Republic of Iraq

Ministry of Higher Education

& Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Removal of some organic dyes from aqueous solution by using clay surface

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements For the Bachelor Degree in Chemistry

By

1. Asia Kadhim **2. Azhar Hussein**

Supervisor

Assist. Prof. Dr. Khawla Kani Jassim

2025 A.D 1446 A.H

Abstract

In this study, the adsorption of methylene blue dye from aqueous solutions onto kaolinite clay was investigated under batch conditions. Various initial dye concentrations were used, and the effects of different parameters namely contact time, adsorbent dosage (kaolin mass), temperature, and solution pH on the adsorption efficiency were systematically studied.

The equilibrium data were analyzed using both the Langmuir and Freundlich isotherm models. The Langmuir model provided a better fit to the experimental results, suggesting that the adsorption occurred mainly as a monolayer on a homogeneous surface. The maximum adsorption capacity (Q_{max}) and the Langmuir constant (b) were determined, reflecting a strong affinity between the dye molecules and the kaolinite surface. Freundlich constants (Kf and n) were also calculated, indicating favorable adsorption on a heterogeneous surface with potential multilayer formation.

Thermodynamic parameters (ΔH°, ΔS°, and ΔG°) were evaluated based on Van't Hoff plots. The negative values of at all studied temperatures confirmed the spontaneous nature of the adsorption process. The negative indicated that the adsorption was exothermic, while the positive revealed an increase in randomness at the solid–liquid interface during dye adsorption.

Overall, the findings demonstrate that kaolinite is an effective, low-cost, and environmentally friendly adsorbent for the removal of methylene blue from wastewater, highlighting its potential use in industrial wastewater treatment applications.

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

Removal of Water and Textile Pollutants Using Advanced Oxidation Methods

A research paper submitted to the Chemistry Department Council in the College of Science as part of the requirements for a Bachelor's degree in Chemistry.

Prepared by students:

Saif Bassem Salman

Supervised by

Prof. Dr. Azal Shaker Wahib

2025 AD **1446 AH**

Ministry of Higher Education and Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Biochemistry and its uses in modern technologies in developing new drugs

Supervised by

Shaima Hassan

Done by

Hussein Nasser Abdul Hussein

Tabarak Nazim Kamel

1446هـ

2025م

Abstract

This research examines the effectiveness of advanced oxidation technologies (AOPs) in removing organic pollutants, heavy metals, biological contaminants, and pharmaceuticals from industrial wastewater, particularly those from the textile industry, a major source of water pollution due to its extensive use of dyes and chemicals. The research examined various types of AOPs, such as ozone, hydrogen peroxide, Fenton reaction, and ultraviolet radiation, demonstrating the ability of these processes to generate highly reactive free radicals capable of decomposing complex compounds into harmless substances. The research also discussed the advantages and disadvantages of these technologies, highlighting the challenges of their application on an industrial scale due to high costs and the potential for the formation of byproducts. The research concluded that combining these technologies with conventional treatment methods may contribute to achieving effective and sustainable wastewater treatment, calling for further applied and economic studies to expand their use in the industrial sector.

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

chemistry department

Heterogeneous metal catalysts: from single atoms to nanoclusters and nanoparticles

Research Submitted To The College Of Science Council As Part Of The Requirements For Obtaining A Bachelor's Degree In Chemistry

BY

Al-Hawra Zainab Samir

Duaa Abdul Ali Hassan

Supervision

Assist.lecturer. Dhaha Hussein Majeed

1446 AH **2025 AD**

Abstract

Metal species with different size (single atoms, nanoclusters, and nanoparticles) show different catalytic behavior for various heterogeneous catalytic reactions. It has been shown in the literature that many factors including the particle size, shape, chemical composition, metal–support interaction, and metal–reactant/solvent interaction can have significant influences on the catalytic properties of metal catalysts. The recent developments of well-controlled synthesis methodologies and advanced characterization tools allow one to correlate the relationships at the molecular level. In this Review, the electronic and geometric structures of single atoms, nanoclusters, and nanoparticles will be discussed. Furthermore, we will summarize the catalytic applications of single atoms, nanoclusters, and nanoparticles for different types of reactions, including CO oxidation, selective oxidation, selective hydrogenation, organic reactions, electrocatalytic, and photocatalytic reactions. We will compare the results obtained from different systems and try to give a picture on how different types of metal species work in different reactions and give perspectives on the future directions toward better understanding of the catalytic behavior of different metal entities (single atoms, nanoclusters, and nanoparticles) in a unifying manner.

Ministry of Higher Education and Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Biochemistry and its uses in modern technologies in developing new drugs

Supervised by

Shaima Hassan

Done by

Hussein Nasser Abdul Hussein

Tabarak Nazim Kamel

1446هـ

2025م

Abstract

Biochemistry plays a central role in the development of modern pharmaceutical technologies, offering a deep understanding of biological molecules and their functions in health and disease. This paper explores how biochemical principles are applied in drug discovery and design, from identifying molecular targets to optimizing drug action and delivery. The integration of biochemistry with emerging tools—such as molecular modeling, and genetic engineering has significantly improved the speed, accuracy, and effectiveness of new drug development. Studies, including the creation of enzyme inhibitors, monoclonal antibodies, and mRNA-based vaccines, highlight the practical impact of biochemical advances. As precision medicine and biotechnology continue to evolve, biochemistry remains a foundational science in producing safe, targeted, and innovative therapies.

The Republic of Iraq
Ministry of Higher Education
And scientific research
Al-Muthanna University
College of Science
Department of Chemistry

Food Chemistry

Thesis/ Submitted to the University College of Science Council Al-Muthanna, partially fulfilling the condition Bachelor of Science in Chemistry

by

Iman Salman Ghamous

Sajjad Imran Muhammad

Supervised by

M. Afaf Murtada Kazim

2025A.D 1446 A.H

Introduction

Food is one of the most fundamental aspects of life. It sustains our bodies, providing the necessary nutrients and energy required for growth, development, and daily functioning. However, food is not simply a combination of elements that humans consume; it is a complex array of chemical substances that interact with one another in ways that determine the taste, texture, nutritional value, and safety of the foods we eat. The chemistry of food, or food chemistry, is an essential field of science that focuses on understanding these chemical components and their interactions, helping to improve food quality, safety, and nutritional content. By comprehending the principles of food chemistry, we can also understand how food preparation and storage methods affect the chemical composition of food, which can, in turn, impact its health benefits. Food Chemistry as an Interdisciplinary Science Food chemistry is an interdisciplinary field that merges various branches of chemistry, biology, and biochemistry to explore the molecular composition of food and how it changes during processing, cooking, and digestion. At its core, food chemistry investigates the chemical structures of food molecules such as carbohydrates, proteins, lipids (fats), vitamins, minerals, and water, and how these molecules interact to create the flavors, textures, and nutritional properties of food. This knowledge is not only important for understanding the inherent qualities of food but also for improving food production processes, enhancing the sensory qualities of food, and ensuring that food remains safe and nutritious for consumption[1].The Role of Chemical Components in Food The major chemical components in food include carbohydrates, proteins, lipids, vitamins, minerals, and water, each playing distinct roles in nutrition and health. Carbohydrates, for instance, are the primary energy source for the human body, and they are found in foods such as grains, vegetables, fruits,

Republic of Iraq Ministry of Higher Education Department of ChemistryAl
-Scientific ResearchMuthanna
University College of Science

Spectral determination of cobalt

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements For the Bachelor Degree in Chemistry

By

Aya Fahad Chaid
Mohammed Jabber kilo

Supervisor

Asst. Prof. Dr. Zaman Sahib Mahdi

2025 A.D **1446 A. H**

Abstract

This research, initiated with acknowledgements and an abstract, focuses on the analysis of heavy metals, particularly cobalt, in the environment and biological systems. It begins with a general introduction and outlines the research objectives. The study includes a literature review on heavy metals and their environmental impact, followed by a specific investigation into cobalt and its presence in the food chain. Furthermore, the research examines trace element analysis in various matrices, including water, medicinal plants, vegetables, and river bivalve molluscs. The methodology section details the use of miniaturized techniques for sample preparation, specifically Solvent Microextraction (SME) and its classification. The concluding chapter likely presents the key findings and their implications.

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

Methods For Preparing Five Heterocyclic Compounds

A research paper submitted to the Chemistry Department Council in the College of Science as part of the requirements for a Bachelor's degree in Chemistry.

Prepared by students:

Sarah Mubarak Mazhar

Rana Hajan Kreidi

Supervised by

Lecturer: Asstabraq Mohsin Yasir

1446 AH **2025 AD**

Abstract

Heterocyclic compounds are an important class of organic molecules characterized by the presence of one or more heteroatoms—such as nitrogen, oxygen, or sulfur—within ring structures. These compounds are vital in a variety of applications, ranging from pharmaceuticals to agriculture and materials science. Their diverse structures have unique physical and chemical properties, distinguishing them from carbon-based cyclic compounds that contain only carbon atoms in their rings.

Aromatic heterocyclic compounds, similar to benzene, in which one or more carbon atoms are replaced by a heteroatom, include well-known examples such as pyridine, pyrrole, and furan. In addition, there are heterocyclic compounds in which multiple carbon atoms are replaced by heteroatoms, resulting in compounds such as pyridazines, pyrimidines, and pyrazines, as well as more complex structures such as triazines and tetrazines.

Abstract

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Republic of Iraq
Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Chemistry

Synthesis and Characterization of Some Formazan Derivatives

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements for the Bachelor Degree in Chemistry

By

Bashaaer Ali
Amal Fadel

Supervisor

Assist. Lecturer. Hawraa Abdulkadhim Mazyed

2025 A.D 1446A.H

Abstract

In general, in this research has been studied Preparation methods and Spectral properties of Formazne derivatives. Where, the formazans are colored compounds ranging from red to orange or blue depending upon their structures. formazans are compounds which contain the characteristic chain of atoms (N=N–C=N–NH),

In this research, the structure of formazans and tetrazolium salts has been described. Furthermore, importance and usage of formazan-tetrazolium systems have been explained. Tautomerization properties and geometric isomers based on conjugate π-system of formazans have been examined. In addition, common synthesis of these compounds and UV-visible, IR, 1H NMR spectrums used in explanation of structures have been discussed.

Republic of Iraq

Ministry of Higher Education and

Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

Efficient and Fast adsorption of the organic dyes on the Poly (AA-co-AM)

A research submitted to College of Science/Al-Muthanna University in Partial Fulfillment of the Requirements for the Bachelor's Degree in Chemistry

By

Zahraa Ayed Khalif **Najla Saad Jasim**

Supervisor:

Asst. prof. Dr. Masar Ali Awad

2025 AD **1446 AH**

Abstract

Hydrogels (AA-co-Am)have garnered considerable interest in water purification owing to their distinctive physicochemical characteristics, including high porosity, modifiable surface chemistry, and superior water retention capacity. This study provides a thorough examination of the use of hydrogels in wastewater treatment. It encompasses their categorization and separation procedures, including adsorption. Furthermore, it examines how functional groups improve the efficiency of pollutant removal. their efficacy in adsorption and evaluating the benefits and limits of hydrogels, especially regarding regeneration capacities. It explores hydration processes in hydrogels, emphasizing the fundamental mechanisms and measuring methods involved.

Republic of Iraq

Ministry of Higher Education

&Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Cholesterol and its relationship to diabetes

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements for the Bachelor Degree in Chemistry

By

Mohammed Najm Obaid Mohammed Kazim Abdul

Supervisor

Dr. Shaima Hassan Falah

2025A.D 1446 AH

Abstract

This research provides a comprehensive and in-depth overview of Diabetes Mellitus and its various effects, alongside the complex relationship between it and disorders of blood cholesterol levels. The research begins with a comprehensive definition of diabetes and its main classifications, focusing on the mechanisms of both Type 1 Diabetes Mellitus (T1DM), resulting from the autoimmune destruction of insulin-producing beta cells, and Type 2 Diabetes Mellitus (T2DM), associated with insulin resistance and beta cell dysfunction. It also addresses Gestational Diabetes Mellitus (GDM) and other specific types of diabetes with diverse causes.

The research thoroughly reviews the multifaceted manifestations of diabetes and then moves on to a comprehensive analysis of the risk factors leading to its development, categorizing them into non-modifiable factors (such as genetics and age) and modifiable factors (such as lifestyle and weight), emphasizing the importance of lifestyle interventions in disease prevention.

The first part of the research concludes by underscoring the need for a multifaceted approach to diabetes prevention. The research then transitions to a comprehensive overview of the various methods for diagnosing diabetes.

In the second part, the research focuses on the intricate relationship and interplay between cholesterol and diabetes. It specifically addresses Diabetic Dyslipidemia as a multifaceted threat in the pathophysiology of Diabetes Mellitus. The research elucidates the synergistic peril resulting from the combination of diabetes and unhealthy cholesterol levels, and emphasizes the necessity of a multifaceted approach to managing cholesterol levels in diabetic patients to mitigate associated health risks.

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

Electrolytic cells and their applications

A research paper submitted to the Chemistry Department Council in the College of Science as part of the requirements for a Bachelor's degree in Chemistry.

Prepared by students:

Asaad Hadi Jaber

Hamid Aziz Hassayeh

Supervised by: Prof. Dr. Hassan Sobeih

1446 AH **2025 AD**

Abstract

Electrochemical cells are energy conversion devices that generate or consume electrical energy through redox reactions. They are classified into galvanic cells, electrolytic cells, primary cells, secondary cells, and fuel cells. Galvanic cells, such as the Daniell cell, produce electricity from spontaneous reactions, while electrolytic cells require external electrical energy to drive non-spontaneous reactions, as seen in electrolysis and electroplating. Primary cells are non-rechargeable batteries used in small electronic devices, whereas secondary cells, like lead-acid and lithium-ion batteries, are rechargeable and widely used in automobiles and consumer electronics. Fuel cells continuously generate electricity by reacting hydrogen with oxygen, offering high efficiency and environmental benefits. These electrochemical systems play a vital role in energy storage, transportation, and sustainable energy solutions.

Republic of Iraq Ministry of Higher
Education & Scientific Research
Al-Muthanna University
College of Science
Department of Chemistry

Synthesis, Characterization of Some Heterocyclic Compounds and Study Biological Activity

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements For the Bachelor Degree in Chemistry

By

Badr Saud Madai

Fahd Adel Obaidi

Supervisor

Dr. Wafaa Mahdi Alkoofee

2024 A.D **1445 A. H**

Abstract

This paper examines the thermal stability of 1,2,3-triazole compounds synthesized through click reaction. Through experimental analysis and characterization techniques, the study elucidates the effects of temperature on the stability of these compounds. The results provide valuable insights into the thermal decomposition mechanisms and kinetics, contributing to the understanding of the thermal behavior of triazole derivatives prepared via click chemistry. In this research, the thermal stability of 1,2,3-triazole compounds prepared via click reaction is investigated. Through a combination of analytical methods, including thermal analysis and spectroscopic techniques, the study assesses the thermal degradation behavior of these compounds at different temperatures. The findings contribute to the comprehension of the thermal stability properties of triazole derivatives synthesized using click chemistry, offering implications for their potential applications in various fields.

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

Antioxidants chemistry And Applications

A research paper submitted to the Chemistry Department Council in the College of Science as part of the requirements for a Bachelor's degree in Chemistry.

Prepared by students:

Muntadher Thejil Abdullah

Farah Bassem Abdul-Ilah Jassim

Supervised by

Asst.Inst: Afaf Murtadha Kazim

2025 AD **1446 AH**

Abstract

This study examines antioxidants in terms of their definition and mechanism of action in combating free radicals, which cause cell damage and lead to many chronic diseases such as heart disease, cancer, and premature aging. It begins by presenting the historical background of antioxidants and the evolution of their use from industrial to biological applications following the discovery of vitamins C and E.

The study classifies antioxidants into two main types: water-soluble, such as vitamin C and glutathione, and fat-soluble, such as vitamin E and carotenoids, explaining the role of each in protecting the body. It also highlights their widespread uses in the food industry as food preservatives, cosmetics, and the chemical industry.

The study highlights the medical applications of antioxidants, such as their role in preventing diabetic complications, improving the health of premature infants, and their contribution to cancer protection and supporting nervous system health. It also highlights the importance of plants as natural sources of antioxidants and their superiority over synthetic types in terms of safety and effectiveness. Finally, the research discusses the interaction of antioxidants with drugs and treatments, emphasizing the importance of their thoughtful use to achieve health benefits without negatively affecting the effectiveness of other treatments.

Republic of Iraq

Ministry of Higher Education

& Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Click chemistry, Synthesis 1,2,3 triazole and study applications

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements for the Bachelor Degree in Chemistry

By

Shoroq Ali Mallouh

Maryam Imad Abdul Hussein

Supervisor

Dr. Shaima Adel Mohamed

2025 A.D **1446 A. H**

Abstract

Triazoles are a class of five-membered heterocyclic compounds containing three nitrogen atoms and two carbon atoms. They exist in two isomeric forms: 1,2,3-triazoles and 1,2,4-triazoles, both exhibiting significant biological and chemical properties. Triazoles have garnered considerable interest due to their versatility in medicinal chemistry, agrochemicals, and material science. They serve as key pharmacophores in antifungal, antibacterial, anticancer, and antiviral drugs, owing to their stability, hydrogen bonding capabilities, and ability to bind with biological targets. Synthetic methods such as the Huisgen 1,3-dipolar cycloaddition, especially its copper-catalyzed variant (CuAAC), have facilitated the development of triazole-containing compounds with high regioselectivity and efficiency. The broad application potential and structural tunability of triazoles continue to make them a focus of intensive research in both academic and industrial chemistry.

Republic of Iraq

Ministry of Higher Education & Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Application of Ionic Liquids in gas Chromatography (GC)and liquid Chromatography (LC) techniques

A Research

Submitted to College of Science/ Al-Muthanna University in Partial

Fulfillment of the Requirements For the Bachelor Degree in chemistry

By

Fatima Ali Kadim **Ammar Salem Mohan**

Supervised by

Dr. Masar Ali Awad

2025A.D 1446A.H

Abstract

The natural contamination and pollution caused by the chemical industries has expanded in large number for a few decades. The desire of generating environmental friendly materials and less hazardous substances has been increased among the researchers and scientists. This is being fulfilled through the principles of Green chemistry. Ionic liquids (Ils) have emerged as an environmentally friendly alternative to various organic solvents and catalysts with high activity and selectivity. In this review, the history of ionic liquids, its properties, synthesis and applications in various fields have been discussed. The list of commercially available ionic liquids also has been added in this review. The present review is aimed for giving general overview of ionic liquids and processes involved in preparation and development of ionic liquids and also their applications.

Ionic liquids (Ils) are salts in the liquid state at ambient temperature, which are nonvolatile, nonflammable with high thermal stability and dissolve easily for a wide range of inorganic and organic materials. As a kind of potential green solvent, they show high efficiency and selectivity in the field of separation research, especially in instrumental analysis. Thus far, Ils have been successfully applied by many related researchers in high-performance liquid chromatography and capillary electrophoresis as chromatographic stationary phases, mobile phase additives or electroosmotic flow modifiers. This study provides a detailed review of these applications in the study of natural products. Furthermore, the prospects of Ils in liquid chromatographic and electrodriven techniques are discussed.

Republic of Iraq

Ministry of Higher Education

Scientific Research

Al-Muthanna University

College of Science

Department of chemistry

Potential use of some Iraqi plants for water purification

A Research

Submitted to College of Science/ Al-Muthanna University in Partial
Fulfillment of the Requirements For the Bachelor Degree in chemistry

By

Muna Saleh Awad

Rusul manshed jabar

Supervised by

Dr. Muna Hasson

1446A.H **2025A.D**

Abstract

This research aims to evaluate the biological efficiency of some local Iraqi plants in improving the quality of polluted water by studying their effect on a set of physical and chemical indicators.

The study provides a comparative account of the physical and chemical properties of Ephedra spp , Wormwoods, Teucrium oliyerianu, Germander, Thyme, Kaysun A total water sampls from rever samawa were collected The methodology involved measuring physical parameters such as pH, alkalinity, conductivity, total dissolved solids (TDS), turbidity, and hardness against the standards set by the WHO and Iraqi drinking water regulations.

Based on the results obtained, it can be said that the plant used has demonstrated efficiency in improving some water properties, demonstrating its potential as a sustainable, natural solution for treating polluted water. However, further experiments may be necessary to test its effect on other types of contaminants such as heavy metals or bacteria

Republic of Iraq Ministry of Higher
Education &Scientific Research
AL-Muthanna University
College of Science
Department of Chemistry

Study of Adsorption Efficiency of Tea Powder for Removel of some organic Dyes

A Research Submitted to the Chemistry Department / College of Science / Al-Muthanna University as Partial Fulfillment of the Requirements for the Degree of B. Sc. of Science in Chemistry.

By

Ghadeer Ali Gazar **Ruqaya Abdulzahra Hassan**

Supervised By

Prof. Dr. Hassan Sabih Jabr

2025 A.D **1446 A.H**

Abstract:

In this current study were taken the tea leaves washed with Distilled water first, for several times to remove dirt, Dust, and any unwanted particles,and Placed in a drying oven And dried with a temperature to complete drying. Then the Material was ground with a home grinder into small- particles. Until it became almost powder. Then a sieve of (125um) size Sifted it. Alizarine Red S(AR) from their aqucous solutions has Been studied using several methods, and then study the factors Affecting adsorption, such as the weight of the adsorbent, the Equilibrium time, the temperature, and the pH as a result of the Adsorption process.The results indicated that the adsorption applied curve of type (S) according to Giles classification, the equilibrium time was (10 min). The effect of temperature was studied within the range of (25-45)°C. The results showed that the removal decreases with increasing temperature (exothermic processe). Results used to determine the adsorption isotherm of (Langmuir, Freundlich) model. The results showed Freundlich isotherm was the most suitable with experimental data, it gives correlation coefficients (R^2) larger from Langmuir correlation coefficients . The results showed that the adsorption process affected by the pH, The pH Values showed that the optimum pH for the absorbance was 4 For the AR dye.also, the adsorbent weight has an effect on the adsorption, as it increases with increasing the adsorbent dosage.

Republic of Iraq

Ministry of Higher Education

&Scientific Research

Al-Muthanna University

College of Science

Department of Chemistry

Sulf drugs: preparation and study the pharmacological effects

A Research Submitted to College of Science/ Al-Muthanna University in Partial Fulfillment of the Requirements for the Bachelor Degree in Chemistry

By

Aliaa Kamel Rady Ali Raheem Khader

Supervisor

Noor Hameed Imran

2025A.D 1446 AH

Abstract

Sulfur-containing heterocyclic compounds have emerged as an important class of bioactive molecules in drug discovery owing to their diverse pharmacological activities and unique modes of action. Sulfur drugs exert their pharmacological actions primarily through their ability to interfere with microbial growth and modulate immune responses. The provided compounds showed a spectrum of heterocyclic ring structures of varying sizes, from three- to seven-membered rings, each influencing the medicinal potency of the compounds. Smaller rings, such as three- and four-membered rings, often impart unique reactivity and functional properties, potentially leading to potent pharmacological effects. Conversely, larger rings, such as six- and seven-membered rings, may offer increased structural stability and favorable interactions with biological targets, enhancing the medicinal potency of the compounds. Understanding the relationship between ring size and medicinal potency is crucial in drug design to facilitate the development of therapeutics with optimized efficacy and pharmacokinetic properties. This review provides a comprehensive overview of drugs that contain sulfur-containing heterocyclic compounds as key structural motifs, modes of action, and interactions with specific protein targets, enzymes, receptors, and cellular processes. Moreover, we highlight their potential as drug candidates for treating numerous diseases and highlight their significance in drug discovery research .

Republic of Iraq

Ministry of Higher Education and Scientific Research

Al-Muthanna University / College of Science

Department of Chemistry

"Mass Spectrophotometer"

A research paper submitted to the Chemistry Department Council in the College of Science as part of the requirements for a Bachelor's degree in Chemistry.

Prepared by students

Fatima Mohammed Hassan

Abbas Hamid Thuwaini

Supervised by

Assistant Teacher: Nahla Ghazi Fahad

1446 AH **2025AD**

Abstract

Mass spectrometry is a powerful analytical technique used to determine the composition of compounds and their molecular structures. Unlike infrared, visible, or ultraviolet spectroscopy, mass spectrometry involves exposing molecules to high-energy electron beams, resulting in ionization and fragmentation. The resulting ions are separated based on their mass-to-charge ratio (m/e) and recorded in a mass spectrum. A mass spectrometer consists of five main components: a sample handling system, an ionization chamber, an ion analyzer, an ion collector, and a recording device. The ionization chamber plays a crucial role in this process, generating ions by bombarding the sample with high-energy electrons or by other ionization methods.

Republic of Iraq

Ministry of Higher Education

& Scientific Research

AL-Muthanna University

College of Science

Department of Chemistry

Environment Pollution by Plastic Waste in Muthanna Governorate and method of treating it

Graduation Research Project

For the BSc Degree in Chemistry

By

Tabarak Hussein

Fatima Salman

Supervisor

Hawraa AbdulKadhim Mazyed

2025 A.D 1446

Abstract:

This study investigates the escalating environmental pollution caused by plastic waste in Muthanna Governorate, Iraq. The rapid increase in plastic consumption, coupled with inadequate waste management infrastructure, has led to significant accumulation of plastic debris in terrestrial and potentially aquatic environments. This pollution poses a serious threat to the local ecosystem, impacting soil quality, water resources, biodiversity, and potentially human health through various pathways. The research aims to assess the current state of plastic waste pollution in the governorate, identify the primary sources and types of plastic waste, and evaluate its environmental impact. Furthermore, the study explores potential methods for treating and managing this plastic waste, considering both conventional and innovative approaches. This includes examining the feasibility and effectiveness of strategies such as source reduction, recycling (mechanical and chemical), energy recovery (incineration and pyrolysis), and biological degradation. The findings of this research will provide valuable insights for developing sustainable and effective waste management strategies to mitigate plastic pollution and protect the environment and public health in Muthanna Governorate.