

Process And Reactor Design For Thermo Chemical Energy Stores

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Analysis of state laws and regulations impacting animal waste management - 1978

Advances in Concentrating Solar Thermal Research and Technology - Manuel Blanco 2016-11-10

After decades of research and development, concentrating solar thermal (CST) power plants (also known as concentrating solar power (CSP) and as Solar Thermal Electricity or STE systems) are now starting to be widely commercialized. Indeed, the IEA predicts that by 2050, with sufficient support over ten percent of global electricity could be produced by concentrating solar thermal power plants. However, CSP plants are just but one of the many possible applications of CST systems. Advances in Concentrating Solar Thermal Research and Technology provides detailed information on the latest advances in CST systems research and technology. It promotes a deep understanding of the challenges the different CST technologies are confronted with, of the research that is taking place worldwide to address those challenges, and of the impact that the innovation that this research is fostering could have on the emergence of new CST components and concepts. It is anticipated that these developments will substantially increase the cost-competitiveness of commercial CST solutions and reshape the technological landscape of both CST technologies and the CST industry. After an introductory chapter, the next three parts of the book focus on

key CST plant components, from mirrors and receivers to thermal storage. The final two parts of the book address operation and control and innovative CST system concepts. Contains authoritative reviews of CST research taking place around the world Discusses the impact this research is fostering on the emergence of new CST components and concepts that will substantially increase the cost-competitiveness of CST power Covers both major CST plant components and system-wide issues Advances in Heat Transfer and Thermal Engineering - Chuang Wen 2021-06-01

This book gathers selected papers from the 16th UK Heat Transfer Conference (UKHTC2019), which is organised every two years under the aegis of the UK National Heat Transfer Committee. It is the premier forum in the UK for the local and international heat transfer community to meet, disseminate ongoing work, and discuss the latest advances in the heat transfer field. Given the range of topics discussed, these proceedings offer a valuable asset for engineering researchers and postgraduate students alike.

Chemical Reactor Design and Control - William L. Luyben 2007-07-16
Chemical Reactor Design and Control uses process simulators like Matlab®, Aspen Plus, and Aspen Dynamics to study the design of chemical reactors and their dynamic control. There are numerous books that focus on steady-state reactor design. There are no books that consider practical control systems for real industrial reactors. This

unique reference addresses the simultaneous design and control of chemical reactors. After a discussion of reactor basics, it: Covers three types of classical reactors: continuous stirred tank (CSTR), batch, and tubular plug flow Emphasizes temperature control and the critical impact of steady-state design on the dynamics and stability of reactors Covers chemical reactors and control problems in a plantwide environment Incorporates numerous tables and shows step-by-step calculations with equations Discusses how to use process simulators to address diverse issues and types of operations This is a practical reference for chemical engineering professionals in the process industries, professionals who work with chemical reactors, and students in undergraduate and graduate reactor design, process control, and plant design courses.

Energy - 1976

Energy and Water Development Appropriations for 2004 - United States. Congress. House. Committee on Appropriations. Subcommittee on Energy and Water Development 2003

Advances in Carbon Management Technologies - Subhas Sikdar
2020-03-19

Advances in Carbon Management Technologies comprises 43 chapters contributed by experts from all over the world. Volume 1 of the book, containing 23 chapters, discusses the status of technologies capable of yielding substantial reduction of carbon dioxide emissions from major combustion sources. Such technologies include renewable energy sources that can replace fossil fuels and technologies to capture CO₂ after fossil fuel combustion or directly from the atmosphere, with subsequent permanent long-term storage. The introductory chapter emphasizes the gravity of the issues related to greenhouse gas emission global temperature correlation, the state of the art of key technologies and the necessary emission reductions needed to meet international warming targets. Section 1 deals with global challenges associated with key fossil fuel mitigation technologies, including removing CO₂ from the atmosphere, and emission measurements.

Section 2 presents technological choices for coal, petroleum, and natural gas for the purpose of reducing carbon footprints associated with the utilization of such fuels. Section 3 deals with promising contributions of alternatives to fossil fuels, such as hydropower, nuclear, solar photovoltaics, and wind. Chapters 19 of this book is freely available as a downloadable Open Access PDF under a Creative Commons Attribution-Non Commercial-No Derivatives 4.0 license. The links can be found on the book's Routledge web page at

<https://www.routledge.com/9780367198428>

Chemical Process Design and Integration - Robin Smith 2016-08-02
Written by a highly regarded author with industrial and academic experience, this new edition of an established bestselling book provides practical guidance for students, researchers, and those in chemical engineering. The book includes a new section on sustainable energy, with sections on carbon capture and sequestration, as a result of increasing environmental awareness; and a companion website that includes problems, worked solutions, and Excel spreadsheets to enable students to carry out complex calculations.

Advances in Thermochemical Biomass Conversion - A. V. Bridgwater 1994

Modeling of Chemical Kinetics and Reactor Design - A. Kayode Coker
2001

Selecting the best type of reactor for any particular chemical reaction, taking into consideration safety, hazard analysis, scale-up, and many other factors is essential to any industrial problem. An understanding of chemical reaction kinetics and the design of chemical reactors is key to the success of the of the chemist and the chemical engineer in such an endeavor. This valuable reference volume conveys a basic understanding of chemical reactor design methodologies, incorporating control, hazard analysis, and other topics not covered in similar texts. In addition to covering fluid mixing, the treatment of wastewater, and chemical reactor modeling, the author includes sections on safety in chemical reaction and scale-up, two topics that are often neglected or overlooked. As a real-

world introduction to the modeling of chemical kinetics and reactor design, the author includes a case study on ammonia synthesis that is integrated throughout the text. The text also features an accompanying CD, which contains computer programs developed to solve modeling problems using numerical methods. Students, chemists, technologists, and chemical engineers will all benefit from this comprehensive volume. Shows readers how to select the best reactor design, hazard analysis, and safety in design methodology Features computer programs developed to solve modeling problems using numerical methods

Chemical Engineering Design - Gavin Towler 2012-01-25

Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, this edition has been specifically developed for the U.S. market. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards. It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data, and Excel spreadsheet calculations, plus over 150 Patent References for downloading from the companion website. Extensive instructor resources, including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for

students or practicing engineers working on design projects. New discussion of conceptual plant design, flowsheet development and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of batch processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data and Excel spreadsheet calculations plus over 150 Patent References, for downloading from the companion website Extensive instructor resources: 1170 lecture slides plus fully worked solutions manual available to adopting instructors

Zero Waste Biorefinery - Yogalakshmi Kadapakkam Nandabalan
2022-01-12

This book is a compilation of process, technologies and value added products such as high value biochemicals and biofuels produced from different waste biorefineries. The book is sectioned into four categories providing a comprehensive outlook about zero waste biorefinery and technologies associated with it. The emerging technologies that potentially put back the lignocellulosic waste, municipal solid waste and food waste into intrinsic recycling for production of high value biochemicals and bioenergy, along with associated challenges and opportunities are also included. The content also focuses on algal biorefineries leading to sustainable circular economy through production of broad spectrum of bioactive compounds, bioethanol, biobutanol, biohydrogen, biodiesel through integrated biorefinery approach. The volume also includes chapters on conversion technologies and

mathematical models applied for process optimization. A sound foundation about the underlying principles of biorefineries and a up-to-date state-of-the-art based overview on the latest advances in terms of scientific knowledge, techno-economic developments and life cycle assessment methodologies of integrated waste biorefinery is provided. This volume will be of great interest to professionals, post-graduate students and policy makers involved in waste management, biorefineries, circular economy and sustainable development.

Modeling of Chemical Kinetics and Reactor Design - A. Kayode Coker 2001-08-14

Selecting the best type of reactor for any particular chemical reaction, taking into consideration safety, hazard analysis, scale-up, and many other factors is essential to any industrial problem. An understanding of chemical reaction kinetics and the design of chemical reactors is key to the success of the of the chemist and the chemical engineer in such an endeavor. This valuable reference volume conveys a basic understanding of chemical reactor design methodologies, incorporating control, hazard analysis, and other topics not covered in similar texts. In addition to covering fluid mixing, the treatment of wastewater, and chemical reactor modeling, the author includes sections on safety in chemical reaction and scale-up, two topics that are often neglected or overlooked. As a real-world introduction to the modeling of chemical kinetics and reactor design, the author includes a case study on ammonia synthesis that is integrated throughout the text. The text also features an accompanying CD, which contains computer programs developed to solve modeling problems using numerical methods. Students, chemists, technologists, and chemical engineers will all benefit from this comprehensive volume. Shows readers how to select the best reactor design, hazard analysis, and safety in design methodology Features computer programs developed to solve modeling problems using numerical methods

Nuclear Energy for Hydrogen Generation through Intermediate Heat Exchangers - Bahman Zohuri 2016-07-15

This book describes recent technological developments in next generation nuclear reactors that have created renewed interest in

nuclear process heat for industrial applications. The author's discussion mirrors the industry's emerging focus on combined cycle Next Generation Nuclear Plants' (NGNP) seemingly natural fit in producing electricity and process heat for hydrogen production. To utilize this process heat, engineers must uncover a thermal device that can transfer the thermal energy from the NGNP to the hydrogen plant in the most performance efficient and cost effective way possible. This book is written around that vital quest, and the author describes the usefulness of the Intermediate Heat Exchanger (IHX) as a possible solution. The option to transfer heat and thermal energy via a single-phase forced convection loop where fluid is mechanically pumped between the heat exchangers at the nuclear and hydrogen plants is presented, and challenges associated with this tactic are discussed. As a second option, heat pipes and thermosyphons, with their ability to transport very large quantities of heat over relatively long distance with small temperature losses, are also examined.

Chemical Engineering Progress - 2009

Transport Phenomena for Chemical Reactor Design - Laurence A. Belfiore 2003-07-04

Laurence Belfiore's unique treatment meshes two mainstream subject areas in chemical engineering: transport phenomena and chemical reactor design. Expressly intended as an extension of Bird, Stewart, and Lightfoot's classic *Transport Phenomena*, and Froment and Bischoff's *Chemical Reactor Analysis and Design*, Second Edition, Belfiore's unprecedented text explores the synthesis of these two disciplines in a manner the upper undergraduate or graduate reader can readily grasp. *Transport Phenomena for Chemical Reactor Design* approaches the design of chemical reactors from microscopic heat and mass transfer principles. It includes simultaneous consideration of kinetics and heat transfer, both critical to the performance of real chemical reactors. Complementary topics in transport phenomena and thermodynamics that provide support for chemical reactor analysis are covered, including: Fluid dynamics in the creeping and potential flow regimes around solid

spheres and gas bubbles The corresponding mass transfer problems that employ velocity profiles, derived in the book's fluid dynamics chapter, to calculate interphase heat and mass transfer coefficients Heat capacities of ideal gases via statistical thermodynamics to calculate Prandtl numbers Thermodynamic stability criteria for homogeneous mixtures that reveal that binary molecular diffusion coefficients must be positive In addition to its comprehensive treatment, the text also contains 484 problems and ninety-six detailed solutions to assist in the exploration of the subject. Graduate and advanced undergraduate chemical engineering students, professors, and researchers will appreciate the vision, innovation, and practical application of Laurence Belfiore's Transport Phenomena for Chemical Reactor Design. *Advanced Nuclear Research* - United States. Congress. House. Committee on Science and Astronautics. Subcommittee on Aeronautics and Space Technology 1974

Reactor and Process Design in Sustainable Energy Technology - Fan Shi 2014-07-28

Reactor Process Design in Sustainable Energy Technology compiles and explains current developments in reactor and process design in sustainable energy technologies, including optimization and scale-up methodologies and numerical methods. Sustainable energy technologies that require more efficient means of converting and utilizing energy can help provide for burgeoning global energy demand while reducing anthropogenic carbon dioxide emissions associated with energy production. The book, contributed by an international team of academic and industry experts in the field, brings numerous reactor design cases to readers based on their valuable experience from lab R&D scale to industry levels. It is the first to emphasize reactor engineering in sustainable energy technology discussing design. It provides comprehensive tools and information to help engineers and energy professionals learn, design, and specify chemical reactors and processes confidently. Emphasis on reactor engineering in sustainable energy technology Up-to-date overview of the latest reaction engineering

techniques in sustainable energy topics Expert accounts of reactor types, processing, and optimization Figures and tables designed to comprehensively present concepts and procedures Hundreds of citations drawing on many most recent and previously published works on the subject

Multiphase Flow and Chemical Reactor Thermodynamics for Hydrolysis and Thermochemical Production - Kevin Pope 2012

Energy Research Abstracts - 1986

Thermochemical Conversion of Biomass to Liquid Fuels and Chemicals - Mark Crocker 2010-09-10

There is increasing recognition that low-cost, high capacity processes for the conversion of biomass into fuels and chemicals are essential for expanding the utilization of carbon neutral processes, reducing dependency on fossil fuel resources, and increasing rural income. While much attention has focused on the use of biomass to produce ethanol via fermentation, high capacity processes are also required for the production of hydrocarbon fuels and chemicals from lignocellulosic biomass. In this context, this book provides an up-to-date overview of the thermochemical methods available for biomass conversion to liquid fuels and chemicals. In addition to traditional conversion technologies such as fast pyrolysis, new developments are considered, including catalytic routes for the production of liquid fuels from carbohydrates and the use of ionic liquids for lignocellulose utilization. The individual chapters, written by experts in the field, provide an introduction to each topic, as well as describing recent research developments.

Nanoparticle Technologies - Farid Bensebaa 2012-12-31

Several nanoparticle technologies are currently being used and others are under development to address the global energy demand and environmental issues. Technicoeconomic challenges of energy conversion (fuel cell and solar cell), saving (by reducing raw materials and energy demands), and storage (batteries) could be addressed using nanoparticles. Catalysis remains the most important commercial

application of nanoparticles. Nanoparticle-based lightweight materials (aerogels) will likely have a significant impact in the transportation sector. Electrodes currently use nanoparticles in advanced secondary batteries. Semiconductor nanoparticles are used in photoelectrochemical cells. Hydrogen production and storage issues could be addressed using advanced nanoparticle attributes. Nanoparticles will likely contribute in the medium term to new lighting and lubrication solutions. Numerous other long-term energy concepts using nanoparticles are under development.

Fusion Energy Update - 1979

Fossil Energy Update - 1977

Multiphase Catalytic Reactors - Zeynep Ilse Önsan 2016-06-03

Provides a holistic approach to multiphase catalytic reactors from their modeling and design to their applications in industrial manufacturing of chemicals Covers theoretical aspects and examples of fixed-bed, fluidized-bed, trickle-bed, slurry, monolith and microchannel reactors Includes chapters covering experimental techniques and practical guidelines for lab-scale testing of multiphase reactors Includes mathematical content focused on design equations and empirical relationships characterizing different multiphase reactor types together with an assortment of computational tools Involves detailed coverage of multiphase reactor applications such as Fischer-Tropsch synthesis, fuel processing for fuel cells, hydrotreating of oil fractions and biofuels processing

Progress in Exergy, Energy, and the Environment - Ibrahim Dincer 2014-06-17

This thorough and highly relevant volume examines exergy, energy and the environment in the context of energy systems and applications and as a potential tool for design, analysis, optimization. It further considers their role in minimizing and/or eliminating environmental impacts and providing for sustainable development. In this regard, several key topics ranging from the basics of the thermodynamic concepts to advanced

exergy analysis techniques in a wide range of applications are covered.

Thermal Safety of Chemical Processes - Francis Stoessel 2021-05-24

Completely revised and updated to reflect the current IUPAC standards, this second edition is enlarged by five new chapters dealing with the assessment of energy potential, physical unit operations, emergency pressure relief, the reliability of risk reducing measures, and process safety and process development. Clearly structured in four parts, the first provides a general introduction and presents the theoretical, methodological and experimental aspects of thermal risk assessment. Part II is devoted to desired reactions and techniques allowing reactions to be mastered on an industrial scale, while the third part deals with secondary reactions, their characterization, and techniques to avoid triggering them. Due to the inclusion of new content and restructuring measures, the technical aspects of risk reduction are highlighted in the new section that constitutes the final part. Each chapter begins with a case history illustrating the topic in question, presenting lessons learned from the incident. Numerous examples taken from industrial practice are analyzed, and each chapter concludes with a series of exercises or case studies, allowing readers to check their understanding of the subject matter. Finally, additional control questions have been added and solutions to the exercises and problems can now be found.

The State of the Art of Thermo-Chemical Heat Storage - Salvatore Vasta 2021-08-30

The heat storage based on thermochemical technology is associated with higher amounts of energy stored with respect to systems based on sensible heat. This interesting feature is stimulating the interest of the scientific community, among energy providers and grid managers, since it can effectively support the operation and integration of renewable high-efficiency systems and local smart grids. Research in this field is achieving unprecedented goals thanks to the profitable exploitation of results obtained in the field of heat pumps and thermally driven systems. The present issue offers the reader a sensational window to this rapidly evolving world.

Chemical Reactor Design and Operation - K. Roel Westerterp 1991-01-08

Chemical Reactor Design and Operation K. R. Westerterp, W. P. M. van Swaaij and A. A. C. M. Beenackers Chemical Reaction Engineering Laboratories, Twente University of Technology, Enschede, The Netherlands This is a comprehensive handbook on the design and operation of chemical reactors which are vital elements in every manufacturing process. The book offers an introduction to the modern literature and covers in depth the relevant theory of chemical reactors. The theory is illustrated by numerous worked examples typical to chemical reaction engineering practice in research, development, design and operation. The examples range from fine chemicals to large scale production and from water purification to metallurgical processes, commencing with simple homogenous model reactors and then moving to the complicated, multi-phase, heterogeneous reactors met with in reality. All the examples are based on the industrial experience of the authors. Much effort is dedicated to the behaviour of reactors in practice and to the capacity, yield and selectivity of the reactor. The book is thoroughly indexed and cross-referenced. This edition will be particularly useful to undergraduate and graduate students studying chemical reactors.

Contents Fundamentals of chemical reactor calculations Model reactors: single reactions, isothermal single phase reactor calculations Model reactors: multiple reactions, isothermal single phase reactors Residence time distribution and mixing in continuous flow reactors Influence of micromixing on chemical reactions The role of the heat effect in model reactors Multi-phase reactors, single reactions Multi-phase reactors, multiple reactions Heat effects in multi-phase reactors The authors: The authors have accumulated a long experience both in fine chemicals and in the petrochemicals industry, in Europe as well as abroad. Currently they are jointly responsible for the research work in chemical reaction engineering and process development at Twente University. Several new reactor types and new processes have been developed at their institute and present research interests include gasification, fluidization and gas-liquid reactors, three-phase reactors, high-pressure technology in chemical reaction engineering, thermal behaviour of heterogeneous reactors and computer design and economic evaluation of reaction units

and chemical plants.

Encyclopedia of Sustainable Technologies - Martin Abraham
2017-07-04

Encyclopedia of Sustainable Technologies provides an authoritative assessment of the sustainable technologies that are currently available or in development. Sustainable technology includes the scientific understanding, development and application of a wide range of technologies and processes and their environmental implications. Systems and lifecycle analyses of energy systems, environmental management, agriculture, manufacturing and digital technologies provide a comprehensive method for understanding the full sustainability of processes. In addition, the development of clean processes through green chemistry and engineering techniques are also described. The book is the first multi-volume reference work to employ both Life Cycle Analysis (LCA) and Triple Bottom Line (TBL) approaches to assessing the wide range of technologies available and their impact upon the world. Both approaches are long established and widely recognized, playing a key role in the organizing principles of this valuable work. Provides readers with a one-stop guide to the most current research in the field Presents a grounding of the fundamentals of the field of sustainable technologies Written by international leaders in the field, offering comprehensive coverage of the field and a consistent, high-quality scientific standard Includes the Life Cycle Analysis and Triple Bottom Line approaches to help users understand and assess sustainable technologies

On Solar Hydrogen and Nanotechnology - Lionel Vayssieres
2010-01-26

More energy from the sun strikes Earth in an hour than is consumed by humans in an entire year. Efficiently harnessing solar power for sustainable generation of hydrogen requires low-cost, purpose-built, functional materials combined with inexpensive large-scale manufacturing methods. These issues are comprehensively addressed in On Solar Hydrogen & Nanotechnology - an authoritative, interdisciplinary source of fundamental and applied knowledge in all

areas related to solar hydrogen. Written by leading experts, the book emphasizes state-of-the-art materials and characterization techniques as well as the impact of nanotechnology on this cutting edge field. Addresses the current status and prospects of solar hydrogen, including major achievements, performance benchmarks, technological limitations, and crucial remaining challenges Covers the latest advances in fundamental understanding and development in photocatalytic reactions, semiconductor nanostructures and heterostructures, quantum confinement effects, device fabrication, modeling, simulation, and characterization techniques as they pertain to solar generation of hydrogen Assesses and establishes the present and future role of solar hydrogen in the hydrogen economy Contains numerous graphics to illustrate concepts, techniques, and research results On Solar Hydrogen & Nanotechnology is an essential reference for materials scientists, physical and inorganic chemists, electrochemists, physicists, and engineers carrying out research on solar energy, photocatalysis, or semiconducting nanomaterials, both in academia and industry. It is also an invaluable resource for graduate students and postdoctoral researchers as well as business professionals and consultants with an interest in renewable energy.

Multiphase Reactor Engineering for Clean and Low-Carbon Energy Applications - Yi Cheng 2017-02-21

Provides a comprehensive review on the brand-new development of several multiphase reactor techniques applied in energy-related processes Explains the fundamentals of multiphase reactors as well as the sophisticated applications Helps the reader to understand the key problems and solutions of clean coal conversion techniques Details the emerging processes for novel refining technology, clean coal conversion techniques, low-cost hydrogen productions and CO₂ capture and storage Introduces current energy-related processes and links the basic principles of emerging processes to the features of multiphase reactors providing an overview of energy conversion in combination with multiphase reactor engineering Includes case studies of novel reactors to illustrate the special features of these reactors

Multi-Objective Optimization in Chemical Engineering - Gade Pandu Rangaiah 2013-03-20

For reasons both financial and environmental, there is a perpetual need to optimize the design and operating conditions of industrial process systems in order to improve their performance, energy efficiency, profitability, safety and reliability. However, with most chemical engineering application problems having many variables with complex inter-relationships, meeting these optimization objectives can be challenging. This is where Multi-Objective Optimization (MOO) is useful to find the optimal trade-offs among two or more conflicting objectives. This book provides an overview of the recent developments and applications of MOO for modeling, design and operation of chemical, petrochemical, pharmaceutical, energy and related processes. It then covers important theoretical and computational developments as well as specific applications such as metabolic reaction networks, chromatographic systems, CO₂ emissions targeting for petroleum refining units, ecodesign of chemical processes, ethanol purification and cumene process design. Multi-Objective Optimization in Chemical Engineering: Developments and Applications is an invaluable resource for researchers and graduate students in chemical engineering as well as industrial practitioners and engineers involved in process design, modeling and optimization.

Gasification for Synthetic Fuel Production - R Luque 2014-08-29

Gasification involves the conversion of carbon sources without combustion to syngas, which can be used as a fuel itself or further processed to synthetic fuels. The technology provides a potentially more efficient means of energy generation than direct combustion. This book provides an overview of gasification science and engineering and the production of synthetic fuels by gasification from a variety of feedstocks. Part one introduces gasification, reviewing the scientific basis of the process and gasification engineering. Part two then addresses gasification and synthetic fuel production processes. Finally, chapters in part three outline the different applications of gasification, with chapters on the conversion of different types of feedstock. Examines the

design of gasifiers, the preparation of feedstocks, and the economic, environmental and policy issues related to gasification Reviews gasification processes for liquid fuel production Outlines the different applications of gasification technology

Thermal Safety of Chemical Processes - Francis Stoessel 2008-06-25

Based on the author's many years of experience in practicing safety assessment in industry and teaching students or professionals in this area, the topic of this book is seldom found on university curricula and many professionals do not have the knowledge required to interpret thermal data in terms of risks. For this reason, Francis Stoessel adopts a unique systematic how-to-do approach: Each chapter begins with a case history illustrating the topic and presenting the lessons learned from the incident. In so doing, he analyzes a goldmine of numerous examples stemming from industrial practice, additionally providing a series of problems or case studies at the end of each chapter. Divided into three distinct sections, part one looks at the general aspects of thermal process safety, while Part 2 deals with mastering exothermal reactions. The final section discusses the avoidance of secondary reactions, including heat accumulation and thermal confinement.

Chemical Reactor Design - Juan A. Conesa 2019-12-04

A guide to the technical and calculation problems of chemical reactor analysis, scale-up, catalytic and biochemical reactor design Chemical Reactor Design offers a guide to the myriad aspects of reactor design including the use of numerical methods for solving engineering problems. The author - a noted expert on the topic - explores the use of transfer functions to study residence time distributions, convolution and deconvolution curves for reactor characterization, forced-unsteady-state operation, scale-up of chemical reactors, industrial catalysis, design of multiphase reactors, biochemical reactors design, as well as the design of multiphase gas-liquid-solid reactors. Chemical Reactor Design contains several examples of calculations and it gives special emphasis on the numerical solutions of differential equations by using the finite differences approximation, which offers the background information for understanding other more complex methods. The book is designed for

the chemical engineering academic community and includes case studies on mathematical modeling by using of MatLab software. This important book: - Offers an up-to-date insight into the most important developments in the field of chemical, catalytic, and biochemical reactor engineering - Contains new aspects such as the use of numerical methods for solving engineering problems, transfer functions to study residence time distributions, and more - Includes illustrative case studies on MatLab approach, with emphasis on numerical solution of differential equations using the finite differences approximation Written for chemical engineers, mechanical engineers, chemists in industry, complex chemists, bioengineers, and process engineers, Chemical Reactor Design addresses the technical and calculation problems of chemical reactor analysis, scale-up, as well as catalytic and biochemical reactor design.

Biomass, Biofuels, Biochemicals - Sunita Varjani 2021-12-04

Biomass, Biofuels, Biochemicals: Circular Bioeconomy: Technologies for Biofuels and Biochemicals provides comprehensive information on strategies and approaches that facilitate the integration of technologies for the production of bio-based fuels, chemicals and other value-added products from wastes with waste biorefinery concepts and green strategies. The book also covers lifecycle assessment and techno-economic analyses of integrated biorefineries within a circular bioeconomy framework. As there has been continual research on new designs in production and consumerist approaches as we move towards sustainable development by scientists of various disciplines, law makers, environmental activists and industrialists, this book provides the latest details. Resources consumption and environment degradation necessitates a transition of our linear economy towards sustainable social and technical systems. As fossil resources are only projected to fulfill the needs of the population for the next couple of centuries, new tactics and standards must be created to ensure future success. Covers recent developments and perspectives on biofuels and chemicals production Provides the latest on the integration of technologies and processes for biofuels and chemicals production Paves a way forward roadmap to achieve Sustainable Development Goals Covers recent

developments in lifecycle assessment and techno economic analysis using a waste biorefinery approach

Energy Storage, Grid Integration, Energy Economics, and the Environment - Radian Belu 2019-09-10

The book covers energy storage systems, bioenergy and hydrogen economy, grid integration of renewable energy systems, distributed generation, economic analysis, and environmental impacts of renewable energy systems. The overall approaches are interdisciplinary and comprehensive, covering economic, environmental, and grid integration issues as well as the physical and engineering aspects. Core issues discussed include mechanical, electrical, and thermal energy storage systems, batteries, fuel cells, biomass and biofuels, hydrogen economy, distributed generation, a brief presentation of microgrids, and in-depth discussions of economic analysis and methods of renewable energy systems, environmental impacts, life-cycle analysis, and energy conservation issues. With several solved examples, holistic material presentation, in-depth subject matter discussions and self-content material presentation, this textbook will appeal strongly to students and professional and nonprofessional readers who wish to understand this fascinating subject. Readers are encouraged to solve the problems and questions, which are useful ways to understand and apply the concepts

and the topics included.

ERDA Energy Research Abstracts - United States. Energy Research and Development Administration 1976

Chemical Reactor Analysis and Applications for the Practicing Engineer - Louis Theodore 2012-09-11

This book's format follows an applications-oriented text and serves as a training tool for individuals in education and industry involved directly, or indirectly, with chemical reactors. It addresses both technical and calculational problems in this field. While this text can be complimented with texts on chemical kinetics and/or reactor design, it also stands alone as a self-teaching aid. The first part serves as an introduction to the subject title and contains chapters dealing with history, process variables, basic operations, kinetic principles, and conversion variables. The second part of the book addresses traditional reactor analysis; chapter topics include batch, CSTRs, tubular flow reactors, plus a comparison of these classes of reactors. Part 3 keys on reactor applications that include non-ideal reactors: thermal effects, interpretation of kinetic data, and reactor design. The book concludes with other reactor topics; chapter titles include catalysis, catalytic reactors, other reactions and reactors, and ABET-related topics. An extensive Appendix is also included