and Videos; Scientific apparatus; Enquiring and Researching; Concept Mapping; Charts; Assignments; Mind Maps. Group learning- - Group Discussions; Think- Pair- Share; Peer conferencing; Presentations; Simulations; Interaction with Collaboration. Questioning- Content Based Questions after each topic; Practical Based Question; Apparatus Handling Techniques. Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom.
Content Obligatory Vocabulary (Keywords)	Simple Distillation, Fractional Distillation, Steam Distillation and Distillation under reduced pressure.
Learning Concepts/ Teaching Points	• Proper explanation of the content with examples and practice questions. • Clarity of Concept from experiments conducted. • Knowledge of Scientific Apparatus and their handling. • Content related Activities.
Hard Spots/ Focus Spots	Students find difficulty in recapitulating the apparatus of Fractional Distillation, Steam Distillation, and Distillation under reduced pressure as they have many components in their apparatus and they also get confused in correlating these processes and their applications in day to day life, as the basic principle of these techniques remains same with minor variations.
Experiential Content	Experiment- Demonstration of Simple Distillation method.
Subject Enrichment Activities for Internal Assessment	• Presentations by Students • Assignments • Evaluation of Hands on Experience on Scientific Apparatus • Identification of Parts of Apparatus.
Recapitulation :	The principles and examples related to Simple Distillation, Fractional Distillation, Steam Distillation and Distillation under reduced pressure will be recapitulated.
Assignment:	• MCQ type- questions • VSA type- questions • Long answer type- questions • NCERT questions Upon the completion of this topic, the students will be able to answer the following questions - 1. Discuss the principle of Distillation. 2. Two liquids (A) and (B) can be separated by the method of fractional distillation. The boiling point of liquid (A) is less than boiling point of liquid (B). Which of the liquids do you expect to come out first in the distillate?

	3. What is the difference between Simple Distillation and Fractional Distillation? 4. You have a mixture of three liquids A, B and C. There is a large difference in the boiling points of A and rest of the two liquids i.e., B and C. Boiling point of liquids B and C are quite close. Liquid A boils at a higher temperature than B and C and boiling point of B is lower than C. How will you separate the components of the mixture?
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PERIOD- 3

Chapter Number and Title of Chapter	12 ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES
Topic	METHODS OF PURIFICATION OF ORGANIC COMPOUNDS (12.8)
Period Number	3 (approx. 40 min each)
Learning Objectives	The learners will be able to - Describe the techniques of purification of organic compounds such as Differential Extraction, Column Chromatography and Thin Layer Chromatography. - Comprehend the basic underlying principles of the above mentioned techniques. - Analyze differences between various purification methods and their applications.
Teaching Aids / Resources	- Videos (Teaching and Explanation) - PPT - Concept Map - Additional Resources URL (Web links) - Scientific Apparatus - Interactive whiteboards - Demonstrations
Previous Knowledge/ Curiosity Questions	- What do you understand by the word Extraction? - What do you understand by the word ‘Chroma’? - We know that leaf has a lot of pigments; can you suggest any way to separate them? - What do you mean by Adsorption? - Have you ever heard about silica gel in your daily life? Where is it used?
Announcement of topic	On finding the students unable to answer any of the above mentioned questions, the teacher will announce that Students, today we will learn some other basic techniques used for purification in Organic Chemistry- Differential Extraction, Chromatography and its Various types.
Teaching Methodology/ Strategy	Transaction would proceed in the following manner- Suggestive Methodologies: Brain Storming / Curiosity Questioning - What do you understand by the word ‘Chroma’? - We know that leaf has a lot of pigments; can you suggest any way to separate them? - What do you understand by the word Extraction? - Have you ever heard about silica gel in your daily life? Where is it

	used? • What do you mean by Adsorption? Active learning- Content Based Experiments like Thin Layer Chromatography and Column Chromatography; PPT; Simulations and Videos; Scientific apparatus; Enquiring and Researching; Concept Mapping; Charts; Assignments; Mind Maps. Group learning- - Group Discussions; Think- Pair- Share; Peer conferencing; Presentations; Simulations; Interaction with Collaboration. Questioning- Content Based Questions after each topic; Practical Based Question; Apparatus Handling Techniques. Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom.
Content Obligatory Vocabulary (Keywords)	Differential Adsorption, Adsorption Chromatography, Column Chromatography and Thin Layer Chromatography.
Learning Concepts/ Teaching Points	• Proper explanation of the content with examples and practice questions. • Clarity of Concept from experiments conducted. • Knowledge of Scientific Apparatus and their handling. • Content related Activities.
Hard Spots/ Focus Spots	Students find difficulty in understanding the principle of differential adsorption.
Experiential Content	Experiment- Demonstration of Thin Layer Chromatography And Column Chromatography.
Subject Enrichment Activities for Internal Assessment	• Presentations by Students • Assignments • Evaluation of Hands on Experience on Scientific Apparatus • Identification of Parts of Apparatus
Recapitulation :	The principles of Chromatography and Differential Extraction will be recapitulated.

Assignment:	• MCQ type- questions • VSA type- questions • Long answer type- questions • NCERT questions Upon the completion of this topic, the students will be able to answer the following questions - 1. Differentiate between Thin Layer Chromatography and Column Chromatography. 2. In Column Chromatography, what is the stationary phase and what is mobile phase? 3. Discuss the principle of Chromatography. 4. What is Retardation Factor? 5. How can the spots of colorless compound be seen on TLC plate? 6. Explain the process of Differential Extraction.
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PERIOD- 4

Chapter Number and Title of Chapter	12 ORGANIC CHEMISTRY- SOME BASIC PRINCIPLES AND TECHNIQUES
Topic	METHODS OF PURIFICATION OF ORGANIC COMPOUNDS (12.8)
Period Number	4 (approx. 40 min each)
Learning Objectives	The learners will be able to • Explore the techniques of purification of organic compounds such as Partition Chromatography- Paper Chromatography. • Comprehend the basic underlying principles of the above mentioned technique. • Analyze differences between various purification methods and their applications.
Teaching Aids / Resources	• Videos (Teaching and Explanation) • PPT • Concept Map • Additional Resources URL (Web links) • Scientific Apparatus • Interactive whiteboards • Demonstrations
Previous Knowledge/ Curiosity Questions	• What do you understand by the word ‘Chroma’? • What is Adsorption Chromatography? • What is the principle of Chromatography? • Name the two types of Adsorption Chromatography. • What do you understand by the term ‘Partition’?

Announcement of topic	On finding the students unable to answer any of the above mentioned questions, the teacher will announce that Students, today we will learn some other basic techniques used for purification in Organic Chemistry- Chromatography and its Various types.
Teaching Methodology/ Strategy	Transaction would proceed in the following manner- Suggestive Methodologies: Brain Storming / Curiosity Questioning • What do you understand by the word ‘Chroma’? • We know that leaf has a lot of pigments; can you suggest any way to separate them? • What is Adsorption Chromatography? • What is the principle of Chromatography? • What do you understand by the term ‘Partition’? Active learning- PPT; Simulations and Videos; Scientific apparatus; Enquiring and Researching; Concept Mapping; Charts; Assignments; Mind Maps. Group learning- - Group Discussions; Think- Pair- Share; Peer conferencing; Presentations; Simulations; Interaction with Collaboration. Questioning- Content Based Questions after each topic; Practical Based Question; Apparatus Handling Techniques. Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom.
Content Obligatory Vocabulary (Keywords)	Differential Adsorption, Partition Chromatography, Paper Chromatography.
Learning Concepts/ Teaching Points	• Proper explanation of the content with examples and practice questions. • Clarity of Concept from experiments conducted. • Knowledge of Scientific Apparatus and their handling. • Content related Activities.
Hard Spots/ Focus Spots	Students find difficulty in understanding the principle of differential adsorption and partition chromatography. Students also get confused between the principles related to Thin Layer Chromatography and Paper Chromatography and often use these terms, inter-convertibly.
Experiential Content	Explanatory Videos and Recapitulation techniques.
Subject Enrichment Activities for Internal Assessment	• Presentations by Students • Assignments • Evaluation of Hands on Experience on Scientific Apparatus • Identification of Parts of Apparatus

Recapitulation :	The principles of Chromatography and important questions related to the whole topic will be recapitulated.
Assignment:	• MCQ type- questions • VSA type- questions • Long answer type- questions • NCERT questions Upon the completion of this topic, the students will be able to answer the following questions - 1. Differentiate between Thin Layer Chromatography and Paper Chromatography. 2. What is the stationary phase and mobile phase in Paper Chromatography?