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Product and Process Design Principles Prentice Hall

Providing vital knowledge on the design and synthesis of specific metal-organic framework (MOF) classes as well as their properties, this ready reference summarizes the state of the art in chemistry. Divided into four parts, the first begins with a basic introduction to typical cluster units or coordination geometries and provides examples of recent and advanced MOF structures and applications typical for the respective class. Part II covers recent progress in linker chemistries, while special MOF classes and morphology design are described in Part III. The fourth part deals with advanced characterization techniques, such as NMR, in situ studies, and modelling. A final unique feature is the inclusion of data sheets of commercially available MOFs in the appendix, enabling experts and newcomers to the field to select the appropriate MOF for a desired application. A must-have reference for chemists, materials scientists, and engineers in academia and

industry working in the field of catalysis, gas and water purification, energy storage, separation, and sensors.

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

The methods used by chemists and chemical engineers for the conception, design and operation of chemical process systems have undergone significant changes in the last 10 years. The most important of modern computer-aided techniques are process analysis and process system synthesis, both of which are closely related. The first part of the book presents the principles of model building, simulation and model application. On the basis of an appropriate set of hierarchical levels of chemical systems, the general strategy of analysis by deterministic and statistical methods is treated. The second part deals with process system synthesis beginning with reaction path analysis. One of the major features of this part are new methods for the synthesis of reactor networks, separation sequences, heat-exchanger systems and entire chemical process systems by a combined procedure of heuristic rules and fuzzy set algorithms. This procedure, which is known as knowledge engineering, is an efficient combination of human creativity and theoretically based knowledge. This book, which is illustrated by examples, should prove extremely useful as a text for a senior/graduate course for students of chemistry and chemical engineering and will also be invaluable for chemists and chemical engineers in research and industry, and specialists dealing with the analysis and synthesis of process systems.

The Quantum Dot Academic Press

“ Batch Chemical Process Integration: Analysis, Synthesis and Optimization ” is an excellent source of information on state-of-the-art mathematical and graphical techniques for analysis, synthesis and optimization of batch chemical plants. It covers recent techniques in batch process integration with a particular focus on the capabilities of the mathematical techniques. There is a section on graphical techniques as well as performance comparison between graphical and mathematical techniques. Prior to delving into the intricacies of wastewater minimisation

and heat integration in batch processes, the book introduces the reader to the basics of scheduling which is aimed at capturing the essence of time. A chapter on the synthesis of batch plants to highlight the importance of time in design of batch plants is also presented through a real-life case study. The book is targeted at undergraduates and postgraduate students, researchers in batch process integration, practising engineers and technical managers.

Introduction to Chemical Processes Elsevier

Over the last 20 years, fundamental design concepts and advanced computer modeling have revolutionized process design for chemical engineering. Team work and creative problem solving are still the building blocks of successful design, but new design concepts and novel mathematical programming models based on computer-based tools have taken out much of the guess-work. This book presents the new revolutionary knowledge, taking a systematic approach to design at all levels.

The Logic of Chemical Synthesis John Wiley & Sons

Sustainability in the Design, Synthesis and Analysis of Chemical Engineering Processes is an edited collection of contributions from leaders in their field. It takes a holistic view of sustainability in chemical and process engineering design, and incorporates economic analysis and human dimensions. Ruiz-Mercado and Cabezas have brought to this book their experience of researching sustainable process design and life cycle sustainability evaluation to assist with development in government, industry and academia. This book takes a practical, step-by-step approach to designing sustainable plants and processes by starting from chemical engineering fundamentals. This method enables readers to achieve new process design approaches with high influence and less complexity. It will also help to incorporate sustainability at the early stages of project life, and build up multiple systems level perspectives. Ruiz-Mercado and Cabezas ' book is the only book on the market that looks at process sustainability from a chemical engineering fundamentals perspective. Improve plants, processes and products with sustainability in mind; from conceptual design to life cycle assessment Avoid retro fitting costs by planning for sustainability

concerns at the start of the design process Link sustainability to the chemical engineering fundamentals

Chemical Process Design Prentice Hall

Analysis and Synthesis of Singular Systems provides a base for further theoretical research and a design guide for engineering applications of singular systems. The book presents recent advances in analysis and synthesis problems, including state-feedback control, static output feedback control, filtering, dissipative control, H8 control, reliable control, sliding mode control and fuzzy control for linear singular systems and nonlinear singular systems. Less conservative and fresh novel techniques, combined with the linear matrix inequality (LMI) technique, the slack matrix method, and the reciprocally convex combination approach are applied to singular systems. This book will be of interest to academic researchers, postgraduate and undergraduate students working in control theory and singular systems. Discusses recent advances in analysis and synthesis problems for linear singular systems and nonlinear singular systems Offers a base for further theoretical research as well as a design guide for engineering applications of singular systems Presents several necessary and sufficient conditions for delay-free singular systems and some less conservative results for time-delay singular systems

Integrated Chemical Processes Wiley

"The new 4th edition of Seider's 'Product and Process Design Principles: Synthesis, Analysis and Design' covers content for process design courses in the chemical engineering curriculum, showing how process design and product design are inter-linked and why studying the two is important for modern applications. A principal objective of this new edition is to describe modern strategies for the design of chemical products and processes, with an emphasis on a systematic approach. This fourth edition presents two parallel tracks: (1) product design ("what to make"), and (2) process design ("how to make"), with an emphasis on process design. Process design instructors can show easily how product designs lead to new chemical processes.

Alternatively, product design can be taught in a separate course subsequent to the process design course."--adapted from description on publisher web site.

Green Chemistry and Engineering Pearson

"The fourth edition of Elements of Chemical Reaction Engineering is a completely revised version of the book. It combines authoritative coverage of the principles of chemical reaction engineering with an unsurpassed focus on critical thinking and creative problem solving, employing open-ended questions and stressing the Socratic method. Clear and organized, it integrates text, visuals, and computer simulations to help readers solve even the most challenging problems through reasoning, rather than by memorizing equations."--BOOK JACKET. Chemical Process Equipment Design Pearson Educaci ó n

Industrial Chemical Process Analysis and Design uses chemical engineering principles to explain the transformation of basic raw materials into major chemical products. The book discusses traditional processes to create products like nitric acid, sulphuric acid, ammonia, and methanol, as well as more novel products like bioethanol and biodiesel. Historical perspectives show how current chemical processes have developed over years or even decades to improve their yields, from the discovery of the chemical reaction or physico-chemical principle to the industrial process needed to yield commercial quantities. Starting with an introduction to process design, optimization, and safety, Martin then provides stand-alone chapters—in a case study fashion—for commercially important chemical production processes. Computational software tools like MATLAB®, Excel, and Chemcad are used throughout to aid process analysis. Integrates principles of chemical engineering, unit operations, and chemical reactor engineering to understand process synthesis and analysis Combines traditional computation and modern software tools to compare different solutions for the same problem Includes historical perspectives and traces the improving efficiencies of commercially important chemical production processes Features worked examples and end-of-chapter problems with solutions to show the application of concepts discussed in the text

Analysis, Synthesis, and Design of Chemical Processes Elsevier

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.

Analysis, Synthesis and Design of Chemical Processes Pearson Education

This practical how-to-do book deals with the design of sustainable chemical processes by means of systematic methods aided by computer simulation. Ample case studies illustrate generic creative issues, as well as the efficient use of simulation techniques, with each one standing for an important issue taken from practice. The didactic approach guides readers from basic knowledge to mastering complex flow-sheets, starting with chemistry and thermodynamics, via process synthesis, efficient use of energy and waste minimization, right up to plant-wide control and process dynamics. The simulation results are compared with flow-sheets and performance indices of actual industrial licensed processes, while the complete input data for all the case studies is also provided, allowing readers to reproduce the results with their own simulators. For everyone interested in the design of innovative chemical processes.

Analysis and Synthesis of Singular Systems Elsevier

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

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

Understanding Batch Chemical Processes John Wiley & Sons

As the range of feedstocks, process technologies and products expand, biorefineries will become increasingly complex manufacturing systems. *Biorefineries and Chemical Processes: Design, Integration and Sustainability Analysis* presents process modelling and integration, and whole system life cycle analysis tools for the synthesis, design, operation and sustainable development of biorefinery and chemical processes. Topics covered include: Introduction: An introduction to the concept and development of biorefineries. Tools: Included here are the methods for detailed economic and environmental impact analyses; combined economic value and environmental impact analysis; life cycle assessment (LCA); multi-criteria analysis; heat integration and utility system design; mathematical programming based optimization and genetic algorithms. Process synthesis and design: Focuses on modern unit operations and innovative process flowsheets. Discusses thermochemical and biochemical processing of biomass, production of chemicals and polymers from biomass, and processes for carbon dioxide capture. Biorefinery systems: Presents biorefinery process synthesis using whole system analysis. Discusses bio-oil and algae biorefineries, integrated fuel cells and renewables, and heterogeneous catalytic reactors. Companion website: Four case studies, additional exercises and examples are available online, together with three supplementary chapters which address waste and emission minimization, energy storage and control systems, and the optimization and reuse of water. This textbook is designed to bridge a gap between engineering design and sustainability assessment, for advanced students and practicing process designers and engineers.

Conceptual Design of Chemical Processes

This comprehensive work shows how to design and develop innovative, optimal and sustainable chemical processes by applying the principles of process systems engineering, leading to integrated sustainable processes with 'green' attributes. Generic systematic methods are employed, supported by intensive use of computer simulation as a powerful tool for mastering the

complexity of physical models. New to the second edition are chapters on product design and batch processes with applications in specialty chemicals, process intensification methods for designing compact equipment with high energetic efficiency, plantwide control for managing the key factors affecting the plant dynamics and operation, health, safety and environment issues, as well as sustainability analysis for achieving high environmental performance. All chapters are completely rewritten or have been revised. This new edition is suitable as teaching material for Chemical Process and Product Design courses for graduate MSc students, being compatible with academic requirements world-wide. The inclusion of the newest design methods will be of great value to professional chemical engineers. Systematic approach to developing innovative and sustainable chemical processes. Presents generic principles of process simulation for analysis, creation and assessment. Emphasis on sustainable development for the future of process industries.

The Chemistry of Metal-Organic Frameworks Butterworth-Heinemann

This text explains the concepts behind process design. It uses a case study approach, guiding readers through realistic design problems, and referring back to these cases at the end of each chapter.

Throughout, the author uses shortcut techniques that allow engineers to obtain the whole focus for a design in a very short period (generally less than two days).

Chemical Engineering Design McGraw Hill Professional

Accompanying CD-ROM contains the newest version of CAPCOST, HENSAD software and an additional appendix presenting preliminary design information for fifteen key chemical processes. The CD also includes six additional projects, plus chapters on outcomes assessment, written and oral communications, and a written report case study. Chemical Solution Synthesis for Materials Design and Thin Film Device Applications John Wiley & Sons

Revised, and updated *Design and Optimization in Organic Synthesis* presents strategies to explore experimental conditions and methodologies for systematic studies of entire reaction systems (substrates, reagent(s), catalyst(s), and solvents). Chemical phenomena are not usually the result of a single factor and this book describes how statistically designed methods can be used to analyse and evaluate synthetic procedures. The methodology is based on multivariate statistical techniques. The accompanying CD contains data tables and programmes. This book is essential reading for anyone working in process design and development in fine chemicals or the pharmaceutical industry, and is suitable for those with no experience in the field. * Contains recalculated models and redrawn figures, as well as new chapters on for example, the design of combinatorial libraries * Presents strategies to explore experimental conditions and methodologies * Enables the analysis and prediction of the best synthetic procedures

Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives

Elsevier

A review of innovative tools for creative nucleic acid chemists that

open the door to novel probes and therapeutic agents. Nucleic acids continue to gain importance as novel diagnostic and therapeutic agents. With contributions from noted scientists and scholars, *Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives* is a practical reference that includes a wide range of approaches for the synthesis of designer nucleic acids and their derivatives. The book covers enzymatic (including chemo-enzymatic) methods, with a focus on the synthesis and incorporation of modified nucleosides. The authors also offer a review of innovative approaches for the non-enzymatic chemical synthesis of nucleic acids and their analogs and derivatives, highlighting especially challenging species. The book offers a concise review of the methods that prepare novel and heavily modified polynucleotides in sufficient amount and purity for most clinical and research applications. This important book: -Presents a timely and topical guide to the synthesis of designer nucleic acids and their derivatives -Addresses the growing market for nucleotide-derived pharmaceuticals used as anti-infectives and chemotherapeutic agents, as well as fungicides and other agrochemicals. -Covers novel methods and the most recent trends in the field -Contains contributions from an international panel of noted scientists. Written for biochemists, medicinal chemists, natural products chemists, organic chemists, and biotechnologists, *Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives* is a practice-oriented guide that reviews innovative methods for the enzymatic as well as non-enzymatic synthesis of nucleic acid species.

Sustainability in the Design, Synthesis and Analysis of Chemical Engineering Processes Academic Press

Accompanying DVD-ROM contains many realistic, interactive simulations. *Design and Optimization in Organic Synthesis* Springer Science & Business Media

One of the most important objective in this text describes the strategies and approaches for the design of chemical processes. It covers economic (optimization) and environmental issues. The latest design strategies are described, most of which have been improved significantly with the advent of computers, mathematical programming methods, and artificial intelligence. Various methods are utilized to perform the extensive calculations and provide graphical results that are visualized easily, including the usage of computer programs for simulation and design optimization.