

Download Biomass Gasification And Pyrolysis Practical Design And Theory

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Biomass Gasification, Pyrolysis and Torrefaction-Prabir Basu 2013-07-18 Biomass is the most widely used non-fossil fuel in the world. Biomass resources show a considerable potential in the long-term given the increasing proliferation of dedicated energy crops for biofuels. The second edition of Biomass Gasification and Pyrolysis is enhanced with new topics, such as torrefaction and cofiring, making it a versatile resource that not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of biomass conversion systems. This book will allow professionals, such as engineers, scientists, and operating personnel of biomass gasification, pyrolysis or torrefaction plants, to gain a better comprehension of the basics of biomass conversion. The author provides many worked out design problems, step-by-step design procedures and real data on commercially operating systems. With a dedicated focus on the design, analysis, and operational aspects of biomass gasification, pyrolysis, and torrefaction, Biomass Gasification, Pyrolysis and Torrefaction, Second Edition offers comprehensive coverage of biomass in its gas, liquid, and solid states in a single easy-to-access source. Contains new and updated step-by-step process flow diagrams, design data and conversion charts, and numerical examples with solutions Includes chapters dedicated to evolving torrefaction technologies, practicing option of biomass cofiring, and biomass conversion economics Expanded coverage of syngas and other Fischer-Tropsch alternatives Spotlights advanced processes such as supercritical water gasification and torrefaction of biomass. Provides available research results in an easy-to-use design methodology

Biomass Gasification, Pyrolysis and Torrefaction-Prabir Basu 2013 Biomass resources show a considerable potential in the long-term given the increasing proliferation of dedicated energy crops for biofuels. The second edition of Biomass Gasification and Pyrolysis is enhanced with new topics, such as torrefaction and cofiring, making it a versatile resource that not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of biomass conversion systems. This book will allow professionals, such as engineers, scientists, and operating personnel of biomass gasification, pyrolysis or torrefaction plants, to gain a better comprehension of the basics of biomass conversion. The author provides many worked out design problems, step-by-step design procedures and real data on commercially operating systems. With a dedicated focus on the design, analysis, and operational aspects of biomass gasification, pyrolysis, and torrefaction, Biomass Gasification, Pyrolysis and Torrefaction, Second Edition offers comprehensive coverage of biomass in its gas, liquid, and solid states in a single easy-to-access source. Contains new and updated step-by-step process flow diagrams, design data and conversion charts, and numerical examples with solutions Includes chapters dedicated to evolving torrefaction technologies, practicing option of biomass cofiring, and biomass conversion economics Expanded coverage of syngas and other Fischer-Tropsch alternatives Spotlights advanced processes such as supercritical water gasification and torrefaction of biomass. Provides available research results in an easy-to-use design methodology

Biomass Gasification and Pyrolysis-Prabir Basu 2010

Biomass Gasification and Pyrolysis-Prabir Basu 2010-07-19 This book offers comprehensive coverage of the design, analysis, and operational aspects of biomass gasification, the key technology enabling the production of biofuels from all viable sources—some examples being sugar cane and switchgrass. This versatile resource not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of biomass gasifiers. The author provides many worked out design problems, step-by-step design procedures and real data on commercially operating systems. After fossil fuels, biomass is the most widely used fuel in the world. Biomass resources show a considerable potential in the long term if residues are properly handled and dedicated energy crops are grown. Includes step-by-step design procedures and case studies for Biomass Gasification Provides worked process flow diagrams for gasifier design. Covers integration with other technologies (e.g. gas turbine, engine, fuel cells)

Biomass Gasification, Pyrolysis and Torrefaction-Prabir Basu 2018-06-29 Biomass Gasification, Pyrolysis and Torrefaction, Third Edition, is enhanced with a new topic on processing and cleaning of product gas of gasification and a brief introduction to biomaterials, making it a versatile resource that not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of a complete biomass conversion systems. With a dedicated focus on the design, analysis and operational aspects of biomass gasification, pyrolysis and torrefaction, this edition offers comprehensive coverage of biomass in its gas, liquid or solid states in a single accessible source. The author provides many worked design problems, step-by-step design procedures and real data on commercially operating systems. Although the book carries the name 'biomass', the bulk of its content is also applicable to non-biomass fuels like coal, petcoke, municipal solid waste and others. This book will help engineers, scientists and operating personnel of biomass gasification, pyrolysis or torrefaction plants, gain better comprehension of the basics of biomass conversion. Biomass Gasification, Pyrolysis and Torrefaction, Third Edition, is enhanced with a new topic on processing and cleaning of product gas of gasification and brief introduction to biomaterials making it a versatile resource that not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of a complete biomass conversion systems. With a dedicated focus on the design, analysis, and operational aspects of biomass gasification, pyrolysis, and torrefaction, this edition of the book offers comprehensive coverage of biomass in its gas, liquid, or solid states in a single easy-to-access source. The author provides many worked out design problems, step-by-step design procedures and real data on commercially operating systems. Although the book carries the name 'biomass', the bulk of its content is also applicable to non-biomass fuels like, coal, petcoke, municipal solid waste and others. This book will allow professionals, such as engineers, scientists, and operating personnel of biomass gasification, pyrolysis or torrefaction plants, to gain a better comprehension of the basics of biomass conversion. Features updates with the most recent research and technology Expanded to include a new chapter on syngas purification Contains step-by-step process flow diagrams, design data, conversion charts and numerical examples with solutions Provides available research results in an easy-to-use design methodology Examines the economic aspects of biomass conversion

Gasification for Low-grade Feedstock-Yongseung Yun 2018-07-11 Most coveted energy forms nowadays are gas in nature and electricity due to their environmental cleanness and convenience. Recently, gasification market trend is starting to switch to low-grade feedstock such as biomass, wastes, and low-rank coal that are still not properly utilized. In this sense, the most promising area of development in gasification field lies in low-grade feedstock that should be converted to more user-friendly gas or electricity form in utilization. This book tried to shed light on the works on gasification from many parts of the world and thus can feel the technology status and the areas of interest regarding gasification for low-grade feedstock.

Coal and Biomass Gasification-Santaru De 2017-12-13 This book addresses the science and technology of the gasification process and the production of electricity, synthetic fuels and other useful chemicals. Pursuing a holistic approach, it covers the fundamentals of gasification and its various applications. In addition to discussing recent advances and outlining future directions, it covers advanced topics such as underground coal gasification and chemical looping combustion, and describes the state-of-the-art experimental techniques, modeling and numerical simulations, environmentally friendly approaches, and technological challenges involved. Written in an easy-to-understand format with a comprehensive glossary and bibliography, the book offers an ideal reference guide to coal and biomass gasification for beginners, engineers and researchers involved in designing or operating gasification plants.

Gasification-Christopher Higman 2003-10-21 This book provides an excellent overview of current technologies for the gasification of coal, oil, gas, biomass and waste feedstocks. Starting from the basic theory, it reviews the potential feedstocks and their suitability for different types of gasification process. Commercial and near-commercial processes are described individually and various features discussed in detail. There is a comprehensive review of contaminants in synthesis gas as well as of gas treating processes. One chapter is devoted to discussions of various chemical, fuel and power applications for gasification. Economic, environmental and safety issues of gasification are also covered. Both authors have been involved with gasification for over 30 years, gaining in the process a fund of practical insight and experience, which is evident throughout the book. * Addresses practical issues such as selection of the best equipment. * Ideal reference for anyone involved in operating or designing a gasification plant. * Written in an easy-to-understand format with worked examples and a comprehensive glossary and bibliography.

Biomass Volume Estimation and Valorization for Energy-Jaya Shankar Tumuluru 2017-02-22 This book is the outcome of contributions by many experts in the field from different disciplines, various backgrounds, and diverse expertise. This book provides information on biomass volume calculation methods and biomass valorization for energy production. The chapters presented in this book include original research and review articles. I hope the research presented in this book will help to advance the use of biomass for bioenergy production and valorization. The key features of the book are: Providing information on biomass volume estimation using direct, nondestructive and remote sensing methods Biomass valorization for energy using thermochemical (gasification and pyrolysis) and biochemical (fermentation) conversion processes.

Technologies for Converting Biomass to Useful Energy-Erik Dahlquist 2013-04-16 Officially, the use of biomass for energy meets only 10-13% of the total global energy demand of 140 000 TWh per year. Still, thirty years ago the official figure was zero, as only traded biomass was included. While the actual production of biomass is in the range of 270 000 TWh per year, most of this is not used for energy purposes, and mostly it Circulating Fluidized Bed Boilers-Prabir Basu 2015-04-07 Explains operation and scientific fundamentals of circulating fluidized bed (CFB) boilers Outlines practical issues in industrial use Teaches how to optimize design for maximum reliability and efficiency Discusses operating and maintenance issues and how to troubleshoot them This book provides practicing engineers and students with insight into the design and operation of circulating fluidized bed (CFB) boilers through a combination of theoretical concepts and practical experience. An emphasis on combustion, hydrodynamics, heat transfer, and material issues illustrates these concepts with numerous examples from actual operating plants. The relevance of design and feed-stock parameters to the operation of a CFB boiler are also examined, along with their impacts on designs of mechanical components, including cyclones, air distributor grids, and solid recycle systems. This versatile resource explains how fluidized bed equipment works and how the basic principles of thermodynamics and fluid mechanics influence design, while providing insight into planning new projects, troubleshooting existing equipment, and appreciating the capabilities and limitations of the process. From hydrodynamics to construction and maintenance, the author covers all of the essential information needed to understand, design, operate, and maintain a complete fluidized bed system. It is a must for clean coal technology as well as for biomass power generation.

Handbook of Biomass Downdraft Gasifier Engine Systems-Thomas B. Reed 1988

Transformation of Biomass-Andreas Hornung 2014-07-02 Biomass is a key resource for meeting the energy and material demands of mankind in the future. As a result, businesses and technologies are developing around biomass processing and its applications. Transformation of Biomass: Theory to Practice explores the modern applications of biomass and bio-based residues for the generation of energy, heat and chemical products. The first chapter presents readers with a broad overview of biomass and its composition, conversion routes and products. The following chapters deal with specific technologies, including anaerobic digestion, pyrolysis and gasification, as well as hydrothermal and supercritical conversion. Each chapter details current practises, recent developments, business case models and comprehensive analysis of the problems associated with each approach, and how to optimize them. Topics covered include: Anaerobic digestion Reactor design Pyrolysis Catalysis in biomass transformation Engines for combined heat and power Influence of feedstocks on performance and products Bio-hydrogen from biomass Analysis of bio-oils Numerical simulation and formal kinetic parameters evaluation Business case development This textbook will provide students, researchers and industry professionals with a practical and accessible guide to the essential skills required to advance in the field of bioenergy.

Research in Thermochemical Biomass Conversion-A.V. Bridgwater 2012-12-06 This conference is the second such meeting under the auspices of the International Energy Agency's Bioenergy Agreement. The first IEA sponsored Fundamentals of Thermochemical Biomass Conversion Conference was held in Estes Park in 1982 and attracted 153 delegates from 13 countries around the world at a time when interest in biomass derived energy was at a peak. Since then oil prices have fallen considerably and with most prognoses for level prices until the end of the century, there has been a significant downturn in support for biomass conversion technologies. It has been particularly encouraging, therefore, to have received such an excellent response to this meeting. A total of 122 papers were offered, and 135 delegates registered for the conference from 19 countries. The theme of this meeting was Research in Thermochemical Biomass Conversion to reflect the advances made in research, development, demonstration and com mercialisation since the Fundamentals meeting in 1982. The programme was divided into sections on fundamental research, applied research, and demonstration and commercial activities to emphasise the interaction and roles of all levels of research in supporting the eventual commercial implementation. The layout of the pro ceedings reflects this same pattern, with an introductory section on status and technoeconomics to identify opportunities and constraints in different parts of the world. All the papers included in these proceedings have been subjected to the usual peer review process to ensure the highest standards.

Combustion and Gasification in Fluidized-Beds-Prabir Basu 2006-02-17 Besides being one of the best Clean Coal Technologies, fluidized beds are also proving to be the most practical option for biomass conversion. Although the technology is well established, the field lacks a comprehensive guide to the design and operating principles of fluidized bed boilers and gasifiers. With more than 30 years of research and industrial experience, Prabir Basu answers this pressing need with Combustion and Gasification in Fluidized Beds. This book is a versatile resource that explains how fluidized bed equipment works and how to use the basic principles of thermodynamics and fluid mechanics in design while providing insight into planning new projects, troubleshooting existing equipment, and appreciating the capabilities and limitations of the process. From hydrodynamics to construction and maintenance, the author covers all of the essential information needed to understand, design, operate, and maintain a complete fluidized bed system. It is a must for clean coal technology as well as for biomass power generation. Beginning with a general introduction to fossil or biofuel conversion choices, the book surveys hydrodynamics, fundamentals of gasification, combustion of solid fuels, pollution aspects including climate change mitigation, heat transfer in fluidized beds, the design and operation of bubbling and circulating fluidized bed boilers, and various supporting components such as distributor grids, feeding systems, and gas-solid separators.

Handbook Biomass Gasification-Jesper Ahrenfeldt 2005

Biorefinery-Juan-Rodrigo Bastidas-Oyanedel 2019-04-15 This book discusses the biorefinery of biomass feedstocks. In-depth chapters highlight the scientific and technical aspects and present a techno-economic analysis of such systems. By using a TEA approach, the authors present feasible pathways for conversion of biomass (both residual biomass, energy crops and algae biomass), showing the different possibilities for the production of biochemical materials, biofuels, and fertilizers. The concepts presented in this book will link companies, investors, and governments by providing a framework that will help reduce pollutants and create a biomass related economy that incorporates the newest developments and technologies in the area.

Urban Energy Systems-James Keirstead 2013-02-27 Energy demands of cities need to be met more sustainably. This book analyses the technical and social systems that satisfy these needs and asks how methods can be put into practice to achieve this. Drawing on analytical tools and case studies developed at Imperial College London, the book presents state-of-the-art techniques for examining urban energy systems as integrated systems of technologies, resources, and people. Case studies include: a history of the evolution of London's urban energy system, from pre-history to the present day a history of the growth of district heating and cogeneration in Copenhagen, one of the world's most energy efficient cities an analysis of changing energy consumption and environmental impacts in the Kenyan city of Nakuru over a thirty year period an application of uncertainty and sensitivity analysis techniques to show how Newcastle-upon-Tyne can reach its 2050 carbon emission targets designing an optimized low-carbon energy system for a new UK eco-town, showing how it would meet ever more stringent emissions targets. For students, researchers, planners, engineers, policymakers and all those looking to make a contribution to urban sustainability.

Thermochemical Processing of Biomass-Robert C. Brown 2019-05-06 A comprehensive examination of the large number of possible pathways for converting biomass into fuels and power through thermochemical processes Bringing together a widely scattered body of information into a single volume, this book provides complete coverage of the many ways that thermochemical processes are used to transform biomass into fuels, chemicals and power. Fully revised and updated, this new edition highlights the substantial progress and recent developments that have been made in this rapidly growing field since publication of the first edition and incorporates up-to-date information in each chapter. Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power, 2nd Edition incorporates two new chapters covering: condensed phased reactions of thermal deconstruction of biomass and life cycle analysis of thermochemical processing systems. It offers a new introductory chapter that provides a more comprehensive overview of thermochemical technologies. The book also features fresh perspectives from new authors covering such evolving areas as solvent liquefaction and hybrid processing. Other chapters cover combustion, gasification, fast pyrolysis, upgrading of syngas and bio-oil to liquid transportation fuels, and the economics of thermochemically producing fuels and power, and more. Features contributions by a distinguished group of European and American researchers offering a broad and unified description of thermochemical processing options for biomass Combines an overview of the current status of thermochemical biomass conversion as well as engineering aspects to appeal to the broadest audience Edited by one of Biofuels Digest's "Top 100 People" in bioenergy for six consecutive years Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power, 2nd Edition will appeal to all academic researchers, process chemists, and engineers working in the field of biomass conversion to fuels and chemicals. It is also an excellent book for graduate and advanced undergraduate students studying biomass, biofuels, renewable resources, and energy and power generation.

Recent Advances in Carbon Capture and Storage-Yongseung Yun 2017-03-08 Carbon capture and storage (CCS) has been considered as a practical way in sequestering the huge anthropogenic CO2 amount with a reasonable cost until a more pragmatic solution appears. The CCS can work as a bridge before fulfilling the no-CO2 era of the future by applying to large-scale CO2 emitting facilities. But CCS appears to lose some passion by the lack of progress in technical developments and in commercial success stories other than EOR. This is the time to go back to basics, starting from finding a solution in small steps. The CCS technology desperately needs far newer ideas and breakthroughs that can overcome earlier attempts through improving, modifying, and switching the known principles. This book tries to give some insight into developing an urgently needed technical breakthrough through the recent advances in CCS research, in addition to the available small steps like soil carbon sequestration. This book provides the fundamental and practical information for researchers and graduate students who want to review the current technical status and to bring in new ideas to the conventional CCS technologies.

Progress in Thermochemical Biomass Conversion-A. V. Bridgwater 2008-04-30 This book is for chemical engineers, fuel technologists, agricultural engineers and chemists in the world-wide energy industry and in academic, research and government institutions. It provides a thorough review of, and entry to, the primary and review literature surrounding the subject. The authors are internationally recognised experts in their field and combine to provide both commercial relevance and academic rigour. Contributions are based on papers delivered to the Fifth International Conference sponsored by the IEA Bioenergy Agreement.

Thermochemical Processing of Biomass-Robert C. Brown 2011-03-16 Thermochemical pathways for biomass conversion offer opportunitiesfor rapid and efficient processing of diverse feedstocks intofuels, chemicals and power. Thermochemical processing has severaladvantages relative to biochemical processing, including greaterfeedstock flexibility, conversion of both carbohydrate and lignininto products, faster reaction rates, and the ability to produce adiverse selection of fuels. Thermochemical Processing of Biomass examines the largenumber of possible pathways for converting biomass into fuels,chemicals and power through the use of heat and catalysts. The bookpresents a practical overview of the latest research in thisrapidly developing field, highlighting the fundamental chemistry,technical applications and operating costs associated withthermochemical conversion strategies. Bridging the gap between research and practical application,this book is written for engineering professionals in the biofuelsindustry, as well as academic researchers working in bioenergy,bioprocessing technology and chemical engineering. Topics covered include: Combustion Gasification Fast Pyrolysis Hydrothermal Processing Upgrading Syngas and Bio-oil Catalytic Conversion of Sugars to Fuels Hybrid Thermochemical/Biochemical Processing Economics of Thermochemical Conversion For more information on the Wiley Series in Renewable Resources,visit <http://www.wiley.com/go/rtrs>"www.wiley.com/go/rtrs/a

Energy from Biomass-Peter Quak 1999 While energy is essential for development, standard fossil fuels are often in short supply in countries where it is needed most. However, alternative fuel resources abound in the form of agricultural and municipal waste or "biomass." This report reviews the state of the art of biomass combustion and gasification systems, their advantages and disadvantages. It also encourages investment in use of these technologies to enable developing countries to better exploit their biomass resources and help close the gap between their energy needs and their energy supply.

Biomass in Small-Scale Energy Applications-Mateusz Szubel 2019-10-11 Biomass in Small-Scale Energy Applications: Theory and Practice presents the current trends in the development of selected biomass-based technologies for distributed energy generation. It describes the methodology, experimental results, and computer simulations with a focus on pilot systems and devices crucial in multiple applications with related environmental/economic issues. It describes which stages of design, development, and application of advanced biomass-based energy devices are critical in order for a given technology to be successful. It includes both technical/practical information and theoretical background related to combustion kinetics, thermodynamics in energy systems, and properties of selected types of biomass, as well as case studies.

Production of Biofuels and Chemicals with Bifunctional Catalysts-Zhen Fang 2017-12-27 This book provides state-of-the-art reviews, current research, prospects and challenges of the production of biofuels and chemicals such as furanic biofuels, biodiesel, carboxylic acids, polyols and others from lignocellulosic biomass, furfurals, syngas and γ -valerolactone with bifunctional catalysts, including catalytic, and combined biological and chemical catalysis processes. The bifunctionality of catalytic materials is concept of not only using multifunctional solid materials as activators, but also design of materials in such a way that the catalytic materials have synergistic characteristics that promote a cascade of transformations with performance beyond that of mixed mono-functional catalysts. This book is a reference designed for researchers, academicians and industrialists in the area of catalysis, energy, chemical engineering and biomass conversion. Readers will find the wealth of information contained in chapters both useful and essential, for assessing the production and application of various biofuels and chemicals by chemical catalysis and biological techniques.

Carbon Dioxide Capture and Storage-Intergovernmental Panel on Climate Change. Working Group III. 2005-12-19 IPCC Report on sources, capture, transport, and storage of CO2, for researchers, policy-makers and engineers.

Production of Hydrogen from Renewable Resources-Zhen Fang 2015-11-06 This book provides state-of-the-art reviews, current research and prospects of producing hydrogen using bio, thermal and electrochemical methods and covers hydrogen separation, storage and applications. Hydrogen produced from biomass offers a clean and renewable energy source and a promising energy carrier that will supplement or replace fossil fuels in the future. The book is intended as a reference work for researchers, academics and industrialists working in the chemical and biological sciences, engineering, renewable resources and sustainability. Readers will find a wealth of information in the text that is both useful for the practical development of hydrogen systems and essential for assessing hydrogen production by bioelectrochemical, electrochemical, fermentation, gasification, pyrolysis and solar means, applied to many forms of biomass. Dr. Zhen Fang is Professor in Bioenergy, Leader and founder of biomass group, Chinese Academy of Sciences, Xishuangbanna Tropical Botanical Garden and is also adjunct Professor of Life Sciences, University of Science and Technology of China. Dr. Richard L Smith, Jr. is Professor of Chemical Engineering, Graduate School of Environmental Studies, Research Center of Supercritical Fluid Technology, Tohoku University, Japan. Dr. Xinhua Qi is Professor of Environmental Science, Nankai University, China.

Handbook of Petrochemical Processes-James G. Speight 2019-06-13 The petrochemical industry is a scientific and engineering field that encompasses the production of a wide range of chemicals and polymers. The purpose of this book is not only to provide a follow-on to form the later chapters of the highly successful Chemistry and Technology of Petroleum 5th Edition but also provides a simplified approach to a very diverse chemical subject dealing with the chemistry and technology of various petroleum and petrochemical process. Following from the introductory chapters, this book provides the readers with a valuable source of information containing insights into petrochemical reactions and products, process technology, and polymer synthesis. Provides readers with a valuable source of information containing insights into petrochemical reactions and products, process technology, and polymer synthesis Introduces the reader to the various petrochemical intermediates are generally produced by chemical conversion of primary petrochemicals to form more complicated derivative products The reactions and processes involved in transforming petroleum-based hydrocarbons into the chemicals that form the basis of the multi-billion dollar petrochemical industry are reviewed and described The book includes information on new process developments for the production of raw materials and intermediates for petrochemicals Includes a description of the origin of the raw materials for the petrochemicals industry - including an overview of the coal chemicals industry

Recent Advancements in Biofuels and Bioenergy Utilization-Prakash Kumar Sarangi 2018-09-29 The concerns relating to global warming, climate change, and increasing energy demands have led to significant research towards the development of alternative energy to substitute the fossil energy sources. Biomass-based energy or biofuels are highly promising due to many perceptible environmental and socio-economic advantages. Cutting-edge academic research and advanced industrial product development have created tremendous scope for the implementation of biofuels at a global scale to reduce the greenhouse gas emissions and supplement the escalating energy demands. The prime focus of this book is to provide an overview of the different technologies utilized to harness the chemical energy from plant-based non-edible biomass and other organic wastes in the form of solid, liquid, and gaseous biofuels. The opportunities and challenges of different biomass conversion technologies, especially biomass-to-liquid, biomass-to-gas and gas-to-liquid routes, as well as biomass pretreatments, densification, anaerobic digestion, reforming, transesterification, supercritical fluid extraction, microalgal carbon sequestration, life-cycle assessment and techno-economic analysis have been comprehensively discussed in this book. This book is an amalgamation of fifteen different chapters each with distinctive investigations and a collective focus relating to the transition from fossil fuels towards carbon-neutral biofuels. This book serves as a benchmark for academic and industrial researchers involved in exploring the true potentials of plant residues and waste organic matter to produce alternative renewable fuels. To realize the real promises of bioenergy, this book attempts to assess the biorefining approaches, biofuel production and application, and environmental sustainability.

Renewable Energy Systems-Martin Kaltschmitt 2012-12-06 Humanity is facing a steadily diminishing supply of fossil fuels, causing researchers, policy makers, and the population as a whole to turn increasingly to alternative and especially renewable sources of energy to make up this deficit. Gathering over 80 peer-reviewed entries from the Encyclopedia of Sustainability Science and Technologies, Renewable Energy Systems provides an authoritative introduction to a wide variety of renewable energy sources. State-of-the-art coverage includes geothermal power stations, ocean energy, renewable energy from biomass, waste to energy, and wind power. This comprehensive, two-volume work provides an excellent introduction for those entering these fields, as well as new insights for advanced researchers, industry experts, and decision makers.

Energy from Organic Materials (Biomass)-Martin Kaltschmitt 2018-07-21 This comprehensive reference is a state-of-the-art survey of biomass as an energy carrier for the provision of heat, electricity, and transportation fuel, considering technical, economic, environmental, and social aspects. On a global scale, biomass contributes roughly 12 to 16 % of the energy needed to cover the overall primary energy consumption. Thus far, it is humanity's most important source of renewable energy, used on practically all continents and growing in importance even in industrialized nations. With detailed coverage of the production of solid, gaseous and liquid fuels, as well as a final energy provision, this volume serves as an introduction for readers just entering the field, but also offers new insights, up-to-date information, as well as latest findings for advanced researchers, industry experts, and decision makers.

The Hydrogen Economy-National Academy of Engineering 2004-09-05 The announcement of a hydrogen fuel initiative in the Presidentâ€™s 2003 State of the Union speech substantially increased interest in the potential for hydrogen to play a major role in the nationâ€™s long-term energy future. Prior to that event, DOE asked the National Research Council to examine key technical issues about the hydrogen economy to assist in the development of its hydrogen R&D program. Included in the assessment were the current state of technology; future cost estimates; CO2 emissions; distribution, storage, and end use considerations; and the DOE R&D program. The report provides an assessment of hydrogen as a fuel in the nationâ€™s future energy economy and describes a number of important challenges that must be overcome if it is to make a major energy contribution. Topics covered include the hydrogen end-use technologies, transportation, hydrogen production technologies, and transition issues for hydrogen in vehicles.

Wastewater Treatment Engineering-Mohamed Samer 2015-10-14 This book provides useful information about bioremediation, phytoremediation, and mycoremediation of wastewater and some aspects of the chemical wastewater treatment processes, including ion exchange, neutralization, adsorption, and disinfection. Additionally, this book elucidates and illustrates the wastewater treatment plants in terms of plant sizing, plant layout, plant design, and plant location. Cutting-edge topics include wet air oxidation of aqueous wastes, biodegradation of nitroaromatic compounds, biological treatment of sanitary landfill leachate, bacterial strains for the bioremediation of olive mill wastewater, gelation of arabinoxylans from maize wastewater, and modeling wastewater evolution.

Biohydrogen-Ayhan Demirbas 2009-06-30 Biohydrogen: For Future Engine Fuel Demands covers the production, purification, storage, pipeline transport, usage, and safety of biohydrogen. Hydrogen promises to be the most significant fuel source of the future, due to its global availability and the fact that water is its only by-product. Biofuels such as bioethanol, biodiesel, bio-oil, and biohydrogen are produced using technologies for thermochemically and biologically converting biomass. Hydrogen fuel production technologies can make use of either non-renewable sources, or renewable sources such as wind, solar, and biorenewable resources. Biohydrogen: For Future Engine Fuel Demands reviews all of the modern biomass-based transportation fuels, including bioethanol, biodiesel, biogas, biohydrogen, and fuel cells. The book also discusses issues of biohydrogen economy, policy and environmental impact. Biohydrogen looks set to be the fuel of choice in the future, replacing both fossil fuels and biorenewable liquid fuels.

Biochar: Gasification Technologies-John Rezaian 2005-04-08 In contrast to traditional combustion, gasification technologies offer the potential for converting coal and low or negative-value feedstocks, such as petroleum coke and various waste materials into usable energy sources or chemicals. With a growing number of companies operating and marketing systems based on gasification concepts worldwide, this b Thermal Biomass Conversion-A. V. Bridgwater 2009 This title presents the results from ThermalNet, which is the latest thermal biomass conversion network to be carried out on a European basis.

Fundamentals of Thermochemical Biomass Conversion-R.P. Overend 2012-12-06 Throughout the world many projects have been underway to investigate the conversion of renewable biomass into energy and synthetic fuels by thermo chemical methods such as combustion, pyrolysis, gasification and liquefaction. While many of these represent prior art used during the early 20th century, the recent decade since the 1970s oil shock has immeasurably increased the knowledge base for such processes. Much of the new knowledge has been gained by persons who were not trained in classical wood chemistry and there have not yet been many attempts to synthesize the knowledge into a corpus of systematic information. To bring this about the International Energy Agency's Forestry Energy collaboration, the Gas Research Institute, the National Research Council of Canada and the US Department of Energy jointly sponsored a conference on the Fundamentals of Thermochemical Biomass Conversion in Estes Park, Colorado which was held on October 18-22, 1982. The Conference, which was structured around invited plenary papers and contributions from researchers, served as the basis for the papers in this volume which reflect the substantial conclusions of the Conference. During the planning for the Conference, it was realized by the editors in their capacity as Co-chairmen that a major problem in biomass research was the lack of reproducibility between reported experiments and their inter comparison on account of the heterogeneity of biomass materials. A well known wood chemist, George M. Bioenergy for Sustainable Development in Africa-Rainer Janssen 2011-11-03 The work builds on the results of the COMPETE Bioenergy Competence Platform for Africa, which was supported by the European Commission and coordinated by WIP Renewable Energies, Germany. The five sections cover biomass production and use, biomass technologies and markets in Africa, biomass policies, sustainability, and financial and socio-economic issues. This valuable work is, in effect, a single-source treatment of a key energy sector in a part of the world which still has a lot of unrealised potential for development.

Thermochemical Processing of Biomass-A. V. Bridgwater 1984

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