

# TRENDS IN MEDICINAL AND ENVIRONMENTAL SCIENCE: AN INTRODUCTION

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## TABLE OF CONTENTS

S. NO.	CHAPTER TITLE	PAGE NO.
<b>Chapter 1</b>	Nutritional Analysis and Evaluation of Food Products Made from Date Seed Powder <i>Mantasha Mirza, Abdul Rahman Khan, Iqbal Azad</i>	<b>1 - 24</b>
<b>Chapter 2</b>	Synthesis, and Computational Studies of Methyl 6-Amino-5-Cyano-2-Oxo-2' h-Spiro[Indoline-3'4'-Pyrano(2,3-C) Pyrazole]-3'-Carboxylate <i>Umme Habiba Malik, Ayesha Anwer, Mohammad Amir, Malik Nasibullah</i>	<b>25 – 39</b>
<b>Chapter 3</b>	Studies of ZnBi <sub>2</sub> O <sub>4</sub> Nanoparticles for the Removal of Amido Black Dye <i>Neda Afreen, Naseem Ahmad, Nafees Ahmad</i>	<b>41 – 49</b>
<b>Chapter 4</b>	Assessment of Heavy Metal Contamination in Polymeric Disposable Items <i>Nafees Ahmad, Arshad Iqbal, Iqbal Azad, Naseem Ahmad</i>	<b>50 – 65</b>
<b>Chapter 5</b>	Ecofriendly Synthesis of Zinc Oxide Nanoparticles Using Moringa Oleifera Leaves Extract and Its Characterizations <i>Mohd. Samiullah, Mohd Arsh Khan, Qazi Inamur Rahman, Abdul Rahman Khan</i>	<b>66 – 85</b>

<b>Chapter 6</b>	Utilization of Peels of Citrus Fruit for Extracting Essential Oil Using Steam Distillation and Soxhlet Extraction	<b>86 – 103</b>
	<i>Saimah Khan, Yusra Khatoon</i>	
<b>Chapter 7</b>	Geo-Polymerization with Particular Emphasis on Fly Ash for Construction Material Applications	<b>104 – 118</b>
	<i>Deepak Mallah, Tahmeena Khan</i>	
<b>Chapter 8</b>	Azole Derivatives and Their Biological Activities	<b>119 – 137</b>
	<i>Vaishnavi Dubey, Mohd Arsh Khan, Neda Fatima, Sabahat Yasmeen Sheikh, Firoj Hassan</i>	

## CHAPTER - 8

# AZOLE DERIVATIVES AND THEIR BIOLOGICAL ACTIVITIES

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### **Abstract**

Azoles, a significant category of nitrogen-containing heterocycles, have attracted considerable interest in medicinal chemistry due to their structural flexibility, capacity to form hydrogen bonds, and diverse biological effects. This chapter delves deeply into azole derivatives, highlighting their synthesis and their importance in pharmacology. Azoles, such as imidazole and benzimidazole derivatives, are renowned for their significant contribution to the advancement of antifungal, anticancer, and antimicrobial medications. The chapter explores various synthetic methods, including Williamson etherification and regioselective nucleophilic ring-opening reactions, used to produce coumarin-based azole derivatives. These derivatives exhibit remarkable therapeutic properties due to their distinct structural features and interactions with biological targets. Furthermore, the crucial role of nitrogen heterocycles in FDA-approved medications is highlighted, underscoring their extensive use in the development and manufacture of drugs. This chapter highlights the vital role of nitrogen-containing heterocycles in contemporary pharmacology and their ability to tackle a wide range of medical issues through showcasing examples of clinically approved drugs and recent breakthroughs.

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