

3rd Edition

Green Chemistry

An Introductory Text

Mike Lancaster



Green Chemistry An Introductory Text

John Andraos, Albert S. Matlack



Green Chemistry An Introductory Text:

Green Chemistry Mike Lancaster, 2010 Aimed at students this introduction to green chemistry encourages new ways of thinking about how products and processes are developed

Green Chemistry Mike Lancaster, 2007-10-31 The challenge for today's new chemistry graduates is to meet society's demand for new products that have increased benefits but without detrimental effects on the environment *Green Chemistry An Introductory Text* outlines the basic concepts of the subject in simple language looking at the role of catalysts and solvents waste minimisation feedstocks green metrics and the design of safer more efficient processes The inclusion of industrially relevant examples throughout demonstrates the importance of green chemistry in many industry sectors Intended primarily for use by students and lecturers this book will also appeal to industrial chemists engineers managers or anyone wishing to know more about green chemistry

Green Chemistry Mike Lancaster, 2025-05-23 Climate change plastic in the oceans and air pollution are just three of the major environmental problems facing planet Earth It will take a global concerted effort to solve these from change in consumer culture and better global regulation to more sustainable product design and carbon neutral pollution free production processes Green chemistry does not have all the answers but with at least 98% of products having a chemical industry input along the supply chain adoption of the principles of green chemistry can make a huge difference This 4th edition still focuses on the core principles of green chemistry but has a new emphasis on how it can help solve many of the environmental problems facing society In particular there is a new chapter on energy decarbonisation and climate change bringing together sustainable energy solutions and possibilities for a fossil free chemical industry and showing how green chemistry can help other sectors such as transport and energy generation achieve net zero There is also discussion of the UN Sustainability Goals and how green chemistry is helping achieve these goals Green chemistry has moved on since the first edition of this book whilst still covering the basics this latest edition also looks at the practical solutions developed This timely textbook originally designed to cover a Masters course in Clean Technology and associated undergraduate modules at the University of York is suitable for undergraduates and post graduates as well as industrialists looking for new ways of thinking how more sustainable products and processes may be developed

Green Chemistry Indu Tucker Sidhwani, 2020

Green Chemistry Mike Lancaster, 2010

Introduction to Green Chemistry Albert Matlack, 2010-04-05 The book covers traditional green chemistry topics including catalysis benign solvents and alternative feedstocks It also discusses relevant but less frequently covered topics with chapters such as Chemistry of Longer Wear and Population and the Environment This coverage highlights the importance of chemistry to everyday life and demonstrates the benefits the expanded exploitation of green chemistry can have for society Copiously illustrated with over 800 figures this second edition provides an update from the frontiers of the field

Introduction to Green Chemistry John Andraos, Albert S. Matlack, 2022-03-09 Interest in green chemistry and clean processes has grown so much in recent years that topics such as fluorous biphasic catalysis metal organic frameworks

and process intensification which were barely mentioned in the First Edition have become major areas of research. In addition, government funding has ramped up the development of fuel cells and biofuels. This reflects the evolving focus from pollution remediation to pollution prevention. Copiously illustrated with more than 800 figures, the Third Edition provides an update from the frontiers of the field. It features supplementary exercises at the end of each chapter relevant to the chemical examples introduced in each chapter. Particular attention is paid to a new concluding chapter on the use of green metrics as an objective tool to demonstrate proof of synthesis plan efficiency and to identify where further improvements can be made through fully worked examples relevant to the chemical industry.

NEW AND EXPANDED RESEARCH TOPICS Metal organic frameworks, Metrics, Solid acids for alkylation of isobutene by butanes, Carbon molecular sieves, Mixed micro and mesoporous solids, Organocatalysis, Process intensification and gas phase enzymatic reactions, Hydrogen storage for fuel cells, Reactive distillation, Catalysts in action on an atomic scale.

UPDATED AND EXPANDED CURRENT EVENTS TOPICS Industry resistance to inherently safer chemistry, Nuclear power, Removal of mercury from vaccines, Removal of mercury and lead from primary explosives, Biofuels, Uses for surplus glycerol, New hard materials to reduce wear, Electronic waste, Smart growth.

The book covers traditional green chemistry topics including catalysis, benign solvents, and alternative feedstocks. It also discusses relevant but less frequently covered topics with chapters such as Chemistry of Long Wear and Population and the Environment. This coverage highlights the importance of chemistry to everyday life and demonstrates the benefits the expanded exploitation of green chemistry can have for society.

Green Chemistry for Beginners Anju Srivastava, Rakesh K. Sharma, 2021-07-14. With escalating concerns over the current state of our planet, the realization to work toward reducing our environmental footprint is gaining momentum. Scientists have realized that green chemistry is the key to reduce waste, rendering a healthy environment and improving human health. The 12 principles of green chemistry are the basic tenets that require understanding at the most fundamental level and implementation to promoting sustainable synthesis. This book discusses innovations in the form of greener technologies, superior green catalysts, alternate reaction media, and green energy sources and elaborates their tremendous potential in combating the critical global challenges on the horizon. It intends to empower and educate students to grasp the key concepts of green chemistry, think out of the box, and come up with new ideas and apply the basic concepts in greening the world. It extensively covers the goals of the United Nations 2030 Agenda of Sustainable Development, which can be successfully achieved with the aid of green chemistry. It also highlights cutting edge greener technologies such as biomimicry, miniaturization, and continuous flow. Edited by two active green chemists, the book presents in-depth knowledge of this field and is extremely helpful for undergraduate, graduate, and postgraduate readers as well as academic and industrial researchers.

Alternative Solvents for Green Chemistry Francesca Kerton, Ray Marriott, 2015-11-09. Everyone is becoming more environmentally conscious, and therefore chemical processes are being developed with their environmental burden in mind. This also means that more traditional chemical methods are being

replaced with new innovations and this includes new solvents Solvents are everywhere but how necessary are they They are used in most areas including synthetic chemistry analytical chemistry pharmaceutical production and processing the food and flavour industry and the materials and coatings sectors However the principles of green chemistry guide us to use less of them or to use safer more environmentally friendly solvents if they are essential Therefore we should always ask ourselves do we really need a solvent Green chemistry as a relatively new sub discipline is a rapidly growing field of research Alternative solvents including supercritical fluids and room temperature ionic liquids form a significant portion of research in green chemistry This is in part due to the hazards of many conventional solvents e g toxicity and flammability and the significant contribution that solvents make to the waste generated in many chemical processes Solvents are important in analytical chemistry product purification extraction and separation technologies and also in the modification of materials Therefore in order to make chemistry more sustainable in these fields a knowledge of alternative greener solvents is important This book which is part of a green chemistry series uses examples that tie in with the 12 principles of green chemistry e g atom efficient reactions in benign solvents and processing of renewable chemicals materials in green solvents Readers get an overview of the many different kinds of solvents written in such a way to make the book appropriate to newcomers to the field and prepare them for the green choices available The book also removes some of the mystique associated with alternative solvent choices and includes information on solvents in different fields of chemistry such as analytical and materials chemistry in addition to catalysis and synthesis The latest research developments not covered elsewhere are included such as switchable solvents and biosolvents Also some important areas that are often overlooked are described such as naturally sourced solvents including ethanol and ethyl lactate and liquid polymers including poly ethyleneglycol and poly dimethylsiloxane As well as these additional alternative solvents being included the book takes a more general approach to solvents not just focusing on the use of solvents in synthetic chemistry Applications of solvents in areas such as analysis are overviewed in addition to the more widely recognised uses of alternative solvents in organic synthesis Unfortunately as the book shows there is no universal green solvent and readers must ascertain their best options based on prior chemistry cost environmental benefits and other factors It is important to try and minimize the number of solvent changes in a chemical process and therefore the importance of solvents in product purification extraction and separation technologies are highlighted The book is aimed at newcomers to the field whether research students beginning investigations towards their thesis or industrial researchers curious to find out if an alternative solvent would be suitable in their work **Green**

Chemistry for Environmental Remediation Rashmi Sanghi,Vandana Singh,2012-01-20 The book explains the importance of chemistry in solving environmental issues by highlighting the role green chemistry plays in making the environment clean and green by covering a wide array of topics ranging from sustainable development microwave chemical reaction renewable feedstocks microbial bioremediation and other topics that when implemented will advance environmental improvement

Green Chemistry for Environmental Remediation provides insight on how educators from around the world have incorporated green chemistry into their classrooms and how the principles of green chemistry can be integrated into the curriculum. The volume presents high quality research papers as well as in depth review articles from eminent professors, scientists, chemists and engineers both from educational institutions and from industry. It introduces a new emerging green face of multidimensional environmental chemistry. Each chapter brings forward the latest literature and research being done in the related area. The 23 chapters are divided into 4 sections: Green chemistry and societal sustainability including teaching and education of green chemistry; Green lab technologies and alternative solutions to conventional laboratory techniques; Green bio energy sources as green technology frontiers; Green applications and solutions for remediation. Green Chemistry for Environmental Remediation is an important resource for academic researchers, students, faculty, industrial chemists, chemical engineers, environmentalists and anyone interested in environmental policy safeguarding the environment. Relevant industries include those in clean technology, renewable energy, biotechnology, pharmaceutical and chemicals. Another goal of the book is to promote and generate awareness about the relationship of green chemistry with the environment amongst the younger generation who might wish to pursue a career in green chemistry.

Green Chemistry Suresh C. Ameta, Rakshit Ameta, 2013-09-11. This book highlights the potential and scope of green chemistry for clean and sustainable development. Covering the basics, the book introduces readers to the need and the many applications and benefits and advantages of environmentally friendly chemical practice and application in industry. The book addresses such topics as ecologically safe products, catalysts and solvents, conditions needed to produce such products, types of chemical processes that are conducive to green chemistry and much more.

Tools for Green Chemistry, Volume 10 Evan S. Beach, Soumen Kundu, 2017-06-12. Volume 10 in the Handbook of Green Chemistry series provides useful and practical tools, databases and laboratory approaches to support chemists working in both academia and industry in achieving their green chemistry goals. Among many other helpful techniques covered, the authors offer prediction software, life cycle assessment methodology and screening tools.

Green Chemistry, Nanotechnology, and Sustainable Materials for Climate Action and Circular Economy Neethu Sundaresan, Bhoj Ram, Temesh Parker, Uday Kumar, Thaleswar, Sanket Ghule, Akshay Chavan, Shubham Jadhav, Dinesha H E, Pooja More, Manju Shahare, Rini Punathil, Rajendra K. Jain, A.P. Mishra, Supriyo Acharya, Rajiv Narula, Laxmikant, Gokul Prasad, P. Vishvanathan, Tapan Acharya, Gouri Acharya, Tukesha Sahu, Joel Osei-Asiamah, Sophia Zaidi, Mitali Gurung, 2025-09-03. The rapid pace of technological and industrial advancement has brought tremendous benefits to society, yet it has also generated pressing environmental challenges. Issues such as plastic pollution, resource depletion and climate change highlight the urgent need for innovative materials and sustainable solutions. Against this backdrop, Green Materials and Sustainable Applications has been conceived as a collective effort to showcase the latest developments, methodologies and applications of environmentally friendly materials and technologies. This volume brings together

interdisciplinary contributions from researchers and practitioners working across key domains of sustainable materials science including nanomaterials biopolymers photocatalysts thermodynamic modeling biomass valorization and green composites Each chapter not only explores the scientific principles underlying these technologies but also emphasizes their practical and societal implications particularly in reducing environmental impact enhancing material efficiency and supporting the global shift toward a circular economy

Green Chemistry for Environmental Sustainability Sanjay K. Sharma, Ackmez Mudhoo, 2010-07-19 When the Nobel Prize Committee recognized the importance of green chemistry with its 2005 Nobel Prize for Chemistry this relatively new science came into its own Although no concerted agreement has been reached yet about the exact content and limits of this interdisciplinary discipline there seems to be increasing interest in environmental topic

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

Green Chemistry Bela Torok, Timothy Dransfield, 2017-11-07 Green Chemistry An Inclusive Approach provides a broad overview of green chemistry for researchers from either an environmental science or chemistry background starting at a more elementary level incorporating more advanced concepts and including more chemistry as the book progresses Every chapter includes recent state of the art references in particular review articles to introduce researchers to this field of interest and provide them with information that can be easily built upon By bringing together experts in multiple subdisciplines of green chemistry the editors have curated a single central resource for an introduction to the discipline as a whole Topics include a broad array of research fields including the chemistry of Earth s atmosphere water and soil the synthesis of fine chemicals and sections on pharmaceuticals plastics energy related issues energy storage fuel cells solar and wind energy conversion etc greenhouse

gases and their handling chemical toxicology issues of everyday products from perfumes to detergents or clothing and environmental policy issues Introduces the topic of green chemistry with an overview of key concepts Expands upon presented concepts with the latest research and applications providing both the breadth and depth researchers need Includes a broad range of application based problems to make the content accessible for professional researchers and undergraduate and graduate students Authored by experts in a broad range of fields providing insider information on the aspects or challenges of a given field that are most important and urgent *The Algebra of Organic Synthesis* John Andraos, 2016-04-19 The Algebra of Organic Synthesis combines the aims philosophies and efforts involved in organic synthesis reaction optimization and green chemistry with techniques for determining quantitatively just how green synthesis plans are It provides the first complete quantitative description of synthesis strategy analysis in the context of green ch

Medicinal Chemistry Erin Johnson, 2019-06-25 Medicinal chemistry is the chemistry discipline concerned with the design development and synthesis of pharmaceutical drugs The discipline combines expertise from chemistry and pharmacology to identify develop and synthesize chemical agents that have a therapeutic use and to evaluate the properties of existing drugs Medicinal Chemistry is a comprehensive and well illustrated presentation of the major areas of pharmaceutical drug research It will be extremely useful as a textbook for pharmacy students and as an overview for research scientists entering the pharmaceutical industry The book integrates the chemical and pharmacological aspects of drugs and links the sciences of organic chemistry biochemistry and biology with the clinical areas of required for a thorough understanding of modern medicinal drugs The treatment of pain and disease is one of the most important goals of humankind Since ancient times people have been using potions natural products and even the dust of mummies for the treatment of health problems The healing effects of remedies were often ascribed to spirits and mythical entities but some of the herbal preparations did possess curative properties In the 1800 s scientists began to investigate potions to determine what chemicals were present that could cause the observed healing Thus the early days of medicinal chemistry began with the study of naturally occurring materials that were effective in treating human disorders The studies were tedious and required much sample purification and structure determination at a time when instrumental methods of analysis were unavailable Also screening methods for chemical efficacy against disease had to be developed so that humans were not used as trials The book builds on the history of drug development but does not assume much background knowledge The focus is on building upon the understandings of the molecular function of drugs and from there taking a broad overview of the topical issues and most frequently used techniques *Green Chemistry* Lalit Prasad, Shafat Ahmad Khan, Arvind Kumar Jain, Rajender S Varma, 2025-03-31 Green Chemistry A Path to Sustainable Development provides updated information and knowledge on green chemistry analyzes greener solutions for environmental sustainability and includes principles and practices metrics green chemical technologies and real world applications Chapters explore interdisciplinary approaches to green chemistry as

well as value added through by products conversion of waste to value added products remodeling from a conventional approach to a greener approach and the challenges opportunities and future scope of green chemistry Finally this book discusses green methodologies processes and new chemical development Evaluates greener approaches and methodologies for sustainability Discusses new chemical processes and methodologies recycling and zero waste technologies Explains broad spectrum utilization of greener products and processes in multi product synthesis industries Provides new insights for environmental sustainability job opportunities and economic development

Organometallic Chemistry Shay

Beck,2019-09-06 Organometallic Chemistry is the study of chemical compounds containing bonds between carbon and metal The term e Metale is defined deliberately broadly in this context and may include elements such as silicon or boron which are not metallic but are considered to be metalloids Almost all branches of chemistry and material science now interface with organometallic chemistry Organometallics find practical uses in stoichiometric and catalytic processes especially processes involving carbon monoxide and alkene derived polymers Organometallic OM chemistry is the study of compounds containing and reactions involving metal carbon bonds The metal carbon bond may be transient or temporary but if one exists during a reaction or in a compound of interest we re squarely in the domain of organometallic chemistry Despite the denotational importance of the M C bond bonds between metals and the other common elements of organic chemistry also appear in OM chemistry metal nitrogen metal oxygen metal halogen and even metal hydrogen bonds all play a role Metals cover a vast swath of the periodic table and include the alkali metals group 1 alkali earth metals group 2 transition metals groups 3 12 the main group metals groups 13 15 e under the stairse and the lanthanides and actinides The principal idea of this book is to offer a comprehensive coverage of unconventional and thought provoking topics in organometallic chemistry It also supplies practical information about reaction mechanisms along with the descriptions of contemporary applications to organic synthesis organized by mechanism and kinetic It will serve as a valuable reference tool for students and professional of organic and post organic chemistry who need to become better acquainted with the subject

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