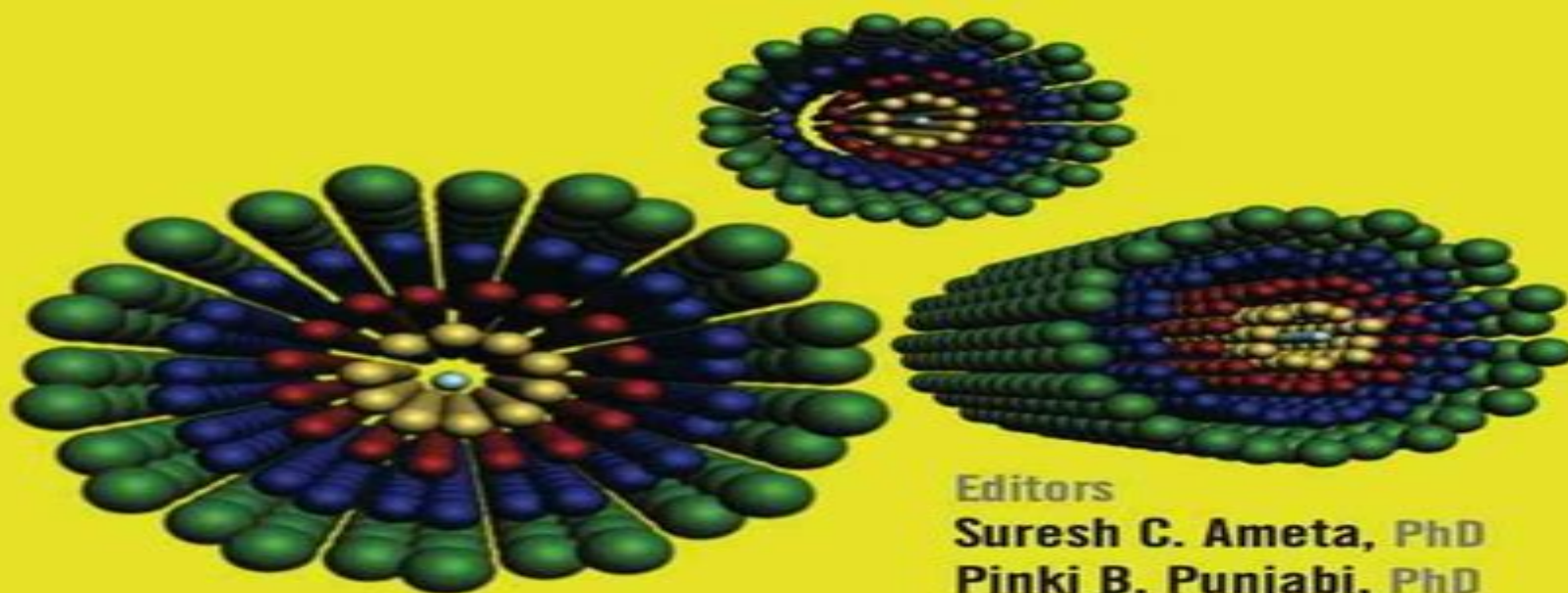


Microwave-Assisted Organic Synthesis

A Green Chemical Approach



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Microwave Assisted Organic Synthesis A Green Chemical Approach

Goutam Brahmachari



Microwave Assisted Organic Synthesis A Green Chemical Approach:

Microwave-Assisted Organic Synthesis Suresh C. Ameta, Pinki B. Punjabi, Rakshit Ameta, Chetna Ameta, 2014-12-22 The large scale production of chemicals to meet various societal needs has created environmental pollution including pollution from byproducts and improper disposal of waste With the world facing adverse consequences due to this pollution green chemistry is increasingly being viewed as a means to address this concern Since most organic syntheses Contemporary Chemical Approaches for Green and Sustainable Drugs Marianna Torok, 2022-08-26 Contemporary Chemical Approaches for Green and Sustainable Drugs provides readers with the knowledge they need to integrate sustainable approaches into their work Sections cover different aspects of green and sustainable drug development from design to disposal including computer aided drug design green resourcing of drugs and drug candidates an overview of the health concerns of pharmaceutical pollution and a survey of potential chemical methods for its reduction Drawing together the knowledge of a global team of experts this book provides an inclusive overview of the chemical tools and approaches available for minimizing the negative environmental impact of current and newly developed drugs This will be a useful guide for all academic and industrial researchers across green and sustainable chemistry medicinal chemistry environmental chemistry and pharmaceutical science Provides an integrative overview of the environmental risks of drugs and drug by products to support chemists in pre emptively addressing these issues Highlights the advantages of computer aided drug design green and sustainable sourcing and novel methods for the production of safer more effective drugs Presents individual chapters written by renowned experts with diverse backgrounds Reflects research in practice through selected case studies and extensive state of the art reference sections to serve as a starting point in the design of any specialized environmentally conscious medicinal chemistry project

Microwave Assisted Organic Synthesis Jason Tierney, Pelle Lidström, 2009-02-12 The first reports on the application of microwaves in organicsynthesis date back to 1986 but it was not until the recentintroduction of specifically designed and constructed equipment which countered the safety and reproducibility concerns thatsynthetic application of microwaves has become established as alaboratory technique Microwave assisted synthesis is now beingadopted in many industrial and academic laboratories to takeadvantage of the novel chemistry that can be carried out using avariety of organic reaction types This book demonstrates the underlying principles of microwavedielectric heating and by reference to a range of organic reactiontypes it s effective use in synthetic organic chemistry Toillustrate the impact microwave assisted organic synthesis can haveon chemical research case studies drawn mainly from thepharmaceutical industry are presented *Green Synthetic Approaches for Biologically Relevant Heterocycles* Goutam Brahmachari, 2021-03-20 Green Synthetic Approaches for Biologically Relevant Heterocycles Second Edition Volume One Advanced Synthetic Techniques reviews this significant group of organic compounds within the context of sustainable methods and processes expanding on the first edition with fully updated coverage and a whole range of new chapters Volume One explores advanced synthetic techniques with each chapter

presenting in depth coverage of various green protocols for the synthesis of a wide variety of bioactive heterocycles that are classified on the basis of ring size and or the presence of heteroatoms Techniques covered range from high pressure cycloaddition reactions and microwave irradiation to sustainable one pot domino reactions This updated edition is an essential resource on sustainable approaches for academic researchers R D professionals and students working across medicinal organic natural product and green chemistry Provides fully updated coverage of the field of greener heterocycle synthesis Includes new chapters on varied multicomponent reactions alongside both traditional and novel approaches Presents information in an accessible style with an emphasis on sustainability

Green Chemical Synthesis with Microwaves and Ultrasound Dakeshwar Kumar Verma, Chandrabhan Verma, Paz Otero Fuertes, 2024-03-25 Green Chemical Synthesis with Microwaves and Ultrasound A guide to the efficient and sustainable synthesis of organic compounds Chemical processes and the synthesis of compounds are essential aspects of numerous industries and particularly central to the creation of drug like structures Their often significant environmental biproducts however have driven substantial innovations in the areas of green and organic synthesis which have the potential to drive efficient solvent free synthesis and create more sustainable chemical processes The use of microwaves and ultrasounds in chemical synthesis has proven an especially fruitful area of research with the potential to produce a more sustainable industrial future Green Chemical Synthesis with Microwaves and Ultrasound provides a comprehensive overview of recent advances in microwave and ultrasound driven synthesis and their cutting edge applications Green Chemical Synthesis with Microwaves and Ultrasound readers will also find Introduction to the key equipment and tools of green chemical synthesis Detailed discussion of methods including ultrasound irradiation metal catalyzed reactions enzymatic reactions and many more An authorial team with immense experience in environmentally friendly organic chemical production Green Chemical Synthesis with Microwaves and Ultrasound is ideal for chemists organic chemists chemical engineers biochemists and any researchers or industry professionals working on the synthesis of chemicals and or organic compounds

Green Approaches in Medicinal Chemistry for Sustainable Drug Design Bimal Banik, 2024-05-31 Extensive experimentation and high failure rates are a well recognized downside to the drug discovery process with the resultant high levels of inefficiency and waste producing a negative environmental impact Sustainable and Green Approaches in Medicinal Chemistry 2e reveals how medicinal chemistry can play a direct role in addressing this issue After providing essential context to the growth of green chemistry in relation to drug discovery the book goes on to identify a broad range of practical techniques and useful insights revealing how medicinal chemistry techniques can be used to improve efficiency mitigate failure and increase the environmental benignity of the entire drug discovery process Drawing on the knowledge of a global team of experts Sustainable and Green Approaches in Medicinal Chemistry Second Edition encourages the growth of green medicinal chemistry and supports medicinal chemists drug discovery researchers pharmacologists and all those in related fields across both academia and industry in integrating

these approaches into their own work This second volume of the second edition includes the development of nanoparticles and nanocomposites as well as the application of ultrasound and microwave induced methods studies solventless synthesis defines the role of steroids studies reactions in aqueous solution identifies enzyme mediated reactions investigates ionic liquids and deep eutectic solvents explores natural products investigates solid supports realizes the effects of salts focuses on combinatorial chemistry develops one pot methods analyzes multi component reactions investigates dipole moment values and examines computer assisted methods Highlights the need for adoption of sustainable and green chemistry pathways in drug development Reveals risk factors associated with the drug development process and the ways sustainable approaches can help address these Identifies novel and cost effective green medicinal chemistry approaches for improved efficiency and sustainability

Microwave Chemical and Materials Processing Satoshi Horikoshi, Robert F. Schiffrmann, Jun Fukushima, Nick Serpone, 2017-11-28 The principal aim of this book is to introduce chemists through a tutorial approach to the use of microwaves by examining several experiments of microwave chemistry and materials processing It will subsequently enable chemists to fashion their own experiments in microwave chemistry or materials processing Microwave heating has become a popular methodology in introducing thermal energy in chemical reactions and material processing in laboratory scale experiments Several research cases where microwave heating has been used in a wide range of fields have been reported including organic synthesis polymers nanomaterials biomaterials and ceramic sintering among others In most cases microwave equipment is used as a simple heat source Therefore the principal benefits of microwave radiation have seldom been taken advantage of One reason is the necessity to understand the nature of electromagnetism microwave engineering and thermodynamics However it is difficult for a chemist to appreciate these in a short time so they act as barriers for the chemist who might take an interest in the use of microwave radiation This book helps to overcome these barriers by using figures and diagrams instead of equations as much as possible

Microwave-assisted Polymer Synthesis Richard Hoogenboom, Ulrich S. Schubert, Frank Wiesbrock, 2016-09-02 The series Advances in Polymer Science presents critical reviews of the present and future trends in polymer and biopolymer science It covers all areas of research in polymer and biopolymer science including chemistry physical chemistry physics material science The thematic volumes are addressed to scientists whether at universities or in industry who wish to keep abreast of the important advances in the covered topics Advances in Polymer Science enjoys a longstanding tradition and good reputation in its community Each volume is dedicated to a current topic and each review critically surveys one aspect of that topic to place it within the context of the volume The volumes typically summarize the significant developments of the last 5 to 10 years and discuss them critically presenting selected examples explaining and illustrating the important principles and bringing together many important references of primary literature On that basis future research directions in the area can be discussed Advances in Polymer Science volumes thus are important references for every polymer scientist as well as for other scientists interested in polymer

science as an introduction to a neighboring field or as a compilation of detailed information for the specialist Review articles for the individual volumes are invited by the volume editors Single contributions can be specially commissioned Readership Polymer scientists or scientists in related fields interested in polymer and biopolymer science at universities or in industry graduate students **Green Techniques for Organic Synthesis and Medicinal Chemistry** Wei Zhang, Berkeley W.

Cue, 2012-05-10 An updated overview of the rapidly developing field of green engineering techniques for organic synthesis and medicinal chemistry Green chemistry remains a high priority in modern organic synthesis and pharmaceutical R D with important environmental and economic implications This book presents comprehensive coverage of green chemistry techniques for organic and medicinal chemistry applications summarizing the available new technologies analyzing each technique s features and green chemistry characteristics and providing examples to demonstrate applications for green organic synthesis and medicinal chemistry The extensively revised edition of Green Techniques for Organic Synthesis and Medicinal Chemistry includes 7 entirely new chapters on topics including green chemistry and innovation green chemistry metrics green chemistry and biological drugs and the business case for green chemistry in the generic pharmaceutical industry It is divided into 4 parts The first part introduces readers to the concepts of green chemistry and green engineering global environmental regulations green analytical chemistry green solvents and green chemistry metrics The other three sections cover green catalysis green synthetic techniques and green techniques and strategies in the pharmaceutical industry Includes more than 30% new and updated material plus seven brand new chapters Edited by highly regarded experts in the field Berkeley Cue is one of the fathers of Green Chemistry in Pharma with backgrounds in academia and industry Brings together a team of international authors from academia industry government agencies and consultancies including John Warner one of the founders of the field of Green Chemistry Green Techniques for Organic Synthesis and Medicinal Chemistry Second Edition is an essential resource on green chemistry technologies for academic researchers R D professionals and students working in organic chemistry and medicinal chemistry Nontraditional Activation Methods in Green and Sustainable Applications Bela Torok, Christian Schaefer, 2021-02-25 Nontraditional Activation Methods in Green and Sustainable Applications Microwaves Ultrasounds Photo Electro and Mechanochemistry and High Hydrostatic Pressure provides a broad overview of non traditional activation methods to help readers identify and use appropriate approaches in reducing the environmental impact of their work Sections discuss the fundamental principles of each method and provide examples of their practical use illustrating their usefulness Given the importance of expanding laboratory based technologies to the industrial level chapters that cover both existing and potential industrial and environmental applications are also included Highlighting the usefulness and adaptability of these methods for a range of practical applications this book is a practical guide for both those involved with the design and application of synthetic methodologies and those interested in the implementation and impact of green chemistry principles in practice from synthetic and medicinal chemists to food

developers and environmental policy planners Discusses and critically assesses the advantages of non traditional activation methods in green and sustainable chemistry applications Features individual chapters written by renowned experts in the field Contains extensive state of the art reference sections providing critically filtered information to readers

Catalyst-free Organic Synthesis Goutam Brahmachari,2017-11-06 It is well established that organic synthetic processes have been at the core of the chemical industry for hundreds of years in the production of organic compounds with a wide range of applications However we are becoming increasingly aware of the hazardous substances used and generated by these chemical processes The field of organic synthesis has undergone profound changes to switch to equally efficient but more sustainable processes that avoid the extensive use of toxic and hazardous reagents and solvents harsh reaction conditions and expensive and sophisticated catalysts Explaining methods for carrying out chemical syntheses without the use of catalysts this book shows how avoiding catalysts during synthesis can mean less use of toxic chemicals environmentally damaging chemicals or endangered elements and lower costs It is an important reference for chemists involved in organic synthesis as well as for green chemists

Microwaves in Chemistry Applications Aparna Das,Bimal Banik,2021-05-09 Microwaves in Chemistry Applications Fundamentals Methods and Future Trends offers a number of benefits over conventional heating technologies including acceleration of reaction rates milder reaction conditions higher chemical yields lower energy usage and different reaction selectivity all of which can improve the sustainability of processes The book provides valuable insights into the underlying chemistry at play in microwave assisted processes introducing fundamental concepts discussing the modeling of reactions in such processes and also highlighting a range of key methods and applications of microwaves in chemistry for improved sustainability Beginning with an introduction to microwave chemistry Part One discusses foundational principles equipment and approaches for modeling reactions and assessing the outputs of those models Methods in microwave chemistry are then the focus of Part Two with microwave assisted synthesis catalysis reduction and reactions all explored in detail Part Three reflects on the practical usage of these methods to address specific issues covering a number of interesting applications Provides guidance on the modeling and interpretation of microwave effects Discusses microwave chemistry in the context of green chemistry principles Outlines a range of important microwave methods including microwave assisted synthesis catalysis reactions and reductions

Advanced Oxidation Processes for Wastewater Treatment Suresh C. Ameta,Rakshit Ameta,2018-02-19 Advanced Oxidation Processes for Waste Water Treatment Emerging Green Chemical Technology is a complete resource covering the fundamentals and applications of all Advanced Oxidation Processes AOPs This book presents the most up to date research on AOPs and makes the argument that AOPs offer an eco friendly method of wastewater treatment In addition to an overview of the fundamentals and applications it details the reactive species involved along with sections on reactor designs thus helping readers understand and implement these methods Presents in depth coverage of all types of Advanced Oxidation Processes including Super Critical Water

Oxidation Photo Fenton and Like Processes Includes a fundamental review applications reactive species and reactor designs Reviews applications across waste types including industrial waste domestic and municipal sewage and hospital wastes

Towards Green Chemical Processes: Strategies and Innovations Pallavi Jain,Sapna Raghav,Anil Kumar Jangir,2025-08-01

This book is designed for forward thinking professionals researchers and senior students in chemistry chemical engineering and industrial manufacturing this essential resource explores how green chemistry can be effectively applied in real world industrial settings It also speaks directly to environmental engineers and sustainability experts eager to stay ahead of emerging trends and innovations in sustainable practices With practical insights tailored for industry leaders and policymakers committed to reducing environmental impact this work delivers scalable solutions and cutting edge strategies for transforming industrial processes A vital tool for anyone looking to drive meaningful change it empowers organizations to meet sustainability targets while enhancing efficiency and innovation

A Green Chemistry Approach - Microwave Assisted Organic Synthesis B. P. Nandeshwarappa,2017-04-20

Mechanochemistry and Emerging Technologies for Sustainable Chemical Manufacturing Evelina Colacino,Felipe Garcia,2023-07-06 This unique volume describes advances in the field of mechanochemistry in particular the scaling up of mechanochemical processes Scalable techniques employed to carry out solvent free synthesis are evaluated Comparability to continuous flow chemistry the current industrial benchmark for continuous efficient chemical synthesis is presented The book concludes that mechanochemical synthesis can be scaled up into a continuous sustainable process It demonstrates that large scale mechanochemistry can meet industrial demands especially in the pharmaceutical industry Features Mechanochemistry is rapidly developing as a multidisciplinary science on the borderline between chemistry materials science and environmental science This unique text focuses on mechanochemistry with the ability to scale up and illustrates how mechanochemical synthesis is no longer an obstacle This timely book highlights recent advancements describing what can be achieved in chemical synthesis Mechanochemistry enables the synthesis of multiple polymorphic crystalline forms in the production of drugs in the form of tablets or granules in capsules

Chemistry of Polymeric Metal Chelates Gulzhian I. Dzhardimalieva,Igor E. Uflyand,2018-02-13 This book deals with the chemistry of polymeric metal chelates The main results and the production and chemical structure of polymers with chelate units as well as the specificity of metal complex binding of different structure are presented here This book also reveals the transformations which components undergo in the course of chelation Special attention is paid not only to synthetic but also to natural including living systems The usage of polymeric metal chelates and their development are examined The related research was performed for chelates with chain structure This book is useful to researchers being active in synthesis and design of macromolecular metal chelates

Sustainable Approaches in Pharmaceutical Sciences Kamal Shah,Durgesh Nandini Chauhan,Nagendra Singh Chauhan,2023-11-06 Highly comprehensive and detailed text on best possible sustainable approaches associated with the development design and origination of pharmaceuticals Sustainable

Approaches in Pharmaceutical Sciences enables readers to understand the best possible green approaches associated with the development design and origination of pharmaceuticals including resources that may minimize the adverse effects associated with synthesis isolation and extraction Sustainable Approaches in Pharmaceutical Sciences covers a myriad of current topics including mechanochemical improvements for API synthesis as well as the role of artificial intelligence AI in the development and discovery of pharmaceuticals along with recent developments in hydrogels which respond to triggered factors during topical drug delivery Authored by experienced scientists from institutions across the world other sample topics covered in Sustainable Approaches in Pharmaceutical Sciences include Green technologies and benefits associated with them white biotechnology green chemistry and eco friendly approaches for designing active pharmaceutical ingredients Impact of sustainable approaches in pharmaceutical industries regarding use of solvents nanoparticles formulations and antimicrobial bandages Micro extractive methods capable of generating high recovery values of the analytes and associated techniques such as dispersive liquid liquid microextraction Benefits of the exploration of sustainable chemistry on a commercial scale particularly in relation to bioresources chemical manufacturing and organic transformation Discussing both the foundational science and practicality of different approaches regarding human and environmental health Sustainable Approaches in Pharmaceutical Sciences is an essential resource for scientists medical professionals and industrial professionals working in the fields of sustainable technology and synthesis in pharmaceutical sciences along with advanced level students

Chemistry and Chemical Engineering for Sustainable Development Miguel A. Esteso, Ana Cristina Faria Ribeiro, A. K. Haghi, 2020-11-26 The world faces significant challenges as population and consumption continue to grow while nonrenewable fossil fuels and other raw materials are depleted at ever increasing rates This volume takes a technical approach that addresses these issues using green design and analysis It brings together innovative research new concepts and novel developments in the application of new tools for chemical and materials engineers It is an immensely research oriented comprehensive and practical work that focuses on the use of applied concepts to enhance productivity and sustainability in chemical engineering It contains significant research that reports on new methodologies and important applications in the fields of chemical engineering as well as the latest coverage of chemical databases Highlighting theoretical foundations real world cases and future directions the volume covers a diverse collection of the newest innovations in the field including new research on atomic nuclear physics the barometric formula amino acids in aqueous solutions bioremediation and biotechnology and more *Handbook of Greener Synthesis of Nanomaterials and Compounds* Boris Kharisov, Oxana Kharissova, 2021-04-03 Modern techniques to produce nanoparticles nanomaterials and nanocomposites are based on approaches that frequently involve high costs inefficiencies and negative environmental impacts As such there has been a real drive to develop and apply approaches that are more efficient and benign The Handbook of Greener Synthesis of Nanomaterials and Compounds provides a comprehensive review of developments in this

field combining foundational green and nano chemistry with the key information researchers need to assess select and apply the most appropriate green synthesis approaches to their own work Volume 1 Fundamental Principles and Methods provides a clear introduction to the fundamentals of green synthesis that places synthesis in the context of green chemistry Beginning with a discussion of key greener physical and chemical methods for synthesis including ultrasound microwave and mechanochemistry methods the book goes on to explore biological methods including biosynthesis green nanoformation and virus assisted methods Discusses synthesis in the context of the principles of green chemistry Highlights both traditional and innovative technologies for the synthesis of nanomaterials and related composites under green chemistry conditions Reflects on the current and potential applications of natural products chemistry in synthesis

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