
Green Engineering Environmentally Conscious Design Of Chemical Process Free

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Innovations in Green Chemistry and Green Engineering Springer Science & Business Media

This volume is part of a two-volume set devoted to promoting the concept of green chemistry. This first volume illustrates the pronounced impact that green engineering is having in a wide range of areas within chemical engineering, its counterpart will examine the role of green chemistry within chemical synthesis, each leading to a greater understanding and hopefully greater adoptions of these techniques by governments and chemical industry.

Sustainable Communities Design Handbook Elsevier
A comprehensive textbook on petrochemical conversion processes for petroleum and natural gas fractions as produced by refinery operations This innovative textbook provides essential links between

the chemical sciences and chemical technology, between petrochemistry and hydrocarbon technology. The book brings alive key concepts forming the basis of chemical technology and presents a solid background for innovative process development. In all chapters, the processes described are accompanied by simplified flow schemes, encouraging students to think in terms of conceptual process designs. Petrochemistry: Petrochemical Processing, Hydrocarbon Technology and Green Engineering introduces students to a variety of topics related to the petrochemical industry, hydrocarbon processing, fossil fuel resources, as well as fuels and chemicals conversion. The first chapter covers the fundamentals and principals for designing several of the processes in the book, including discussions on thermodynamics, chemical kinetics, reactor calculations, and industrial catalysts. The following chapters address recent advances in hydrocarbon technology, energy technology, and sources of hydrocarbons. The book then goes on to discuss the

petrochemical industry based on four basic pillars, all derived from petroleum and natural gas: Production of lower alkenes; other sources of lower alkenes; petrochemicals from C2-C3 alkenes Production of BTX aromatics; chemicals from BTX aromatics C1 technology Diversification of petrochemicals The growing importance of sustainable technology, process intensification and addressing greenhouse gas emissions is reflected throughout the book. Written for advanced students working in the areas of petrochemistry, hydrocarbon technology, natural gas, energy materials and technologies, alternative fuels, and recycling technologies the book is also a valuable reference for industrial practitioners in the oil and gas industry.

Green Engineering John Wiley & Sons
Chemical processes provide a diverse array of valuable products and materials used in applications ranging from health care to transportation and food processing. Yet these

same chemical processes that provide products and materials essential to modern economies, also generate substantial quantities of wastes and emissions. Green Chemistry is the utilization of a set of principles that reduces or eliminate the use or generation of hazardous substances in design. Due to extravagant costs needed to managing these wastes, tens of billions of dollars a year, there is a need to propose a way to create less waste. Emission and treatment standards continue to become more stringent, which causes these costs to continue to escalate. Green Chemistry and Engineering describes both the science (theory) and engineering (application) principles of Green Chemistry that lead to the generation of less waste. It explores the use of milder manufacturing conditions resulting from the use of smarter organic synthetic techniques and the

maintenance of atom efficiency that can temper the effects of chemical processes. By implementing these techniques means less waste, which will save industry millions of dollars over time. - Chemical processes that provide products and materials essential to modern economies generate substantial quantities of wastes and emissions, this new book describes both the science (theory) and engineering (application) principles of Green Chemistry that lead to the generation of less waste - This book contains expert advise from scientists around the world, encompassing developments in the field since 2000 - Aids manufacturers, scientists, managers, and engineers on how to implement ongoing changes in a vast developing field that is important to the environment and our lives
Petrochemistry CRC Press

This book explores a balance between energy and material, applied to chemical reactors with catalysis, to achieve a given purpose. It includes the fundamentals of chemical reaction engineering and explains reactor design fundamentals. The book spans the full range-from the fundamentals of kinetics and heterogeneous catalysis via modern experimental and theoretical results of model studies-to their equivalent large-scale industrial production processes. It also includes significant developments, with recent research case studies and literature.

Green Technology and Design for the Environment CRC Press
Environmentally safe engineering is one of the hottest and most controversial topics in technical

circles. Though many publications offer theory and intellectual discussion of the topic, this book provides practical, hands-on advice including hints and tips from the nation's top engineers. Green Electronics/Green Bottom Line offers practical advice for engineers and managers who want or need to incorporate environmental issues into the design process. The emerging discipline of Design for the Environment (DfE) combines engineering know-how with environmental awareness. Topics include international policy issues such as ISO 14000, materials selection (e.g., for recyclability),

manufacturing concerns like no-flux processes, and design issues such as power consumption. Real-world cases show how these elements can be included in everyday designs. Each chapter opens with a topical cartoon and lively story, interview or editorial. The discussion will then move to specific engineering issues and their economic and social context. The last section explores larger possibilities and new directions still to be explored by engineers concerned with education, health, and environmental quality. Contributors include engineers from Motorola, Analog Devices, Dupont, Compaq, Nortel, AMD, and Apple

Computer, and academics from universities in the US, Canada, the UK, and Europe, as well as the Rocky Mountain Institute. - An everyday guide to environmentally sound electronics design - Contributors include top engineers from the biggest electronics manufacturers and most prestigious universities - Real-world cases illustrate topics giving concepts the reader can apply immediately

Analysis, Synthesis and Design of Chemical Processes John Wiley & Sons

Green chemistry promotes improved syntheses as an intellectual endeavour that can have

a great impact both on preserving and utilizing our planet ' s finite resources and the quality of human life. This masterful accomplishment provides an evaluation of environmental impact metrics according to life cycle assessment analysis based on the Mackay compartment environmental model and Guiné environmental impact potentials formalism. Assumptions, limitations, and dealing with missing data are addressed. Best literature resources for finding key toxicological parameters are provided and applied to individual reactions as well as entire synthesis plans, in order to target molecules

of interest. Key Features: Provides an evaluation of environmental impact metrics according to life cycle assessment analysis Summarises safety-hazard metrics according to the same model as life cycle assessment including occupational exposure limits, risk phrases, flammability, and other physical parameters The book will be useful in a range of chemistry courses, from undergraduate to advanced graduate courses, whether based in lectures, tutorials or laboratory experiments Green Chemical Engineering CRC Press Written by an expert, using the same approach that made the previous two

editions so successful, Fundamentals of Environmental Chemistry, Third Edition expands the scope of book to include the strongly emerging areas broadly described as sustainability science and technology, including green chemistry and industrial ecology. The new edition includes: Increased emphasis on the applied aspects of environmental chemistry Hot topics such as global warming and biomass energy Integration of green chemistry and sustainability concepts throughout the text More and updated questions and answers, including some that require Internet research Lecturers Pack on CD-ROM with solutions manual, PowerPoint presentations, and chapter figures available upon qualifying course adoptions The book provides a basic course in chemical science, including the fundamentals of organic chemistry and

biochemistry. The author uses real-life examples from environmental chemistry, green chemistry, and related areas while maintaining brevity and simplicity in his explanation of concepts. Building on this foundation, the book covers environmental chemistry, broadly defined to include sustainability aspects, green chemistry, industrial ecology, and related areas. These chapters are organized around the five environmental spheres, the hydrosphere, atmosphere, geosphere, biosphere, and the anthrosphere. The last two chapters discuss analytical chemistry and its relevance to environmental chemistry. Manahan's clear, concise, and readable style makes the information accessible, regardless of the readers' level of chemistry knowledge. He demystifies the material for those who need the basics of chemical science for

their trade, profession, or study curriculum, as well as for readers who want to have an understanding of the fundamentals of sustainable chemistry in its crucial role in maintaining a livable planet.

Green Electronics/Green Bottom Line
CRC Press

With clear explanations, real-world examples and updated questions and answers, the tenth edition of Environmental Chemistry emphasizes the concepts essential to the practice of environmental science, technology and chemistry while introducing the newest innovations in the field. The author follows the general format and organization popular in preceding editions, including an approach based upon the five environmental spheres

and the relationship of environmental chemistry to the key concepts of sustainability, industrial ecology and green chemistry. This readily adaptable text has been revamped to emphasize important topics such as the world water crisis. It details global climate change to a greater degree than previous editions, underlining the importance of abundant renewable energy in minimizing human influences on climate. Environmental Chemistry is designed for a wide range of graduate and undergraduate courses in environmental chemistry, environmental science and sustainability as well as serving as a general reference work for professionals in the environmental

sciences and engineering.

Green Sustainable Process for Chemical and Environmental Engineering and Science Cambridge University Press

Green Sustainable Process for Chemical and Environmental Engineering and Science:

Switchable Solvents explores the preparation, properties, chemical processes and applications of this class of green solvents. The book provides an in-depth overview on the area of switchable solvents in various industrial applications, focusing on the purification and extraction of chemical compounds utilizing green chemistry protocols

that include liquid-liquid, solid-liquid, friendly organic synthesis and liquid-gas and lipids separation technologies. In addition, it includes recent advances in greener extraction and separation processes. This book will be an invaluable guide to students, professors, scientists and R&D industrial specialists working in the field of sustainable chemistry, organic, analytical, chemical engineering, environmental and pharmaceutical sciences. - Provides a broad overview of switchable solvents in sustainable chemical processes - Compares the use of switchable solvents as greener solvents over conventional solvents - Outlines eco-friendly chemical processes using switchable solvents - Lists various industrial separations/extraction processes using switchable solvents

Essentials of Chemical Reaction Engineering CRC Press

Environmental Engineering: Fundamentals, Sustainability, Design presents civil engineers with an introduction to chemistry and biology, through a mass and energy balance approach. ABET required topics of emerging importance, such as sustainable and global engineering are also covered. Problems, similar to those on the FE and PE exams, are integrated at the end of each chapter. - Aligned with the National Academy of

Engineering 's focus on managing carbon and nitrogen, the 2nd edition now includes a section on advanced technologies to more effectively reclaim nitrogen and phosphorous. Additionally, readers have immediate access to web modules, which address a specific topic, such as water and wastewater treatment. These modules include media rich content such as animations, audio, video and interactive problem solving, as well as links to explorations. Civil engineers will gain a global perspective, developing into innovative leaders in sustainable development.

Synthesis Green Metrics Prentice Hall
The Leading Integrated Chemical Process Design Guide: Now with New Problems, New Projects, and More More than ever,

effective design is the focal point of sound chemical engineering. Analysis, Synthesis, and Design of Chemical Processes, Third Edition, presents design as a creative process that integrates both the big picture and the small details – and knows which to stress when, and why. Realistic from start to finish, this book moves readers beyond classroom exercises into open-ended, real-world process problem solving. The authors introduce integrated techniques for every facet of the discipline, from finance to operations, new plant design to existing process optimization. This fully updated Third Edition presents entirely new problems at the end of every chapter. It also adds extensive coverage of batch process design, including realistic examples of equipment sizing for batch sequencing; batch scheduling for multi-product plants;

improving production via intermediate storage and parallel equipment; and new optimization techniques specifically for batch processes. Coverage includes Conceptualizing and analyzing chemical processes: flow diagrams, tracing, process conditions, and more Chemical process economics: analyzing capital and manufacturing costs, and predicting or assessing profitability Synthesizing and optimizing chemical processing: experience-based principles, BFD/PFD, simulations, and more Analyzing process performance via I/O models, performance curves, and other tools Process troubleshooting and “debottlenecking” Chemical engineering design and society: ethics, professionalism, health, safety, and new “green engineering” techniques Participating successfully in chemical engineering design teams Analysis, Synthesis, and Design of Chemical Processes, Third Edition, draws on nearly 35 years of innovative chemical engineering instruction at West Virginia University. It includes suggested curricula for both single-semester and year-long design courses; case studies and design projects with practical applications; and appendixes with current equipment cost data and preliminary design information for eleven chemical processes – including seven brand new to this edition. Green Architecture (GreenSource Books) John Wiley & Sons The combined challenges of health, comfort, climate change and energy security cross the boundaries of traditional building disciplines. This authoritative collection, focusing mostly on energy and ventilation, provides the current and next generation of building

engineering professionals with what they need to work closely with many disciplines to meet these challenges. A Handbook of Sustainable Building Engineering covers: how to design, engineer and monitor a building in a manner that minimises the emissions of greenhouse gases; how to adapt the environment, fabric and services of existing and new buildings to climate change; how to improve the environment in and around buildings to provide better health, comfort, security and productivity; and provides crucial expertise on monitoring the performance of buildings once they are occupied. The authors explain the principles behind built environment engineering, and offer practical guidance through international case studies.

Green Chemistry and Engineering

Pearson Education

Environmental engineering, is by its very nature, interdisciplinary and it is a challenge to develop courses that will provide students with a thorough broad-based curriculum that includes every aspect of the environmental engineering profession. Environmental engineers perform a variety of functions, most critical of which are process design for waste treatment or pollution prevention, fate and transport modeling, green engineering, and risk assessment. Chemical thermodynamics and chemical kinetics, the two main pillars of physical chemistry, are two of the many subjects that are crucial to environmental engineering. Based on the success of the successes of previous editions, Principles of Environmental Thermodynamics and Kinetics, Fourth Edition, provides an

overarching view of the applications of chemical thermodynamics and kinetics in various aspects of the field of environmental science and engineering. Written by experts in the field, this new edition offers an improved logical progression of the text with principles and applications, includes new case studies with current relevant environmental events and their relationship to thermodynamics and kinetics, and adds examples and problems for the updated environmental events. It also includes a comprehensive analysis of green engineering with relation applications, updated appendices, and an increased number of thermodynamic and kinetic data for chemical species. While it is primarily intended for undergraduate students at the junior/senior level, the breadth and scope of this book make it a valuable resource

for introductory graduate courses and a useful reference for environmental engineers. Principles of Environmental Thermodynamics and Kinetics Pearson Education Sustainability of Products, Processes and Supply Chains: Theory and Applications presents the recent theoretical developments and applications on the interface between sustainability and process systems engineering. It offers a platform for cutting-edge, holistic analyses of key challenges associated with computer-aided tools for incorporating sustainability principles and approaches into the design and operations of multi-scale process

systems, ranging from molecular and products systems, to energy and chemical processes, and supply chains.

- Presents recent theoretical developments and applications on the interface between sustainability engineering and process engineering
- Offers cutting-edge, holistic analyses of key challenges associated with computer-aided tools for incorporating sustainability principles and approaches into the design and operations of multi-scale process systems
- Brings together the perspectives of leading researchers to stimulate innovative thinking in terms of sustainability

The Integrative Design Guide to Green Building Academic Press

This book highlights cutting-edge ecodesign research, covering product and service design, smart manufacturing, and social perspectives in ecodesign. Featuring selected papers presented at EcoDesign 2019: 11th International Symposium on Environmentally Conscious Design and Inverse Manufacturing, it also includes diverse, interdisciplinary approaches to foster ecodesign research and activities. In the context of Sustainable Development Goals (SDGs), it addresses the need for the manufacturing industry to design innovations for sustainable value creation, taking into account technological developments, legislation, and consumer lifestyles. Further, the

book discusses the concept of circular economy, which originated in Europe and aims to increase resource efficiency by shifting away from the linear economy. Focusing on product life cycle design and management, smart manufacturing, circular economy, and business strategies, and providing useful approaches and solutions to these emerging concepts, this book is intended for both researchers and practitioners working in the broad field of ecodesign and sustainability.

ICSDEC 2012 CRC Press

Written at a level that is accessible to students in all disciplines, Introduction to Environmental Management, Second Edition translates complex environmental issues into practical and understandable terms. The book provides students and practitioners an understanding of the regulations, pollutants, and waste management issues that can be applied in various related environmental fields and industries. This new edition is updated throughout and adds eleven new chapters, including coverage of water conservation, water toxins, measurement methods, desalination, industrial ecology, legal issues, and more. Features: Updated throughout and includes eleven all-new chapters Reviews the specialized literature on pollution prevention, sustainability, and the role of optimization in water treatment and related areas, as well as references for further reading Provides

illustrative examples and case studies that complement the text throughout. Includes ancillary exams and a solutions manual for adopting instructors. This book serves as a complete teaching tool, offering a combination of insightful coverage, concise language, and convenient pedagogical features, and supplies practical guidance that will aid students and practitioners alike.

Sustainability in Engineering Design and Construction Elsevier

As more factors, perspectives, and metrics are incorporated into the planning and building process, the roles of engineers and designers are increasingly being fused together. Sustainable Infrastructure

explores this trend with in-depth look at sustainable engineering practices in an urban design as it involves watershed master-planning, green building, optimizing water reuse, reclaiming urban spaces, green streets initiatives, and sustainable master-planning. This complete guide provides guidance on the role creative thinking and collaborative team-building play in meeting solutions needed to affect a sustainable transformation of the built environment.

EcoDesign and Sustainability I

Springer Nature

Sustainable Materials and Green Processing for Energy Conversion

provides a concise reference on green processing and synthesis of materials required for the next generation of devices used in renewable energy conversion and storage. The book covers the processing of bio-organic materials, environmentally-friendly organic and inorganic sources of materials, synthetic green chemistry, bioresorbable and transient properties of functional materials, and the concept of sustainable material design. The book features chapters by worldwide experts and is an important reference for students, researchers, and engineers interested in gaining

extensive knowledge concerning green processing of sustainable, green functional materials for next generation energy devices. Additionally, functional materials used in energy devices must also be able to degrade and decompose with minimum energy after being disposed of at their end-of-life. Environmental pollution is one of the global crises that endangers the life cycles of living things. There are multiple root causes of this pollution, including industrialization that demands a huge supply of raw materials for the production of products related to meeting the demands of the Internet-of-Things.

As a result, improvement of material and product life cycles by incorporation of green, sustainable principles is essential to address this challenging issue. - Offers a resourceful reference for readers interested in green processing of environmentally-friendly and sustainable materials for energy conversion and storage devices - Focuses on designing of materials through green-processing concepts - Highlights challenges and opportunities in green processing of renewable materials for energy devices
Green Engineering and Technology
Elsevier

Processes that meet the objectives of green chemistry and chemical engineering minimize waste and energy use, and eliminate toxic by-products. Given the ubiquitous nature of products from chemical processes in our lives, green chemistry and chemical engineering are vital components of any sustainable future. Gathering together ten peer-reviewed articles from the Encyclopedia of Sustainability Science and Technology, Innovations in Green Chemistry and Green Engineering provides a comprehensive introduction to the state-of-the-art in this key area of sustainability

research. Worldwide experts present the latest developments on topics ranging from organic batteries and green catalytic transformations to green nanoscience and nanotoxicology. An essential, one-stop reference for professionals in research and industry, this book also fills the need for an authoritative course text in environmental and green chemistry and chemical engineering at the upper-division undergraduate and graduate levels.

Citizen Engineer Elsevier

Accompanying DVD-ROM contains many realistic, interactive simulations.