



Lab of Organic Chemistry 1st stage

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Lecture 1

"Qualitative Analysis of Organic Compounds"

Department of Life Sciences

Qualitative Analysis of Organic Compounds

Introduction

Qualitative analysis in organic chemistry is a fundamental laboratory technique used to identify the chemical nature of unknown compounds. The method depends on systematic chemical tests that reveal the presence of certain elements, such as nitrogen, sulfur, and halogens, and functional groups, like carboxylic acids, aldehydes, ketones, alcohols, and amines

Objectives of the Experiment

.To detect the elements present in the organic compound (N, S, X)

.To identify the type of functional group in the compound

To distinguish between aliphatic and aromatic compounds using the .combustion test

To train students to record and analyze results in a systematic .scientific manner

Materials and Apparatus

Unknown organic compound sample

Metallic sodium

Distilled water

Test tubes and test tube holder

Bunsen burner

Ferrous sulfate (FeSO_4)

Tollens' reagent

Lucas reagent

Procedure

1- Combustion Test

A small amount of the sample is placed in a combustion spoon and exposed directly to the flame of a Bunsen burner. The nature of the flame is observed

A blue, non-sooty flame indicates an aliphatic compound

A yellow, sooty flame indicates an aromatic compound due to a higher carbon content

2- Detection of Sulfur

A portion of the extract is treated with lead acetate solution

:Observation

Formation of a black precipitate indicates the presence of sulfur

3- Detection of Halogens

The extract is acidified with dilute nitric acid, then silver nitrate solution is added

:Possible observations

White precipitate → Chlorine

Cream precipitate → Bromine

Yellow precipitate → Iodine

4- Detection of Functional Groups

Test for Carboxylic Acids

Sodium carbonate is added to the sample

Effervescence due to CO₂ gas indicates the presence of the –COOH group

2- Test for Aldehydes (Tollens' Test)

Tollens' reagent is added followed by gentle heating

Formation of a silver mirror indicates the presence of an aldehyd

3-Test for Alcohols (Lucas Test)

Lucas reagent is added and the time required for turbidity is observed

Immediate turbidity → Tertiary alcohol

Turbidity after a few minutes → Secondary alcohol

No turbidity → Primary alcohol

Discussion

Q1: What is the purpose of performing qualitative analysis of organic compounds?

Q2: Why is the combustion test important in qualitative analysis?

Q3: Why should a single test not be relied upon to identify a compound?

Multiple Choice Questions (MCQ)

1:-The main objective of qualitative analysis is

- A) To determine the molecular weight of the compound**
- B) To determine the quantity of elements in the compound**
- C) To identify the type of elements and functional groups**
- D) To measure the melting point**

2:-The reason for not relying on a single test is

- A) To reduce experiment time**
- B) Because some tests may give similar results**
- C) To increase reagent consumption**
- D) Because qualitative analysis is not important**

3:-Tollens' reagent is used to detect

A- Ketones. B- Aldehydes. C-Alcohols. D- Esters

4-A white precipitate with silver nitrate indicates the presence

A) Bromine

B) Iodine

C) Chlorine

D) Nitrogen