

## SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY EVALUATION OF NEW CYCLIC IMIDES CONTAINING 1,3,4-THIADIAZOLE AND 1,3,4-OXADIAZOLE MOIETIES

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### ABSTRACT

In the present work a variety of new cyclic imides containing two heterocycles namely 1,3,4-thiadiazole and 1,3,4-oxadiazole were synthesized. The most important step in the synthesis of these imides is the preparation of key intermediate (compound (3)) which represents the main heterocyclic amine containing both 1,3,4-thiadiazole and 1,3,4-oxadiazole rings and from which all the new target cyclic imides are synthesized. Synthesis of compound (3) was performed via three steps the first one involved reaction of 2-amino-5-mercapto-1,3,4-thiadiazole with ethyl chloro acetate producing 2-(5-amino-1,3,4-thiadiazole-2-yl)thioethyl acetate<sup>1</sup> which introduced subsequently in reaction with hydrazine hydrate producing the corresponding aceto-hydrazide<sup>2</sup> and this in turn introduced in reaction with carbon disulfide in the third step producing the mentioned amine<sup>3</sup>. Compound<sup>3</sup> was introduced successfully in reaction with different cyclic anhydrides including (maleic, citraconic, succinic, phthalic, pyridinic and pyromellitic) anhydrides producing a series of new amic acids<sup>4-9</sup>. In the final step dehydration of amic acids<sup>4-9</sup> was performed via treatment with acetic anhydride and anhydrous sodium acetate producing the desired corresponding imides<sup>10-15</sup>. The new imides<sup>10-15</sup> were screened for their antimicrobial activity against four types of bacteria and one fungi and the results indicated that they exhibit good antimicrobial activity against the tested organisms.

**Keywords:** Cyclic imides, aceto-hydrazide, pyridinic and pyromellitic anhydrides, amic acids.

### 1. INTRODUCTION

Cyclic imides have been attracted much more attention of organic and medicinal chemists due to their biological activities, most of them are extensively used as analgesic<sup>1</sup>, antinociceptive agents<sup>2</sup> or as reactants for polymer synthesis<sup>3</sup>.

An imide nucleus can be also found in a structure of anxiolytic, antimicrobial, anticancer and anti-inflammatory substances<sup>4-6</sup>.

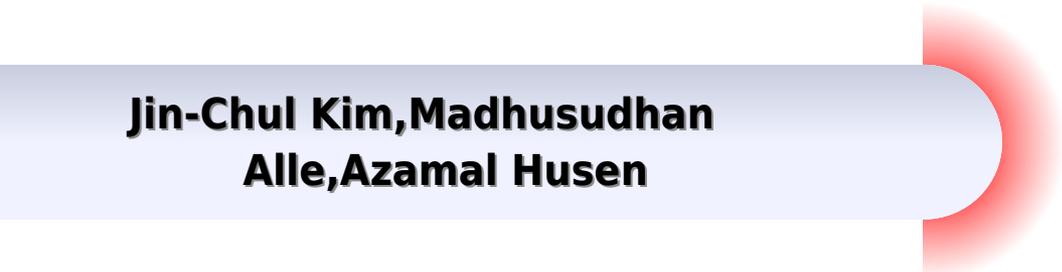
Also five membered heterocyclic compounds show various types of biological activities among them 2,5-disubstituted-1,3,4-thiadiazoles are associated with divers biological activities probably by the virtue (-N=C-S-) grouping, some of them possess antibacterial, antifungal and anticonvulsant

activities<sup>7-9</sup>. Similarly 2,5-disubstituted-1,3,4-oxadiazoles also display wide spectrum of activities such as antibacterial, antimalarial, anti-inflammatory<sup>10,11</sup>, antifungal and anticonvulsant<sup>12,13</sup>.

In light of the therapeutic importance of these rings we attempted to synthesize new molecules containing the above mentioned three biologically active moieties (cyclic imide, 1,3,4-thiadiazole and 1,3,4-oxadiazole). The incorporation of these three moieties into a single molecule can change the activity of the obtained new compounds, thus the present work involved synthesis of new cyclic imides containing both 1,3,4-thiadiazole and 1,3,4-oxadiazole moieties and investigation for their antimicrobial activity.

# Synthesis Characterization And Evaluation Of Ijrpc

**Jin-Chul Kim, Madhusudhan  
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Applications of Nanocomposite Materials in Drug Delivery Inamuddin,Abdullah M. Asiri,Ali Mohammad,2018-06-18 Applications of Nanocomposite in Drug Delivery discusses and explores the applications of nanocomposites in the area of drug delivery Starting with a scientific understanding of drug delivery fundamentals the book explores the utility of nanocomposites in the area of controlled transdermal osteo articular tuberculosis and stimulus sensitive drug delivery applications The book intricately details and discusses a variety of methods for their preparation while also highlighting specific applications of nanocomposites in targeted drug delivery Discusses nanocomposite and nanotechnology for drug delivery Outlines the mechanisms involved in targeted drug delivery using nanocomposites Includes synthesis methods for nanocomposites used in controlled drug delivery Lists various applications of nanocomposites in drug delivery *New and Future Developments in Microbial Biotechnology and Bioengineering* Jay Shankar Singh,DP Singh,2019-03-19 *New and Future Developments in Microbial Biotechnology and Bioengineering* Microbial Biotechnology in Agro environmental Sustainability describes in detail the various roles of microbial resources in the management of crop diseases and how microbes can be used as a source of income for biomass and bioenergy production In addition the book covers microbial inoculants as bio fertilizers to enhance crop productivity along with degraded land restoration Users will find the latest information in the field of microbial biotechnology and its further applications in bio fertilizers bio pesticides its generation as an alternative source of energy restoration degraded and marginal lands the mitigation of global warming gases and more Describes microbial biotechnology and its applications in sustainable agriculture Provides information on the use of a variety of microbes for crop production Outlines microbe based separation techniques for the removal of metal contaminants from soil Describes the role of microbial agents in the generation of alternative sources of energy Includes microbial tools and technologies for the restoration of degraded and marginal lands the mitigation of global warming gases and the bioremediation of polluted sites **Recent Advances in Nanomedicines Mediated Wound Healing** Prashant

Kesharwani,2025-02-21 *Recent Advances in Nanomedicines Mediated Wound Healing* presents an overview of various nanotechnology based drug delivery systems explored widely for wound healing The book provides a comprehensive review of thriving strategies used for wound healing and thoroughly describes the most recent developments in emerging modern drug delivery systems with a focus on nanotechnology It serves as a complete package for a holistic understanding of molecular pathways conventional therapy and novel nanocarrier mediated drug delivery for wound healing while also exploring advanced strategies like siRNA and aptamer mediated approaches and nanomedicines to treat diabetic and full

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**Enhancing the Therapeutic Efficacy of Herbal Formulations** Kesharwani, Rajesh Kumar, Keservani, Raj K., Sharma, Anil K., 2021-03-19 Novel drug delivery systems cover the approaches formulation technologies and modes for transporting any pharmaceutical compound throughout the body to safely get the desired effect A growing area of research is the use of herbal formulations for disease therapy In combining these two areas of research that of novel drug delivery systems and that of herbal formulations the usefulness of herbs is not only proved but its future applications and effectiveness are studied The move towards herbal based novel drug delivery systems can benefit society in a multitude of advantageous ways Enhancing the Therapeutic Efficacy of Herbal Formulations discusses and explores the ways of preparing herbal formulations loaded in novel drug delivery systems and the resultant improvement in efficacy of the effected drugs herbs already available on the market The chapters will highlight traditional and herbal formulations the effects of novel drug delivery systems on herbal formulations and the safe and effective preparation and effects of herbal formulations as a therapeutic intervention This book is ideal for pharmacists doctors and researchers specializing in herbal therapeutics along with practitioners researchers academicians and students interested in how herbal based novel drug delivery systems can benefit society

*Smart Nanomaterials in Biomedical Applications* Jin-Chul Kim, Madhusudhan Alle, Azamal Husen, 2022-01-19 With the start of 2020 the wrath of pandemic challenged the scientific community to develop more advanced drug delivery approaches for biomedical applications endowing conventional drugs with additional therapeutic benefits and minimum side effects Although significant advancements have been done in the field of drug delivery there is a need to focus towards strategizing novel and improved drug delivery systems that should be convenient and cost effective to the patients and simultaneously they should also provide financial benefits to pharmaceutical companies Controlled drug delivery technology offers ample opportunities and scope for improvising the therapeutic efficacy of drugs via optimizing the drug release rate and time For this endeavour smart nanomaterials have served as remarkable candidates for biomedical applications owing to their ground breaking properties and design The development of such nanomaterials requires a broad knowledge related to their physio chemical properties molecular structure mechanisms by which the nanomaterials interact with the cells and methods by which drugs are released at the site of action This knowledge must also be allied with the knowledge of signaling crosstalk mechanisms that are modulated by the nanomaterial drugs composite It can be anticipated

that these emerging drug delivery technologies can facilitate the world to successfully encounter such pandemic outbursts in the future in a cost effective and time effective manner The chapters in this book deal with the advanced technologies and approaches that can benefit advanced students researchers and industry experts in developing smart and intelligent nanomaterials for future biomedical applications and development manufacturing and commercialization for controlled and targeted drug delivery

**Nanosponges for Environmental Remediation** Shikha Gulati,2023-10-11 The book covers the chemistry of various nanosponges as well as the methods for synthesizing them and altering them chemically as well as their characterization and uses in environmental remediation Sensors adaptable materials for oil clean up in the sea the removal of dangerous organic and inorganic pollutants from wastewater the adsorption of various poisonous and greenhouse gases from the air and more are just a few of the environmental uses for nanosponges This book aims to provide broad coverage of recent research progress or up to date knowledge addressing various aspects in this field With this book we aim to provide the readers with the opportunity to learn about different facets of environmental remediation using nanosponges Thus this book scrutinizes the state of the art research and discovery in the use of nanosponges in environmental applications highlighting the scope to which these novel materials have been incorporated by the community Beyond bestowing a summary of recent research by major groups in the field the book presents the approaches behind recent developments providing a long lasting situation for experienced researchers and novices in the field This book also emphasizes the challenges with previous signs of progress and way for further research details relating to the current pioneering technology and future perspectives with a multidisciplinary approach Furthermore it presents up to date information on the economics toxicity and regulations related to these novel materials This book is of interest to those in environmental science and applications particularly graduate students young faculty and others exploring nanosponges

*Gums, Resins and Latexes of Plant Origin* Hosakatte Niranjana Murthy,2022-07-20 This reference book provides a comprehensive overview of natural gums resins and latexes of plants with a focus on their chemistry biological activities and practical uses The content is divided into five main sections each of which contains chapters contributed from valuable experts in their field Naturally occurring plant products have quite diverse applications in many different industries The book aims to highlight the important aspects of plant based gums resins and latexes as well as provide a strategic framework for further research and development activities on these bioproducts It will appeal to a broad audience such as biologists pharmacologists pharmacists food technologists and medical practitioners It is also a useful resource for research investigators of the healthcare industry academia and students of biomedical sciences

**Synthesis, Characterization and Evaluation of Potential Tumor Imaging Radiopharmaceuticals** Almah Bt Awaluddin,1986

**Synthesis, Characterization, and Structure Determination of Cp\*Ir(dpms)Cl and Re(FOX)(CO)<sub>3</sub>** Ryan A. Pohorence,2023

*Synthesis, Characterization and Deposition on Surfaces of Curcuminoids-based Systems* Raúl Díaz Torres,2018

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In an electronic era where connections and knowledge reign supreme, the enchanting power of language has become more apparent than ever. Its capability to stir emotions, provoke thought, and instigate transformation is actually remarkable. This extraordinary book, aptly titled "**Synthesis Characterization And Evaluation Of Ijrpc**," compiled by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we will delve to the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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