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Industrial Chemical Process Analysis and Design Analysis, Synthesis and Design of Chemical Processes Analysis, Synthesis and Design of Chemical Processes Analysis and Synthesis of Chemical Process Systems Risk Analysis and Reduction in the Chemical Process Industry Towards Sustainable Chemical Processes Analysis, Synthesis, and Design of Chemical Processes Biorefineries and Chemical Processes Sustainability in the Design, Synthesis and Analysis of Chemical Engineering Processes Introduction to Chemical Processes Fortran Programs for Chemical Process Design, Analysis, and Simulation Scaling Chemical Processes Analysis, Synthesis, and Design of Chemical Processes Chemical Engineering Design and Analysis Modeling and Analysis of Chemical Engineering Processes Guidelines for Chemical Process Quantitative Risk Analysis Chemical Process Structures and Information Flows Introduction to Chemical Processes Solutions Manual for Analysis, Synthesis, and Design of Chemical Processes Process Analysis and Simulation in Chemical Engineering Manual of Economic Analysis of Chemical Processes Process Analytical Chemistry Fortran Programs for Chemical Process Design, Analysis, and Simulation Integrated Chemical Processes ISE Introduction to Chemical Processes: Principles, Analysis, Synthesis Product and Process Design Principles Guidelines for Chemical Process Quantitative Risk Analysis Analysis, Synthesis, and Design of Chemical Processes Chemical Process Technology Scaleup of Chemical Processes Batch Chemical Process Integration Thermal Safety of Chemical Processes Optimization of Chemical Processes Chemical Process Analysis Integrated Design and Simulation of Chemical Processes Kinetics of Chemical Processes An Approach to Chemical Analysis Applications in Design and Simulation of Sustainable Chemical Processes Chemical Process Engineering Volume 2 Process Dynamics

"Introduction to Chemical Processes: Principles, Analysis, Synthesis, 2e is intended for use in an introductory, one-semester course for students in chemical engineering and related disciplines"-- The chemical process industry faces serious problems with regard to new materials and efficient methods of production due to increasing costs of energy, stringent environmental regulations and global competition. A clear understanding of the processes is required in order to solve these problems. One way is through crisp modeling method; another is through an optimal operation of the process to improve profitability and efficiency. The book is in two parts. The first part discusses the methods of modeling chemical engineering processes through well known mathematical methods involving numerical calculations. This includes the recent concepts of Fuzzy logic and neural nets. The second part describes the efficient optimization methods, which are available for the effective application in many chemical processes. This involves methods of search for extrema as well as optimization, with and without constraint relations. Most books on nonlinear programming are of theoretical type, and the exact procedures of computation are often obscure. But in this book, a number of problems have been worked out. In addition to this, computer programs are included for almost all the topics. Due to the intricacy of optimization programs, the flow charts and the program in clear BASIC language have been provided so that the reader can understand the mathematical methods. The book will be useful for students and practising engineers in the field of chemical engineering, biotechnology, environmental engineering, and applied mathematics Towards Sustainable Chemical Processes describes a comprehensive framework for sustainability assessment, design and the processes optimization of chemical engineering. Beginning with the analysis and assessment in the early stage of chemical products' initiating, this book focuses on the combination of science sustainability and process system engineering, involving mathematical models, industrial ecology, circular economy, energy planning, process integration and sustainability engineering. All chapters throughout answered two fundamental questions in depth: (1) what tools and models are available to be used to assess and design sustainable chemical processes, (2) what the core theories and concepts are to get into the sustainable chemical process fields. Therefore, Towards Sustainable Chemical Processes is an indispensable guide for chemical engineers, researchers, students, practitioners and consultants in sustainability related area. Provides innovative, novel and comprehensive methods and models for sustainability assessment, design and optimization, and synthesis and integration of chemical engineering processes Combines sustainability science with process system engineering Integrates mathematical models, industrial ecology, circular economy, energy planning, process integration and sustainability engineering Includes new case studies related to renewable energy, resource management, process synthesis and process integration Kinetics of Chemical Processes details the concepts associated with the kinetic study of the chemical processes. The book is comprised of 10 chapters that present information relevant to applied research. The text first covers the elementary chemical kinetics of elementary steps, and then proceeds to discussing catalysis. The next chapter tackles simplified kinetics of sequences at the steady state. Chapter 5 deals with coupled sequences in reaction networks, while Chapter 6 talks about autocatalysis and inhibition. The seventh chapter describes the irreducible transport phenomena in chemical kinetics. The next two chapters discuss the correlations in homogenous kinetics and heterogeneous catalysis, respectively. The last chapter covers the analysis of reaction networks. The book will be of great use to students, researchers, and practitioners of scientific disciplines that deal with chemical reaction, particularly chemistry and chemical engineering. 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. Chemical process quantitative risk analysis (CPQRA) as applied to the CPI was first fully described in the first edition of this CCPS Guidelines book. This second edition is packed with information reflecting advances in this evolving methodology, and includes worked examples on a CD-ROM. CPQRA is used to identify incident scenarios and evaluate their risk by defining the probability of failure, the various consequences and the potential impact of those consequences. It is an invaluable methodology to evaluate these when qualitative analysis cannot provide adequate understanding and when more information is needed for risk management. This technique provides a means to evaluate acute hazards and alternative risk reduction strategies, and identify areas for cost-effective risk reduction. There are no simple answers when complex issues are concerned, but CPQRA2 offers a cogent, well-illustrated guide to applying these risk-analysis techniques, particularly to risk control studies. Special Details: Includes CD-ROM with example problems worked using Excel and Quattro Pro. For use with Windows 95, 98, and NT. An Approach to Chemical Analysis: Its Development and Practice provides an overview of the development of chemical analysis and its application in solving analytical problems in chemistry. The text is comprised of 19 chapters that are organized into two parts. In the first part, the text covers the historical aspects of chemical. The book then proceeds to tackling methods for analysis in which the final measurement is preceded by one or more chemical reactions. The first two chapters of the second part discuss distillation and chromatography, respectively. Next, the title details the physical methods that only occasionally and incidentally need to be preceded by chemical reactions. The text will be of great use for students, researchers, and practitioners of chemistry. 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 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. Students taking their first chemical engineering course plunge into the 'nuts and bolts' of mass and energy balances and often miss the broad view of what chemical engineers do. This 1998 text offers a well-paced introduction to chemical engineering. Students are first introduced to the fundamental steps in design and three methods of analysis: mathematical modeling, graphical methods, and dimensional analysis. The book then describes how to apply engineering skills, such as how to simplify calculations through assumptions and approximations; how to verify calculations, significant figures, spreadsheets, graphing (standard, semi-log and log-log); and how to use data maps. In addition, the book teaches engineering skills through the design and analysis of chemical processes and process units in order to assess product quality, economics, safety, and environmental impact. This text will help undergraduate students in chemical engineering develop engineering skills early in their studies. Lecturer's solution manual available from the publisher on request. This book gives engineers the fundamental theories, equations, and computer programs (including source codes) that provide a ready way to analyze and solve a wide range of process engineering problems. Chemical process quantitative risk analysis (CPQRA) as applied to the CPI was first fully described in the first edition of this CCPS Guidelines book. This second edition is packed with information reflecting advances in this evolving methodology, and includes worked examples on a CD-ROM. CPQRA is used to identify incident scenarios and

evaluate their risk by defining the probability of failure, the various consequences and the potential impact of those consequences. It is an invaluable methodology to evaluate these when qualitative analysis cannot provide adequate understanding and when more information is needed for risk management. This technique provides a means to evaluate acute hazards and alternative risk reduction strategies, and identify areas for cost-effective risk reduction. There are no simple answers when complex issues are concerned, but CPQRA2 offers a cogent, well-illustrated guide to applying these risk-analysis techniques, particularly to risk control studies. Special Details: Includes CD-ROM with example problems worked using Excel and Quattro Pro. For use with Windows 95, 98, and NT.

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

Scaling Chemical Processes: Practical Guides in Chemical Engineering is one of a series 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 for engineering professionals who require a basic grounding in various related topics. 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. This book discusses scaling chemical processes from a laboratory through a pilot plant to a commercial plant. It bases scaling on similarity principles and uses dimensional analysis to derive the dimensionless parameters necessary to ensure a successful chemical process development program. This series is fully endorsed and co-branded by the IChemE, and they help to promote the series. Offers practical, short, concise information on the basics to help you get an answer or teach yourself a new topic quickly Includes industry examples to help you solve real world problems Provides key facts for professionals in convenient single subject volumes Discusses scaling chemical processes from a laboratory through a pilot plant to a commercial plant 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) 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. 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

"Introduction to Chemical Processes: Principles, Analysis, Synthesis, 2e is intended for use in an introductory, one-semester course for students in chemical engineering and related disciplines"-- *Chemical Process Structures and Information Flows* focuses on the role of computers in the understanding of chemical processes, including the use of simulation and optimization in computational problems. The book first underscores graphs and digraphs and pipeline networks. Discussions focus on cutsets and connectivity, directed graphs, trees and circuits, matrix representation of digraphs and graphs, reachability matrix, alternative problem formulations and specifications, and steady state conditions in cyclic networks. The manuscript also ponders on computation sequence in process flowsheet calculations and sparse matrix computation. The publication examines scheduling and design of batch plants, including scheduling of products and operations, characteristics of batch processes, branch and bound methods, and multipurpose batch plants. The text also elaborates on observability and redundancy and process data reconciliation and rectification. The manuscript is a valuable reference for chemical engineering students and readers interested in chemical processes and information flow. Concern for the environment has become one of the big issues in modern society, and one of the chief concerns is the environmental impact of modern industrial production. A particularly sensitive issue is the possibility of accidents in industries where there may be severe consequences for people, property and the environment. At one time the nuclear industry was seen as the most likely to be the cause of significant environmental damage, but after the occurrence of several major accidents such as Seveso, Flixborough and Bhopal, that concern extends to much of the chemicals industry. Pressure from society, reflected by strong legislation, coupled with a greater understanding of the impact that chemical processing operations can have, has led to the adoption of higher profile safety and environmental management programs within the chemical industry. Under these programmes existing and new processes are rigorously examined to determine the possible causes and consequences of failure, and the results used to improve the process to make failure less likely. Any process audit, aimed at improving safety or lessening the environmental impact, cannot be carried out using intuition or experience alone, so the discipline of risk analysis has grown as a collection of tools and methods which can be utilized to give a quantitative assessment of the risks involved in operating any given process. In this new book the authors present risk analysis and reduction in a clear and unified way, emphasizing the various different methods which can be used together in a global approach to risk analysis in the chemical process industries. Originally conceived as a text book for graduate level courses in chemical engineering, the clear presentation and thorough coverage will ensure that anyone involved in risk assessment, environmental impact assessment or safety planning will find this book an invaluable source of reference. "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. This practice-oriented book introduces chemists, engineers and technicians to the strategies, techniques and efficiency of modern process analytical chemistry. The author targets in particular those professionals in SMEs who have to carry out process control tasks in a "solo-run". This is the first book dedicated to the entire field of integrated chemical processes, covering process design, analysis, operation and control of these processes. Both the editors and authors are internationally recognized experts from different fields in industry and academia, and their contributions describe all aspects of intelligent integrations of chemical reactions and physical unit operations such as heat exchange, separational operations and mechanical unit operations. As a unique feature, the book also introduces new concepts for treating different integration concepts on a generalized basis. Of great value to a broad audience of researchers and engineers from industry and academia. *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 *CHEMICAL PROCESS ENGINEERING* Written by one of the most prolific and respected chemical engineers in the world and his co-author, also a well-known and respected engineer, this two-volume set is the "new standard" in the industry, offering engineers and students alike the most up-to-date, comprehensive, and state-of-the-art coverage of

processes and best practices in the field today. This new two-volume set explores and describes integrating new tools for engineering education and practice for better utilization of the existing knowledge on process design. Useful not only for students, university professors, and practitioners, especially process, chemical, mechanical and metallurgical engineers, it is also a valuable reference for other engineers, consultants, technicians and scientists concerned about various aspects of industrial design. The text can be considered as complementary to process design for senior and graduate students as well as a hands-on reference work or refresher for engineers at entry level. The contents of the book can also be taught in intensive workshops in the oil, gas, petrochemical, biochemical and process industries. The book provides a detailed description and hands-on experience on process design in chemical engineering, and it is an integrated text that focuses on practical design with new tools, such as Microsoft Excel spreadsheets and UniSim simulation software. Written by two of the industry's most trustworthy and well-known authors, this book is the new standard in chemical, biochemical, pharmaceutical, petrochemical and petroleum refining. Covering design, analysis, simulation, integration, and, perhaps most importantly, the practical application of Microsoft Excel-UniSim software, this is the most comprehensive and up-to-date coverage of all of the latest developments in the industry. It is a must-have for any engineer or student's library. This book offers a comprehensive coverage of process simulation and flowsheeting, useful for undergraduate students of Chemical Engineering and Process Engineering as theoretical and practical support in Process Design, Process Simulation, Process Engineering, Plant Design, and Process Control courses. The main concepts related to process simulation and application tools are presented and discussed in the framework of typical problems found in engineering design. The topics presented in the chapters are organized in an inductive way, starting from the more simplistic simulations up to some complex problems. Completely revised and updated to reflect the current IUPAC standards, this second edition is enlarged by five new chapters dealing with the assessment of energy potential, physical unit operations, emergency pressure relief, the reliability of risk reducing measures, and process safety and process development. Clearly structured in four parts, the first provides a general introduction and presents the theoretical, methodological and experimental aspects of thermal risk assessment. Part II is devoted to desired reactions and techniques allowing reactions to be mastered on an industrial scale, while the third part deals with secondary reactions, their characterization, and techniques to avoid triggering them. Due to the inclusion of new content and restructuring measures, the technical aspects of risk reduction are highlighted in the new section that constitutes the final part. Each chapter begins with a case history illustrating the topic in question, presenting lessons learned from the incident. Numerous examples taken from industrial practice are analyzed, and each chapter concludes with a series of exercises or case studies, allowing readers to check their understanding of the subject matter. Finally, additional control questions have been added and solutions to the exercises and problems can now be found.

The 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. This book gives engineers the fundamental theories, equations, and computer programs (including source codes) that provide a ready way to analyze and solve a wide range of process engineering problems. 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. Suitable as a text for Chemical Process Dynamics or Introductory Chemical Process Control courses at the junior/senior level. This book aims to provide an introduction to the modeling, analysis, and simulation of the dynamic behavior of chemical processes.

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