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Mass Balances for Chemical Engineers

Academic Press

A text to the advances and development of novel technologies in the production of high-value products from economically viable raw materials Lignocellulosic Biorefining Technologies is an essential guide to the most recent advances and developments of novel technologies in the production of various high-value products from economically viable raw materials. Written by a team of experts on the topic, the book covers important topics specifically on production of economical and sustainable products such as various biofuels, organic acids, enzymes, biopigments, biosurfactants, etc. The book highlights the important aspects of lignocellulosic

biorefining including structure, function, and chemical composition of the plant cell wall and reviews the details about the various components present in the lignocellulosic biomass and their characterizations. The authors explore the various approaches available for processing lignocellulosic biomass into second generation sugars and focus on the possibilities of utilization of lignocellulosic feedstocks for the production of biofuels and biochemicals. Each chapter includes a range of clear, informative tables and figures, and contains relevant references of published articles. This important text: Provides cutting-edge information on the recent developments in lignocellulose biorefinery Reviews production of various economically important and sustainable

products, such as biofuels, organic acids, biopigments, and biosurfactants Highlights several broad-ranging areas of recent advances in the utilization of a variety of lignocellulosic feedstocks Provides a valuable, authoritative reference for anyone interested in the topic Written for post-graduate students and researchers in disciplines such as biotechnology, bioengineering, forestry, agriculture, and chemical industry, Lignocellulosic Biorefining Technologies is an authoritative and updated guide to the knowledge about various biorefining technologies.

11th International Symposium on Process Systems Engineering - PSE2012 Frontiers Media SA
Applications in Design and Simulation of

Sustainable Chemical Processes addresses the challenging applications in designing eco-friendly but efficient chemical processes, including recent advances in chemistry and catalysis that rely on renewable raw materials. Grounded in the fundamental knowledge of chemistry, thermodynamics, chemical reaction engineering and unit operations, this book is an indispensable resource for developing and designing innovating chemical processes by employing computer simulations as an efficient conceptual tool. Targeted to graduate and post graduate students in chemical engineering, as well as to professionals, the book aims to advance their skills in process innovation and conceptual design. The work completes the book Integrated Design and Simulation of Chemical Processes by Elsevier (2014) authored by the same team. Includes comprehensive case

studies of innovative processes based on renewable raw materials
Outlines Process Systems Engineering approach with emphasis on systematic design methods
Employs steady-state and dynamic process simulation as problem analysis and flowsheet creation tool
Applies modern concepts, as process integration and intensification, for enhancing the sustainability

Walter de Gruyter GmbH & Co KG

This book focuses on the simulation and modeling of internal combustion engines.

The contents include various aspects of diesel and gasoline engine modeling and simulation such as spray, combustion, ignition, in-cylinder phenomena, emissions, exhaust heat recovery. It also explored engine models and analysis of cylinder bore piston stresses and

temperature effects. This book includes recent literature and focuses on current modeling and simulation trends for internal combustion engines. Readers will gain knowledge about engine process simulation and modeling, helpful for the development of efficient and emission-free engines. A few chapters highlight the review of state-of-the-art models for spray, combustion, and emissions, focusing on the theory, models, and their applications from an engine point of view.

This volume would be of interest to professionals, post-graduate students involved in alternative fuels, IC engines, engine modeling and simulation, and environmental research.

Process Systems Engineering CRC Press

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.

Improvements in Bio-Based
Building Blocks Production
Through Process Intensification
and Sustainability Concepts

Prentice Hall

Biofuels and Biorefining:

Volume One: Current

Technologies for Biomass

Conversion considers the

conventional processes for

biofuels and biomass-derived

products in single and

biorefinery schemes. Sections

address the fundamentals of the

transformation of biomass into

fuels and products, including a

discussion of current and

future scenarios, potential raw

materials that can be used, the main processing technologies and their commercial potential, and a description of the concept of biorefinery and the opportunities offered by this approach. Each chapter is supported by industry case studies covering the development of each product, fuel type, and biorefinery. This book provides an integrated approach to biofuels production and process intensification that will be useful to researchers involved in all aspects of bioenergy, particularly those interested in cost reduction, environmental impact and enhanced production.

Includes all fundamental concepts related to the production of biofuels and value-added products from biomass Provides a comprehensive biorefinery scheme that addresses all biofuel types (liquid, solid and gaseous) and related bio-based products Presents state-of-the-art information on production processes Covers all required information for the modeling and economical assessment of biofuels production in single process or under a biorefinery scheme

Sustainable Design Through Process Integration Springer

Imagine if your process manufacturing plants were running so well that your production, safety, environmental, and profitability targets were being met so that your subject matter experts could focus on data-driven business improvements. Through proper use and analysis of your existing operations data, your company can become an industry leader and reward your stakeholders. Written in an engaging and easily understandable manner, this book demonstrates a step-by-step process of how an organization can effectively utilize technology and make the necessary culture changes to achieve operational excellence. You will see how several industry-

leading companies have used an effective real-time data infrastructure for mission-critical business use cases. The book also addresses challenges involved, such as effectively integrating operational (OT) data with business (IT) systems to enable a more proactive, predictive management model for a fleet of process plants. Some of the things you will take away: Learn how a real-time data infrastructure enables transformation of raw sensor data into contextualized information for operational insights and business process improvement. Understand how reusing the same operational data for multiple use cases significantly impacts fleet management, profitability, and asset stewardship. See how a simple digital unit template representing production flows can be repeatedly used to identify critical inefficiencies in plant operations. Discover best practices of deploying real-time situational awareness alerts and predictive analytics. Realize how to transform your organization into a data-driven culture for continuous sustainable improvement. Find out how leading companies integrate operations data with business intelligence and predictive analytics tools in a corporate on-premises or cloud-enabled environment. Learn how industry-leading companies have imaginatively used a real-time data infrastructure to improve yields,

reduce cycle times, and slash operating costs. This book is targeted for process industries production and operations leadership, senior engineers, IT management, CIOs, and service providers to those industries. Academics will benefit from latest data analysis strategies. This book guides readers to use the best, results-proven approaches to ensure operational excellence.

Methanol Springer Science & Business Media

Methanol: Science and Engineering provides a comprehensive review of the chemistry, properties, and current and potential uses and applications of methanol.

Divided into four parts, the book begins with a detailed account of current production methods and their economics. The second part deals with the applications of methanol, providing useful insights into future applications. Modeling of the various reactor systems is covered in the next section, with final discussions in the book focusing on the economic and environmental impact of this chemical. Users will find this to be a must-have resource for all researchers and engineers studying alternative energy sources. Provides the latest developments on methanol

research Reviews methanol production methods and their economics Outlines the use of methanol as an alternative green transportation fuel Includes new technologies and many new applications of methanol

Principles and Case Studies of Simultaneous Design Elsevier

This book adds a new dimension to the sustainability assessment of food waste reduction and valorisation: policy analysis. Featuring a transdisciplinary analysis by key experts in the field, it identifies the drivers of change in food-waste reduction and valorisation technologies by looking, for example, at the regulatory framework and at policy

actions undertaken by local and global actors. The book explores the development of regulations and policies for food-waste prevention, management, and valorisation at a global as well as European Union level. It also discusses the notion of food waste in legal terms and investigates the effects of the lack of a standard, universal definition of food waste on the efficient use of by-products, promising processes and products for technological and commercial exploitation. Utilising mathematical mapping methods to assess food consumption impacts and providing supply chain models that allow the testing of consumption scenarios, the book goes on to discuss a series of emerging

technologies (tested at lab scale and/ or pilot scale) and opportunities for the valorisation of food waste.

Nanocatalysts in Biofuel

Process Optimization Elsevier

The European Symposium on Computer Aided Process Engineering (ESCAPE) series presents the latest innovations and achievements of leading professionals from the industrial and academic communities. The ESCAPE series serves as a forum for engineers, scientists, researchers, managers and students to present and discuss progress being made in the area of Computer Aided Process

Engineering (CAPE). European industries large and small are bringing innovations into our lives, whether in the form of new technologies to address environmental problems, new products to make our homes more comfortable and energy efficient or new therapies to improve the health and well-being of European citizens. Moreover, the European Industry needs to undertake research and technological initiatives in response to humanity's "Grand Challenges", described in the declaration of Lund, namely, Global Warming, Tightening Supplies of Energy, Water and

Food, Ageing Societies, Public Health, Pandemics and Security. Thus, the Technical Theme of ESCAPE 21 will be "Process Systems Approaches for Addressing Grand Challenges in Energy, Environment, Health, Bioprocessing & Nanotechnologies".

Food Industry Wastes John Wiley & Sons

The Leading Integrated Chemical Process Design Guide: With Extensive Coverage of Equipment Design and Other Key Topics More than ever, effective design is the focal point of sound

chemical engineering. Analysis, Synthesis, and Design of Chemical Processes, Fifth Edition, presents design as a creative process that integrates the big-picture and small details, and knows which to stress when and why. Realistic from start to finish, it moves readers beyond classroom exercises into open-ended, real-world problem solving. The authors introduce up-to-date, integrated techniques ranging from finance to operations, and new plant design to existing process optimization.

The fifth edition includes updated safety and ethics resources and economic factors indices, as well as an extensive, new section focused on process equipment design and performance, covering equipment design for common unit operations, such as fluid flow, heat transfer, separations, reactors, and more. Conceptualization and analysis: process diagrams, configurations, batch processing, product design, and analyzing existing processes Economic analysis: estimating fixed capital

investment and manufacturing costs, measuring process profitability, and more Synthesis and optimization: process simulation, thermodynamic models, separation operations, heat integration, steady-state and dynamic process simulators, and process regulation Chemical equipment design and performance: a full section of expanded and revamped coverage of designing process equipment and evaluating the performance of current equipment Advanced steady-state simulation: goals, models, solution

strategies, and sensitivity and optimization results
Dynamic simulation: goals, development, solution methods, algorithms, and solvers
Societal impacts: ethics, professionalism, health, safety, environmental issues, and green engineering
Interpersonal and communication skills: working in teams, communicating effectively, and writing better reports
This text draws on a combined 55 years of innovative instruction at West Virginia University (WVU) and the University of Nevada, Reno. It includes suggested curricula for one- and two-semester design courses, case studies, projects, equipment cost data, and extensive preliminary design information for jump-starting more detailed analyses.
Designing Renewable Energy Systems Springer Nature
The book discusses a multi-objective optimization approach in LCA that allows the flexible construction of comprehensive Pareto fronts to help understand the weightings and relative importance of its elements.

The methodology is applied to the pertinent topics of thermochemical wood conversion, deep geothermal energy, and regional energy planning.

Food Waste Reduction and

Valorisation Academic Press

This book is based on selected papers from keynote and symposium sessions given at the 16th International Union of Food Science and Technology (IUFoST) World Congress, held in Foz do Iguacu, Brazil August, 2012. The theme of the Congress was the challenges faced by food science in both the developed and developing regions of the world. The symposia featured prominent

world-renowned keynote and plenary speakers, young researchers, and the technical sessions covered the whole spectrum of basic and applied food science and technology, including consumer issues and education, diets and health, ethnic foods, and R&D.?

Analysis, Synthesis and Design of Chemical Processes

Prentice-Hall PTR

Food Industry Wastes:

Assessment and Recuperation of Commodities, Second

Edition presents a

multidisciplinary view of the latest scientific and

economic approaches to food waste management, novel

technologies and treatment, their evaluation and assessment. It evaluates and synthesizes knowledge in the areas of food waste management, processing technologies, environmental assessment, and wastewater cleaning. Containing numerous case studies, this book presents food waste valorization via emerging chemical, physical, and biological methods developed for treatment and product recovery. This new edition addresses not only recycling trends but also innovative

strategies for food waste prevention. The economic assessments of food waste prevention efforts in different countries are also explored. This book illustrates the emerging environmental technologies that are suitable for the development of both sustainability of the food systems and a sustainable economy. So, this volume is a valuable resource for students and professionals including food scientists, bio/process engineers, waste managers, environmental scientists,

policymakers, and food chain supervisors. Provides guidance on current regulations for food process waste and disposal practices Highlights novel developments needed in policy making for the reduction of food waste Raises awareness of the sustainable food waste management techniques and their appraisal through Life Cycle Assessment Explores options for reducing food loss and waste along the entire food supply chain.

Resource Recovery to Approach Zero Municipal Waste 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.

Functional Ingredients from Algae for Foods and

Nutraceuticals Walter de Gruyter GmbH & Co KG

Current development results in a linear flow from raw material to waste, which cannot be sustainable in the long term. Plus, a global population of 7 billion people means that there are 7 billion waste producers in the world. At present, dumping and landfilling are

the primary practices for getting rid of municipal solid waste (MSW). However, this waste contains resources that we've yet to utilize. To create sustainable societies, we need to approach zero waste by recovering these resources. There are cities and countries where zero waste is close to becoming a reality.

Landfilling of organic waste is forbidden in Europe, and countries such as Sweden, Germany, Belgium, and Switzerland have developed a variety of technologies to recover resources from MSW.

Resource Recovery to Approach Zero Municipal Waste explores the solid waste management laws and regulations of different countries, comparing the latest resource recovery technologies and offering future perspectives. The book tackles the many technical, social, ecological, economical, and managerial aspects of this complex subject while promoting the development of sustainable societies to achieve a greener global environment.

Thermal, Mechanical, and Hybrid Chemical Energy Storage Systems

Analysis, Synthesis and Design of Chemical Processes

"Process design is the focal point of chemical engineering practice: the creative activity through which engineers continuously improve facility operations to create products that enhance life. Effective chemical engineering design requires students to integrate a broad spectrum of knowledge and intellectual skills, so they can analyze both the big picture and minute details - and know when to focus on each.

Through three previous editions, this book has established itself as the leading resource for students seeking to apply what they've learned in real-world, open-ended process problems. The

authors help students hone and synthesize their design skills through expert coverage of preliminary equipment sizing, flowsheet optimization, economic evaluation, operation and control, simulation, and other key topics. This new Fourth Edition is extensively updated to reflect new technologies, simulation techniques, and process control strategies, and to include new pedagogical features including concise summaries and end-of-chapter lists of skills and knowledge."--pub. desc.

Analysis, Synthesis, and Design of Chemical Processes
Elsevier

There are many comprehensive

design books, but none of them provide a significant number of detailed economic design examples of typically complex industrial processes. Most of the current design books cover a wide variety of topics associated with process design. In addition to discussing flowsheet development and equipment design, these textbooks go into a lot of detail on engineering economics and other many peripheral subjects such as written and oral skills, ethics, "green" engineering and product

design. This book presents general process design principles in a concise readable form that can be easily comprehended by students and engineers when developing effective flow sheet and control structures. Ten detailed case studies presented illustrate an in-depth and quantitative way the application of these general principles. Detailed economic steady-state designs are developed that satisfy economic criterion such as minimize total annual cost of both capital and energy or return on incremental capital investment. Complete detailed flow sheets and Aspen Plus files are provided. Then conventional PI control structures are be developed and tested for their ability to maintain product quality during disturbances. Complete Aspen Dynamics files are be provided of the dynamic simulations.

**28TH EUROPEAN SYMPOSIUM ON
COMPUTER AIDED PROCESS ENGINEERING**

Pearson Education
3rd Generation Biofuels:
Disruptive Technologies to Enable
Commercial Production is a
comprehensive volume on all

aspects of algal biofuels, offering technological approaches that will the latest advances on commercial implementation. In addition to the fundamentals, the book discusses all applied aspects of 3rd generation biofuels production, including design approaches, unit operations of the upstream and downstream biomass processing, and every potential microalgae-based energy product, including microbial fuel cells. Policy, economic, environmental, and regulatory issues are addressed in a dedicated section. Finally, the book presents pilot and demonstration-scale projects for 3rd generation biofuels production in the format of a white paper. Each chapter reviews the state of the art, discusses the disruptive technological approaches that will potentially enable large-scale production, and concludes with specific recommendations on how to achieve commercial competitiveness. The book provides readers with an invaluable reference for researchers, graduates, and practitioners working in the areas of renewable energy, bioenergy and alternative fuels, and biotechnology. Offers a sequential framework for the design of process plants using 3rd generation feedstock Presents dedicated sections on case studies at pilot and demonstration scales as well as on policy, economic, and environmental issues Provides a global perspective on biofuels production, with more than 40

contributions from world-renowned experts

Microbial Fuels John Wiley & Sons

The book will highlight major trends and developments in the field of microbial fuels, with contributions from a number of highly experienced researchers. It will serve as a comprehensive reference for industrial stakeholders, scientists, researchers and graduate students interested in microbial fuels. The aims of this work are to present the technologies and perspectives taking into account different socio-economical contexts. A

specific chapter will focus on the general perspectives of microbial fuels for low-income and emerging countries.

3rd Generation Biofuels John Wiley & Sons

Accompanying CD-ROM contains CAPCOST, HENSAD and additional chapters on outcomes assessment, written and oral communications, a written report case study and six student design projects.