

Scaleup Of Chemical Processes Conversion From Laboratory Scale Tests To Successful Commercial Size Design

This reference details particle characterization, dynamics, manufacturing, handling, and processing for the employment of multiphase reactors, as well as procedures in reactor scale-up and design for applications in the chemical, mineral, petroleum, power, cement and pharmaceuticals industries. The authors discuss flow through fixed beds, elutriati

The classic reference, now expanded and updated *Chemical Reactor Design, Optimization, and Scaleup* is the authoritative sourcebook on chemical reactors. This new Second Edition consolidates the latest information on current optimization and scaleup methodologies, numerical methods, and biochemical and polymer reactions. It provides the comprehensive tools and information to help readers design and specify chemical reactors confidently, with state-of-the-art skills. This authoritative guide: Covers the fundamentals and principles of chemical reactor design, along with advanced topics and applications Presents techniques for dealing with varying physical properties in reactors of all types and purposes Includes a completely new chapter on meso-, micro-, and nano-scale reactors that addresses such topics as axial diffusion in micro-scale reactors and self-assembly of nano-scale structures Explains the method of false transients, a numerical solution technique Includes suggestions for further reading, problems, and, when appropriate, scaleup or scaledown considerations at the end of each chapter to illustrate industrial applications Serves as a ready reference for explained formulas, principles, and data This is the definitive hands-on reference for practicing professionals and an excellent textbook for courses in chemical reactor design. It is an essential resource for chemical engineers in the process industries, including petrochemicals, biochemicals, microelectronics, and water treatment.

A presentation of developments in the electrochemistry of C60 and related compounds, electroenzymatic synthesis, conducting polymers, and electrochemical partial fluorination. It contains accounts of carbonyl compounds, anodic oxidation of oxygen-containing compounds, electrosynthesis of bioactive materials, electrolyte reductive coupling, and more.

Crystallization Process Systems gives a clear, concise, balanced and up to date presentation of crystallization and solid-liquid separation of the crystalline product. The information is presented in a coherent, concise and logical sequence based on the fundamentals of particulate crystallization processes as systems. By emphasising the analysis, design and operation of particulate crystallization processes as systems, the reader will be able to make a better judgement about the best, cheapest and most effective production method to use. Presents a coherent, concise and logical sequence based on the fundamentals of particulate crystallization processes as systems Emphasis on the design and optimization of the crystallization processing system

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

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

This book provides a comprehensive, step-by-step approach to organic process research and development in the pharmaceutical, fine chemical, and agricultural chemical industries. *Process R&D* describes the steps taken, following synthesis and evaluation, to bring key compounds to market in a cost-effective manner. More people are being hired for work in this area as increasing numbers of drug candidates are identified through combinatorial chemistry and high-throughput screening. The book is directed to industrial (primarily organic) chemists, and academicians (particularly those involved in a growing number of start-up companies) and students who need insight into industrial process R&D. Current books do not describe hands-on, step-by-step, approaches to solving process development problems, including route, reagent, and solvent selection; optimising catalytic reactions; chiral syntheses; and "green chemistry." "*Practical Process Research and Development*" will be a valuable resource for researchers, managers, and graduate students. Provides insights into generating rugged, practical, cost-effective processes for the chemical preparation of "small molecules" Breaks down process optimization into route, reagent and solvent selection, development of reaction conditions, workup, crystallizations and more Includes over 100 tips for rapid process development Presents guidelines for implementing and troubleshooting processes

This book provides general information and data on one of the most promising renewable energy sources: biomass for its thermochemical conversion. During the last few years, there has been increasing focus on developing the processes and technologies for the conversion of biomass to liquid and gaseous fuels and chemicals, in particular to develop low-cost technologies. This book provides date-based scientific information on the most advanced and innovative processing of biomass as well as the process development elements on thermochemical processing of biomass for the production of biofuels and bio-products on (biomass-based biorefinery). The conversion of biomass to biofuels and other value-added products on the principle biorefinery offers potential from technological perspectives as alternate energy. The book covers intensive R&D and technological developments done during the last few years in the area of renewable energy utilizing biomass as feedstock and will be highly beneficial for the researchers, scientists and engineers working in the area of biomass-biofuels- biorefinery. Provides the most advanced and innovative thermochemical conversion technology for biomass Provides information on large scales such as thermochemical biorefinery Useful for researchers intending to study scale up Serves as both a textbook for graduate students and a reference book for researchers Provides information on integration of process and technology on thermochemical conversion of biomass Green, clean and renewable are the hottest keywords for catalysis and industry. This handbook and ready reference is the first to combine the fields of advanced experimentation and catalytic process development for biobased materials in industry. It describes the entire workflow

Read Online Scaleup Of Chemical Processes Conversion From Laboratory Scale Tests To Successful Commercial Size Design

from idea, approach, research, and process development, right up to commercialization. A large part of the book is devoted to the use of advanced technologies and methodologies like high throughput experimentation, as well as reactor and process design models, with a wide selection of real-life examples included at each stage. The contributions are from authors at leading companies and institutes, providing firsthand information and knowledge that is hard to find elsewhere. This work is aimed at decision makers, engineers and chemists in industry, chemists and engineers working with/on renewables, chemists in the field of catalysis, and chemical engineers.

"This resource offers a primer on simple design methods for multiphase reactors in the chemical process industries, particularly the fine chemicals industry. It provides the process design engineer with simple yet theoretically sound procedures. Different types of multiphase reactors are dealt with on an individual basis. The book focuses on the problem of predicting mass transfer rates in these reactors. It also contains finally worked examples that clearly illustrate how a highly complex MPR like the Stirred Tank Reactor (STR) can be designed using simple correlations which need only a scientific calculator"--

The focus of this book is on the technical factors that are critical to the design and startup of a commercial manufacturing facility.

Pharmaceutical and fine chemical products are typically synthesised batchwise which is an anomaly since batch processes have a series of practical and economical disadvantages. On the contrary, flow continuous processes present a series of advantages leading to new ways to synthesise chemical products. Flow processes - * enable control reaction parameters more precisely (temperature, residence time, amount of reagents and solvent etc.), leading to better reproducibility, safer and more reliable processes * can be performed more advantageously using immobilized reagents or catalysts * improve the selectivity and productivity of the process and possibly even the stability of the catalyst * offer opportunities for heat exchange and energy conservation as well as an easy separation and recycling of the reactants and products by adequate process design * achieve multistep syntheses by assembling a line of reactors with minimum or no purification in between two reaction steps * can be assured by facile automation * scale-up can be easily conducted by number-up With all the new research activity in manufacturing chemical products, this comprehensive book is very timely, as it summarises the latest trends in organic synthesis. It gives an insight into flow continuous processes, outlining the basic concepts and explaining the terminology of, and systems approach to, process design dealing with both homogeneous and heterogeneous catalysis and mini- or micro-reactors. The book contains case studies, extensive bibliographies and reference lists in each chapter to enable the reader to grasp the contents and to go on to more detailed texts on specific subjects if desired. The book is written by both organic chemists and engineers giving a multidisciplinary vision of the new tools and methodologies in this field. It is essential reading for organic chemists (in industry or academia) working alongside chemical engineers or who want to undertake chemical engineering projects. It will also be of interest for chemical engineers to see how basic engineering concepts are applied in modern organic chemistry.

This useful reference focuses on the currently available toolbox of bio-catalysed reductions of C=O, C=C and formal C=N bonds to show which transformations can be reliably used in manufacturing processes and which still require improvements. Following an introductory chapter, chapters 2-4 present the synthetic strategies that are currently available for the reduction of C=C and C=O bonds and for reductive amination, by means of whole-cell catalysts and isolated enzymes. Chapters 5-7 go on to describe the improvements achieved thus far, illustrating the current versatility of enzymes in organic synthesis. Chapters 8-12 present the improvements brought about by the optimization of reaction conditions, and the use of particular synthetic sequences. The final chapter describes practical applications of bio-reductions for the synthesis of active pharmaceutical ingredients. With its excellent and comprehensive overview, this book will be of great interest to those working in academia and industry. From the contents: * Development of Sustainable Biocatalyzed Reduction Processes for Organic Chemists * Reductases: From Natural Diversity to Biocatalysis and Emerging Enzymatic Activities. * Synthetic Strategies Based on C=C Bioreductions * Synthetic Strategies Based on C=O Bioreductions * Development of Novel Enzymes for the Improved Reduction of C=C Double Bonds * Development of Novel Enzymes for the Improved Reduction of C=O Double Bonds * Synthetic Applications of Aminotransferases * Strategies for Cofactor Regeneration in Biocatalyzed Reductions * Effects of Solvent System and Substrate Loading in Bioreduction * Perspectives in the Use of In-Situ Product Removal (ISPR) Techniques in Bioreductions * Multi-Enzymatic Cascade Reactions Based on Reduction Processes * Relevant Practical Applications of Bioreduction Processes in the Synthesis of Active Pharmaceutical Ingredients

This volume describes the characteristics of processes used in petroleum refining: upgrading light fractions (reforming and isomerization), converting distillates (catalytic cracking, hydrocracking, and associated equipment), converting residues (visbreaking, coking hydroconversion), and reducing air and water pollution (white product sweetening, acid gas, stack gas, and waste water treatment). This book is available in French Under the title "le raffinage du pétrole. Tome 3. Procédés de transformation". Contents : 1. Introduction. 2. Basic principles governing chemical changes. 3. Industrial catalysts. 4. Catalytic reforming. 5. Catalytic cracking. 6. Isomerization of light paraffins. 7. Aliphatic alkylation. 8. Olefin etherification. 9. Oligomerization. 10. Hydrocracking. 11. Visbreaking of residues. 12. Coking. 13. Residue hydroconversion. 14. Hydrogen production. 15. White products refining by sweetening. 16. Hydrotreating. 17. Acid gas treatment. 18. Desulfurization of stack gases. 19. Water treatment. References. Index.

The second edition of Comprehensive Organic Synthesis—winner of the 2015 PROSE Award for Multivolume Reference/Science from the Association of American Publishers—builds upon the highly respected first edition in drawing together the new common themes that underlie the many disparate areas of organic chemistry. These themes support effective and efficient synthetic strategies, thus providing a comprehensive overview of this important discipline. Fully revised and updated, this new set forms an essential reference work for all those seeking information on the solution of synthetic problems, whether they are experienced practitioners or chemists whose major interests lie outside organic synthesis. In addition, synthetic chemists requiring the essential facts in new areas, as well as students completely new to the field, will find Comprehensive Organic Synthesis, Second Edition an invaluable source, providing an authoritative overview of core concepts. Winner of the 2015 PROSE Award for Multivolume Reference/Science from the Association of American Publishers Contains more than 170 articles across nine volumes, including detailed analysis of core topics such as bonds, oxidation, and reduction Includes more than 10,000 schemes and images Fully revised and updated; important growth areas—including combinatorial chemistry, new technological, industrial, and green chemistry developments—are covered extensively

Chemical Projects Scale Up: How to Go from Laboratory to Commercial covers the chemical engineering steps necessary for taking a laboratory development into the commercial world. The book includes the problems associated with scale up, equipment sizing considerations, thermal characteristics associated with scale up, safety areas to consider, recycling considerations, operability reviews and economic viability. In addition to the process design aspects of commercializing the laboratory development, consideration is given to the utilization of a development in an existing plant. Explains how heat removal for exothermic reactions can be scaled up Outlines how a reactor can be sized from batch kinetic data Discusses how the plant performance of a new catalyst can be evaluated Presents how the economics of a new product/process can be developed Discusses the necessary evaluation of recycling in commercial plants

Process Technology provides a general overview about chemical and biochemical process technology. It focuses on the structure and development of production processes, main technological operations and the important aspects of process economics. The theoretical foundations in each chapter are supplemented by case studies and examples in a clear and instructive manner to illustrate the practical aspects. The author highlights operating principles, reasons for application and available industrial equipment of technological operations. Aim is to facilitate those without a process technology

background in multi-disciplinary cooperation with (bio-) chemical engineers by providing an overview of this exciting field. The textbook is organized into seven distinct parts: Structure of the chemical industry and (bio-) chemical processes (Bio-) Chemical reaction engineering Molecular separations (distillation, extraction, absorption, adsorption) Mechanical separations (filtration, sedimentation, membranes) Particle and final product manufacturing Development, scale-up, design and safety of processes Major industrial process descriptions

Large scale manufacturing of liquid crystal flat panel displays (LCDs) by Japan brought the world's attention to the existence of an enormous market potential exists when there are alternatives to the cathode ray tube (CRT). The Japanese have recognized that new display technologies are critical to making their products highly competitive in the world market. The CRT is losing market share to the solid-state flat panel display. Japan currently holds 90% of the market, and this book outlines opportunities in the former Soviet Union, where companies with the necessary technology are seeking partners, investment, and manufacturing opportunities. Entire cities that were once not even on the map due to their military mission, are now appearing, filled with state-of-the-art electronic technology. The book is developed from the reports issued by investigators based on their field visits to 33 sites in Japan, and 26 sites in Russia, Ukraine, and Belarus.

Transport Processes in Chemically Reacting Flow Systems discusses the role, in chemically reacting flow systems, of transport processes—particularly the transport of momentum, energy, and (chemical species) mass in fluids (gases and liquids). The principles developed and often illustrated here for combustion systems are important not only for the rational design and development of engineering equipment (e.g., chemical reactors, heat exchangers, mass exchangers) but also for scientific research involving coupled transport processes and chemical reaction in flow systems. The book begins with an introduction to transport processes in chemically reactive systems. Separate chapters cover momentum, energy, and mass transport. These chapters develop, state, and exploit useful quantitative "analogies" between these transport phenomena, including interrelationships that remain valid even in the presence of homogeneous or heterogeneous chemical reactions. A separate chapter covers the use of transport theory in the systematization and generalization of experimental data on chemically reacting systems. The principles and methods discussed are then applied to the preliminary design of a heat exchanger for extracting power from the products of combustion in a stationary (fossil-fuel-fired) power plant. The book has been written in such a way as to be accessible to students and practicing scientists whose background has until now been confined to physical chemistry, classical physics, and/or applied mathematics. This book will formally launch "organic synthesis engineering" as a distinctive field in the armory of the reaction engineer. Its main theme revolves around two developments: catalysis and the role of process intensification in enhancing overall productivity. Each of these two subjects are becoming increasingly useful in organic synthesis engineering, especially in the production of medium and small volume chemicals and enhancing reaction rates by extending laboratory techniques, such as ultrasound, phase transfer catalysts, membrane reactor, and microwaves, to industrial scale production. This volume describes the applications of catalysis in organic synthesis and outlines different techniques of reaction rate and/or selectivity enhancement against a background of reaction engineering principles for both homogeneous and heterogeneous systems.

Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design is one of the best-known and most widely adopted texts available for students of chemical engineering. The text deals with the application of chemical engineering principles to the design of chemical processes and equipment. The third edition retains its hallmark features of scope, clarity and practical emphasis, while providing the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards, as well as coverage of the latest aspects of process design, operations, safety, loss prevention, equipment selection, and more. The text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken), and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). Provides students with a text of unmatched relevance for chemical process and plant design courses and for the final year capstone design course Written by practicing design engineers with extensive undergraduate teaching experience Contains more than 100 typical industrial design projects drawn from a diverse range of process industries NEW TO THIS EDITION Includes new content covering food, pharmaceutical and biological processes and commonly used unit operations Provides updates on plant and equipment costs, regulations and technical standards Includes limited online access for students to Cost Engineering's Cleopatra Enterprise cost estimating software

The past, present, and future of green chemistry and green engineering From college campuses to corporations, the past decade witnessed a rapidly growing interest in understanding sustainable chemistry and engineering. Green Chemistry and Engineering: A Practical Design Approach integrates the two disciplines into a single study tool for students and a practical guide for working chemists and engineers. In Green Chemistry and Engineering, the authors—each highly experienced in implementing green chemistry and engineering programs in industrial settings—provide the bottom-line thinking required to not only bring sustainable chemistry and engineering closer together, but to also move business towards more sustainable practices and products. Detailing an integrated, systems-oriented approach that bridges both chemical syntheses and manufacturing processes, this invaluable reference covers: Green chemistry and green engineering in the movement towards sustainability Designing greener, safer chemical synthesis Designing greener, safer chemical manufacturing processes Looking beyond current processes to a lifecycle thinking perspective Trends in chemical processing that may lead to more sustainable practices The authors also provide real-world examples and exercises to promote further thought and discussion. The EPA defines green chemistry as the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green engineering is described as the design, commercialization, and use of products and processes that are feasible and economical while minimizing both

the generation of pollution at the source and the risk to human health and the environment. While there is no shortage of books on either discipline, Green Chemistry and Engineering is the first to truly integrate the two.

Having gained considerable experience in process development at the Institut Français du Pétrole, the authors present a design framework, a review of the available means of investigation, and several examples illustrating their methodology of industrial process scale up. The salient feature of the book is the fact that it addresses a subject which is vital in view of its economic repercussions, yet relatively unknown in technical and scientific circles, due to the confidentiality surrounding it. Contents: 1. Main guidelines of the methodology. 2. Various types of model. 3. Pilot plants and mock-ups. 4. Experimental techniques. 5. Applications to industrial process development. 6. Conclusions. References. Index.

Written to help the student chemist clarify the career areas and technical problems which are to be considered when chemical reactions are carried out on a large scale. Covers the research and development of consumer products based on chemical processes. Topics covered include the chemical industry and large-scale chemical manufacturing, inorganic and fermentation processes, the conversion of petroleum into purified chemical substances, and the environmental impact of these and other processes.

With a focus on actual industrial processes, e.g. the production of light alkenes, synthesis gas, fine chemicals, polyethylene, it encourages the reader to think "out of the box" and invent and develop novel unit operations and processes. Reflecting today's emphasis on sustainability, this edition contains new coverage of biomass as an alternative to fossil fuels, and process intensification. The second edition includes: New chapters on Process Intensification and Processes for the Conversion of Biomass Updated and expanded chapters throughout with 35% new material overall Text boxes containing case studies and examples from various different industries, e.g. synthesis loop designs, Sasol I Plant, Kaminsky catalysts, production of Ibuprofen, click chemistry, ammonia synthesis, fluid catalytic cracking Questions throughout to stimulate debate and keep students awake! Richly illustrated chapters with improved figures and flow diagrams Chemical Process Technology, Second Edition is a comprehensive introduction, linking the fundamental theory and concepts to the applied nature of the subject. It will be invaluable to students of chemical engineering, biotechnology and industrial chemistry, as well as practising chemical engineers. From reviews of the first edition: "The authors have blended process technology, chemistry and thermodynamics in an elegant manner... Overall this is a welcome addition to books on chemical technology." – The Chemist "Impressively wide-ranging and comprehensive... an excellent textbook for students, with a combination of fundamental knowledge and technology." – Chemistry in Britain (now Chemistry World)

This volume, Fluidization, Solids Handling, and Processing, is the first of a series of volumes on "Particle Technology". Particles are important products of chemical process industries spanning the basic and specialty chemicals, agricultural products, pharmaceuticals, paints, dyestuffs and pigments, cement, ceramics, and electronic materials. Solids handling and processing technologies are thus essential to the operation and competitiveness of these industries. Fluidization technology is employed not only in chemical production, it also is applied in coal gasification and combustion for power generation, mineral processing, food processing, soil washing and other related waste treatment, environmental remediation, and resource recovery processes. The FCC (Fluid Catalytic Cracking) technology commonly employed in the modern petroleum refineries is also based on fluidization principles.

A comprehensive overview covering the principles and preparation of catalysts, as well as reactor technology and applications in the field of organic synthesis, energy production, and environmental catalysis. Edited and authored by renowned and experienced scientists, this reference focuses on successful reaction procedures for applications in industry. Topics include catalyst preparation, the treatment of waste water and air, biomass and waste valorisation, hydrogen production, oil refining as well as organic synthesis in the presence of heterogeneous and homogeneous catalysts and continuous-flow reactions. With its practical relevance and successful methodologies, this is a valuable guide for chemists at universities working in the field of catalysis, organic synthesis, pharmaceutical or green chemistry, as well as researchers and engineers in the chemical industry.

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.

Practical Guides in Chemical Engineering are a cluster of short texts that each provides a focused introductory view on a single subject. The full library spans the main topics in the chemical process industries that engineering professionals require a basic understanding of. They are 'pocket publications' that the professional engineer can easily carry with them or access electronically while working. Each text is highly practical and applied, and presents first principles for engineers who need to get up to speed in a new area fast. The focused facts provided in each guide will help you converse with experts in the field, attempt your own initial troubleshooting, check calculations, and solve rudimentary problems. Dimensional Analysis provides the foundation for similitude and for up and downscaling. Aeronautical, Civil, and Mechanical Engineering have used Dimensional Analysis profitably for over

one hundred years. Chemical Engineering has made limited use of it due to the complexity of chemical processes. However, Chemical Engineering can now employ Dimensional Analysis widely due to the free-for-use matrix calculators now available on the Internet. This book shows how to apply matrices to Dimensional Analysis. Practical, short, concise information on the basics will help you get an answer or teach yourself a new topic quickly Supported by industry examples to help you solve a real world problem Single subject volumes provide key facts for professionals

This book will help industrial process innovators in research, development and commercial start-up to assess the risks of commercial-scale implementation and provide them with practical guidelines and methods to reduce the risks to acceptable levels. The book can also be used in co-operation with industrial R&D people and academic researchers to shape open innovation programs and in education as a reference book for process innovation courses. Offers easily accessible, step-by-step, and concise guidelines for industrial process scale-up Explains each stage of the innovation funnel: research, development, demonstration, commercial implementation for any process type and branch Based on industrial experiences and practices, which reduces the risks of commercial scale implementation of new processes to acceptable levels and reduces cost and time of process innovation Very clear, attractive layout, using text boxes that contain clarifying notes and additional information on specific topics, which makes it a quick reference of main subjects and additional information

Chemical Engineering Design is one of the best-known and most widely adopted texts available for students of chemical engineering. It completely covers the standard chemical engineering final year design course, and is widely used as a graduate text. The hallmarks of this renowned book have always been its scope, practical emphasis and closeness to the curriculum. That it is written by practicing chemical engineers makes it particularly popular with students who appreciate its relevance and clarity. Building on this position of strength the fifth edition covers the latest aspects of process design, operations, safety, loss prevention and equipment selection, and much more. Comprehensive in coverage, exhaustive in detail, and supported by extensive problem sets at the end of each chapter, this is a book that students will want to keep to hand as they enter their professional life. The leading chemical engineering design text with over 25 years of established market leadership to back it up; an essential resource for the compulsory design project all chemical engineering students take in their final year A complete and trusted teaching and learning package: the book offers a broader scope, better curriculum coverage, more extensive ancillaries and a more student-friendly approach, at a better price, than any of its competitors Endorsed by the Institution of Chemical Engineers, guaranteeing wide exposure to the academic and professional market in chemical and process engineering.

The first guide to compile current research and frontline developments in the science of process intensification (PI), Re-Engineering the Chemical Processing Plant illustrates the design, integration, and application of PI principles and structures for the development and optimization of chemical and industrial plants. This volume updates professionals on emerging PI equipment and methodologies to promote technological advances and operational efficacy in chemical, biochemical, and engineering environments and presents clear examples illustrating the implementation and application of specific process-intensifying equipment and methods in various commercial arenas.

Advanced Bioprocessing for Alternative Fuels, Bio-based Chemicals, and Bioproducts: Technologies and Approaches for Scale-Up and Commercialization demonstrates novel systems that apply advanced bioprocessing technologies to produce biofuels, bio-based chemicals, and value-added bioproducts from renewable sources. The book presents the use of novel oleaginous microorganisms and utilization strategies for applications of advanced bioprocessing technology in biofuels production and thoroughly depicts the technological breakthroughs of value added bioproducts. It also aides in the design, evaluation and production of biofuels by describing metabolic engineering and genetic manipulation of biofuels feedstocks. Users will find a thorough overview of the most recent discoveries in biofuels research and the inherent challenges associated with scale up. Emphasis is placed on technological milestones and breakthroughs in applications of new bioprocessing technologies for biofuels production. Its essential information can be used to understand how to incorporate advanced bioprocessing technologies into the scaling up of laboratory technologies to industrial applications while complying with biofuels policies and regulations. Presents the use of novel oleaginous microorganisms and utilization strategies for the applications of advanced technologies in biofuels production Provides a basis for technology assessments, progress and advances, as well as the challenges associated with biofuels at industrial scale Describes, in detail, technologies for metabolic engineering and genetic manipulation of biofuels feedstocks, thus aiding in the design, evaluation and production of advanced biofuels

This is the second edition of the text "Bioreaction Engineering Principles" by Jens Nielsen and John Villadsen, originally published in 1994 by Plenum Press (now part of Kluwer). Time runs fast in Biotechnology, and when Kluwer Plenum stopped reprinting the first edition and asked us to make a second, revised edition we happily accepted. A text on bioreactions written in the early 1990's will not reflect the enormous development of experimental as well as theoretical aspects of cellular reactions during the past decade. In the preface to the first edition we admitted to be newcomers in the field. One of us (JV) has had 10 more years of job training in biotechnology, and the younger author (IN) has now received international recognition for his work with the hottest topics of "modern" biotechnology. Furthermore we are happy to have induced Gunnar Liden, professor of chemical reaction engineering at our sister university in Lund, Sweden to join us as co-author of the second edition. His contribution, especially on the chemical engineering aspects of "real" bioreactors has been of the greatest value. Chapter 8 of the present edition is largely unchanged from the first edition. We wish to thank professor Martin Hjortso from LSU for his substantial help with this chapter.

There is a need to explain that generic versions of a drug may not be manufactured by the same process as brand-name drugs and that the different processes may have dramatically different environmental impacts. Two global forces are at odds today—the push for "greener" processes and the push for lower drug prices. This book brings this conflict into sharp focus by discussing in detail the published process chemistry for top-selling small molecule drugs. Providing insights about process route selection, choice of reagents, and reaction conditions, Pharmaceutical Process Chemistry for Synthesis guides process chemists in identifying best processes for manufacturing these blockbuster drugs as they lose patent protection. Further, it highlights the strategies and methodology that might be useful for expediting the process

research and development of the blockbusters of the future. Written from a refreshingly objective perspective, this book is essential for process chemists who need to devise practical syntheses for increasingly complex drugs in a constantly decreasing time frame.

A chemical engineer is generally concerned with the industrial implementation of processes in which chemical or microbiological conversion of material takes place in conjunction with the transfer of mass, heat, and momentum. The characteristics of these processes depend on their scale. They include heterogeneous chemical reactions and unit operations. Understandably, chemical engineers have always wanted to find ways of simulating these processes to gain insights assisting them while designing new industrial plants or trying to optimize existing plants. Irrespective of whether the model involved represents a "scale-up" or a "scale-down", certain important questions always apply: How small can the model be? Is one model sufficient or should tests be carried out in models of different sizes? When must or when can physical properties differ? When must the measurements be carried out on the model with the original system of materials? Which rules govern the adaptation of the process parameters in the model measurements to those of the full-scale plant? Is it possible to achieve complete similarity between the processes in the model and those in its full-scale counterpart? If not: how should one proceed? These questions touch on the fundamentals of the theory of models, which are based on dimensional analysis. Although they have been used in the field of fluid dynamics and heat transfer for more than a century - cars, aircrafts, vessels and heat exchangers were scaled up according to these principles - these methods have gained only a modest acceptance in chemical engineering. This book attempts to fill this gap. It is aimed at students and practicing chemical engineers. It consists of two parts. The first part presents the principles of dimensional analysis and of scale-up, based on it, in an easily comprehensible and transparent manner. These principles are illustrated by 23 examples concerning well-known operations from the field of chemical engineering. The second part of the book presents selected examples of treatment of processes in the field of mechanical (11 samples), thermal (6 examples) and chemical (5 examples) process engineering by the dimensional analysis. The last chapter shows that this method can also be favourably applied to the motion processes in the living world (5 examples), leading to a better understanding of them.

Focusing on scientific and practical aspects of process scale-up, this resource details the theory and practice of transferring pharmaceutical processes from laboratory scale to the pilot plant and production scale. It covers parenteral and nonparenteral liquids and semi-solids, products derived from biotechnology, dry blending and powder handling, granulation and drying, fluid bed applications, compaction and tableting, and film coating and regulatory requirements for scale-up and postapproval changes. Drawing on the experience of twenty contributing researchers, the book employs dimensional analysis as a unified scientific approach to quantify similar processes on different scales.

[Copyright: 0762f493280c9ec35cc20d8c2f867b38](https://doi.org/10.1002/9781118444444.ch38)