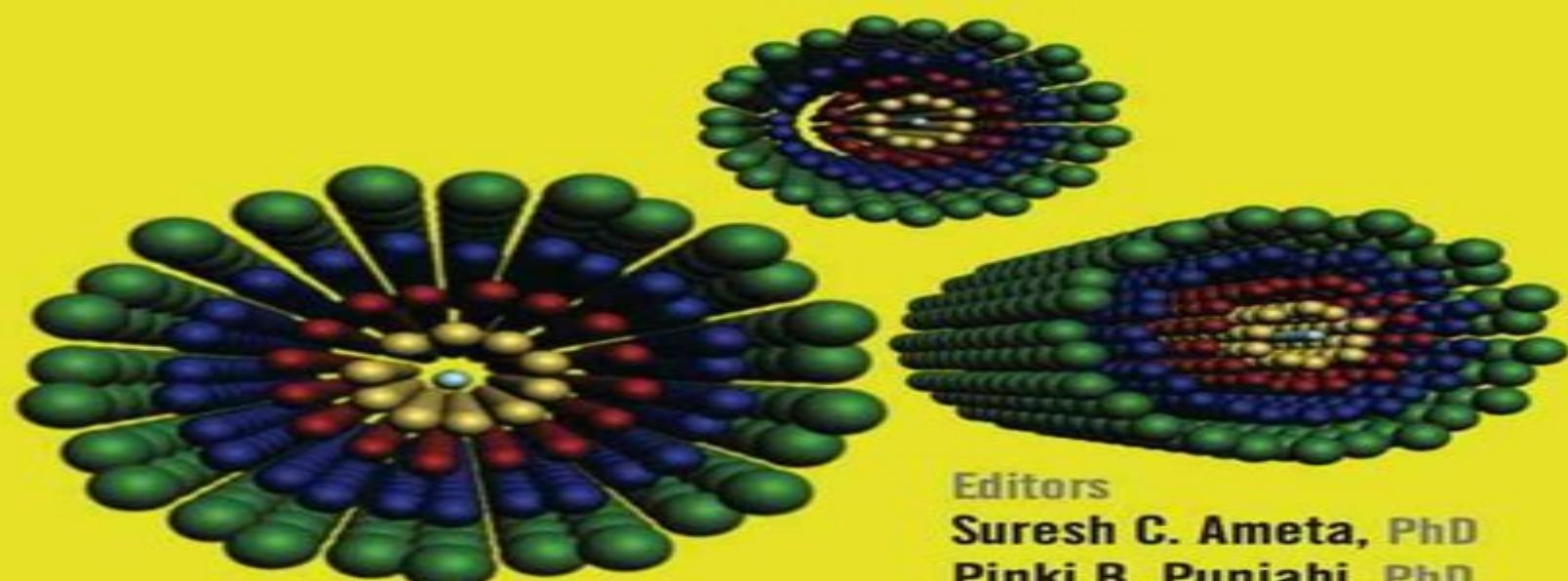


Microwave-Assisted Organic Synthesis

A Green Chemical Approach



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Microwave Assisted Organic Synthesis A Green Chemical Approach

Evelina Colacino, Felipe Garcia

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 synthesis **A Green Chemistry Approach - Microwave Assisted Organic Synthesis** B. P. Nandeshwarappa, 2017-04-20 **Microwave Chemical and Materials Processing** Satoshi Horikoshi, Robert F. Schiffmann, 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.

Green Chemical Synthesis with Microwaves and Ultrasound Daksheshwar Kumar

Verma, Chandrabhan Verma, Paz Otero Fuertes, 2024-12-23 **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. They often significant environmental byproducts 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 an 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

Microwave-assisted Organic Synthesis

D. Bogdal,2006-01-04 Microwave assisted Organic Synthesis One Hundred Reaction Procedures provides readers with a broad overview of microwave assisted Organic Synthesis enabling students and researchers alike to produce more efficient and high yield syntheses while saving time and resources The work addresses key problems faced by chemistry laboratories in academia and in industry that of an ever increasing need for procedures which are low waste energy efficient high yield occur over a short reaction period and use environmentally friendly solvents All these factors play an important role in the development of Green Chemistry methods and in this Microwave assisted Organic Synthesis One Hundred Reaction Procedures is an excellent resource for any library Provides a broad overview of microwave enhanced chemistry Extensive references to the source of each procedure including equipment used full operating procedure and associated hazards Includes exercises and worked problems which can support more independent study

Advances in Microwave Chemistry

Bimal K Banik,Debasish Bandyopadhyay,2018-12-07 Advances in Microwave Chemistry discusses the novel bond formation methodologies synergistic effects of microwaves with other entities sample preparation including digestion combustion and extraction techniques as well as selectivity in chemical processes Recent updates are provided on microwave assisted syntheses of pharmacologically significant aza oxo and other heterocycles including lactams nucleosides bile acids and sterols the preparation of nanomaterials composites and absorber layer materials for thin film This book also incorporates comparative discussions involving microwave irradiation with conventional methods in different aspects of organic inorganic medicinal and green chemistry Key Features Provides a comparative discussion on microwave irradiation with conventional methods in different aspects of organic inorganic medicinal and green chemistry Presents recent applications of microwave radiation in biocatalysis Offers a complete package correlating various aspects of microwaves in organic syntheses the biological impact of products formed in reactions pharmacological features and environmental sustainability of the procedures Explains microwave induced reactions on structurally complex bile acids and sterols Stands as a valuable and unique addition to the well established book series New Directions in Organic and Biological Chemistry

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 a laboratory 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 To illustrate the impact microwave assisted organic synthesis can haveon chemical

research case studies drawn mainly from the pharmaceutical industry are presented **The Production of Biodiesel and Related Fuel Additives** Pratibha S. Agrawal, Samuel L. Rokhum, C. Vanlalveni, N. Shaemningwar Moyon, 2024-07-04 This volume is a review of recent developments opportunities and challenges in the conversion of biomass from different sources to biodiesel or related fuel additives Key features of the book include fully referenced chapters edited by experts a blend of basic and current information on biodiesel and a summary of sustainable use of biodiesel byproducts like glycerol The volume presents a comprehensive range of 13 topics related to biodiesel production and fuel additives It begins with a historical overview of biodiesel and related additives followed by detailed chapters on biodiesel production from various sources such as soybean oil palm oil and Jatropha curcas oil Recent advancements in catalytic thermochemical conversions of biomass into biofuels are explored alongside discussions on algal biocrude as a feedstock The role of homogeneous and heterogeneous catalysis in biodiesel production is examined along with innovative techniques such as microwave and ultrasound assisted synthesis The book also presents information about the utilization of waste cooking oil and waste derived catalysts concluding with insights into solketal synthesis and catalytic biodiesel production via simultaneous esterification and transesterification The book imparts the technical know how on biodiesel and relevant fuel additives for engineering and sustainability students professionals and apprentices It also informs policymakers in the energy sector on the benefits of biodiesel as a renewable energy resource

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 **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

Microwave Heating as a Tool for Sustainable Chemistry Nicholas E. Leadbeater, 2010-09-02 Shorter reaction times higher product yields and enhanced selectivity are some of the advantages microwave heating has over conventional methods causing its use to transition from a curiosity to mainstream both in industrial and academic settings *Microwave Heating as a Tool for Sustainable Chemistry* showcases the application of microwave heati

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

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

Green Techniques for Organic Synthesis and Medicinal Chemistry Wei Zhang, Berkeley W. Cue, 2018-01-18 An updated overview of the rapidly developing field of green 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 **Aqueous Microwave Assisted Chemistry** Vivek Polshettiwar, Rajender S Varma, 2010-05-20 The demands for green and sustainable synthetic methods in the fields of healthcare and fine chemicals combined with the pressure to produce these substances expeditiously and in an environmentally benign fashion pose significant challenges to the synthetic chemical community Green chemistry can avoid pollution by utilizing techniques that are environmentally friendly by design and one of the best green techniques is the use of microwave MW assisted aqueous synthetic protocols Fusing MW technique with water as a benign reaction medium can offer an extraordinary synergistic effect with greater potential than these two individual components in isolation Selective microwave heating can be exploited to develop a high yield protocol and the use of water expedites the MW protocol with more energy efficiency This book provides an overview of the various processes developed using aqueous microwave chemistry and is written for chemists chemical engineers and researchers in the early stages who want to develop sustainable and green processes Written by well known microwave experts the book is a comprehensive examination of the field and is the first book that deals strictly with aqueous microwave chemistry and represents a significant effort towards green chemistry It covers all the microwave assisted aqueous reactions in depth including heterocycle synthesis metal catalysis enzyme catalysis polymer synthesis nanomaterials synthesis and nano catalysis Each chapter contains representative experimental procedures helping the reader quickly replicate some of the experiments to gain hands on experience **Current Organic Chemistry** , 2009 Provides in depth reviews on current progress in the fields of asymmetric synthesis organometallic chemistry bioorganic chemistry heterocyclic chemistry natural product chemistry and analytical methods in organic chemistry Each issue is edited by an appointed Executive Guest Editor Theilheimer's Synthetic Methods of Organic Chemistry A. F. Finch, 2005 The current volume in this renowned series is based on the journal literature published up to March 2005 A Reviews section inclusive of data published up to September 2005 is also included and the volume is introduced with a Trends section focusing on the very recent developments which will form the basis of volume 69 **Microwaves in Organic and Medicinal Chemistry** C. Oliver Kappe, Alexander Stadler, 2006-05-12 The authors of this guide are experts on the use of microwaves for drug synthesis as well as having much experience in teaching courses held under the auspices of the American Chemical Society and the IUPAC In this handy source of information for any practicing synthetic chemist they focus on common reaction types in medicinal chemistry including solid phase and combinatorial methods They consider the underlying theory latest developments in microwave applications and include a variety of examples from recent literature as well as less common applications that are equally relevant for organic and medicinal chemists An indispensable reference for researchers with an affinity to modern methods Microwave Assisted Chemistry Experiments B. R. Prashantha Kumar, T Durai Ananda Kumar, Swathi N, 2021-09

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