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Principles and Modern Applications of Mass Transfer Operations Jaime Benitez 2016-12-08 A staple in any chemical engineering curriculum New edition has a stronger emphasis on membrane separations, chromatography and other adsorptive processes, ion exchange Discusses many developing topics in more depth in mass transfer operations, especially in the biological engineering area Covers in more detail phase equilibrium since distillation calculations are completely dependent on this principle Integrates computational software and problems using Mathcad Features 25-30 problems per chapter

An Introduction to Chemical Engineering Kinetics & Reactor Design Charles G. Hill 1977

PC/Computing 1992-07

Engineering with Mathcad Brent Maxfield 2006-11-18 Using the author's considerable experience of applying Mathcad to engineering problems, Engineering with Mathcad identifies the most powerful functions and features of the software and teaches how to apply these to create comprehensive engineering calculations. Many examples from a variety of engineering fields demonstrate the power and utility of Mathcad's tools, while also demonstrating how other software, such as Microsoft Excel spreadsheets, can be incorporated effectively. This simple, step-by-step approach makes this book an ideal Mathcad text for professional engineers as well as engineering and science students. A CD-ROM packaged with the book contains all the examples in the text and an evaluation version of the Mathcad software, enabling the reader to learn by doing and experiment by changing parameters. * Identifies the key Mathcad functions for creating comprehensive engineering calculations * A step-by-step approach enables easy learning for professional engineers and students alike * Includes a CD-ROM containing all the examples in the text and an evaluation version of the Mathcad software

Applications of MathCAD in Undergraduate Process Control James E. Smith (Jr. (Professor)) 2004

Chemical Engineering Education 2003

Principles and Case Studies of Simultaneous Design William L. Luyben 2012-02-08 There are many comprehensive design books, but none of them provide a significant number of detailed economic design examples of typically complex industrial processes. Most of the current design books cover a wide variety of topics associated with process design. In addition to discussing flowsheet development and equipment design, these textbooks go into a lot of detail on engineering economics and other many peripheral subjects such as written and oral skills, ethics, "green" engineering and product design. This book presents general process design principles in a concise readable form that can be easily comprehended by students and engineers when developing effective flow sheet and control structures. Ten detailed case studies presented illustrate an in-depth and quantitative way the application of these general principles. Detailed economic steady-state designs are developed that satisfy economic criterion such as minimize total annual cost of both capital and energy or return on incremental capital investment. Complete detailed flow sheets and Aspen Plus files are provided. Then conventional PI control structures are be developed and tested for their ability to maintain product quality during disturbances. Complete Aspen Dynamics files are be provided of the dynamic simulations.

Engineering with Mathcad Brent Maxfield 2006 This volume is aimed at engineers, scientists, engineering and science students, and others performing technical calculations. Its purpose is to quickly teach basic Mathcad skills, teach some very useful and powerful features and then teach how to apply these features to create and

organise comprehensive technical calculations.

Fundamental Concepts and Computations in Chemical Engineering Vivek Utgikar 2016-10-25 The Breakthrough Introduction to Chemical Engineering for Today's Students Fundamental Concepts and Computations in Chemical Engineering is well designed for today's chemical engineering students, offering lucid and logically arranged text that brings together the fundamental knowledge students need to gain confidence and to jumpstart future success. Dr. Vivek Utgikar illuminates the day-to-day roles of chemical engineers in their companies and in the global economy. He clearly explains what students need to learn and why they need to learn it, and presents practical computational exercises that prepare beginning students for more advanced study. Utgikar combines straightforward discussions of essential topics with challenging topics to intrigue more well-prepared students. Drawing on extensive experience teaching beginners, he introduces each new topic in simple, relatable language, and supports them with meaningful example calculations in Microsoft Excel and Mathcad. Throughout, Utgikar presents practical methods for effective problem solving, and explains how to set up and use computation tools to get accurate answers. Designed specifically for students entering chemical engineering programs, this text also serves as a handy, quick reference to the basics for more advanced students, and an up-to-date source of valuable information for educators and professionals. Coverage includes Where chemical engineering fits in the engineering field and overall economy Modern chemical engineering and allied industries and their largest firms How typical chemical engineering job functions build on what undergraduates learn The importance of computations, and the use of modern computational tools How to classify problems based on their mathematical nature Fundamental fluid flow phenomena and computational problems in practical systems Basic principles and computations of material and energy balance Fundamental principles and calculations of thermodynamics and kinetics in chemical engineering How chemical engineering systems and problems integrate and interrelate in the real world Review of commercial process simulation software for complex, large-scale computation

Chemical Engineering Progress 2007

Applied Mathematics for Science and Engineering Larry A. Glasgow 2014-09-09 Prepare students for success in using applied mathematics for engineering practice and post-graduate studies • moves from one mathematical method to the next sustaining reader interest and easing the application of the techniques • Uses different examples from chemical, civil, mechanical and various other engineering fields • Based on a decade's worth of the authors lecture notes detailing the topic of applied mathematics for scientists and engineers • Concisely writing with numerous examples provided including historical perspectives as well as a solutions manual for academic adopters

Mathcad for Chemical Engineers Hertanto Adidharma 2007 Mathcad for Chemical Engineers demonstrates the use of Mathcad 13, which is the latest version of one of the most powerful and popular computational software packages in the world, for solving various chemical engineering problems. The book serves as a must-to-have guide and quick reference for chemical engineers and those who would like to learn and use Mathcad as their computational tool. This book can also be used as a textbook for chemical engineering education on computing using Mathcad. The book contains many real-life chemical engineering examples from various areas: material and energy balance, thermodynamics, transport phenomena, kinetics and reactor design, unit operations, engineering economics, and operations management. Unlike other books of similar theme, concise, but comprehensive, explanations are given in each chapter and step-by-step procedures of solving mathematical problems are also given for quick reference. Many examples allow readers to experience the power of Mathcad in solving chemical engineering problems. The book has chapters on Mathcad fundamentals, solving a single algebraic equation and a system of algebraic equations, curve fitting, integration and differentiation, solving a single ordinary differential equation (ODE) and a system of ODEs, solving a single partial differential equation (PDE) and a system of PDEs, and programming in Mathcad. There are a number of exercise problems at the end of each chapter that allow readers to further expose themselves to various chemical engineering problems. Although Mathcad 13 is the software package chosen by the authors and used throughout the book, most of the features discussed can also be applied using earlier versions of Mathcad. Furthermore, although Mathcad will always evolve into a newer version, most of the contents in this book will be applicable for any subsequent version of Mathcad.

Introduction to Mathcad 2000 Ronald W. Larsen 2001 Part of ESource—Prentice Hall's Engineering Source, this book provides a flexible introduction to MathCAD 2000. Featuring over 25 modules and growing, the ESource series provides a comprehensive resource of engineering topics. MathCAD - The Engineer's Scratch Pad; MathCAD Fundamentals; MathCAD Functions; Working with Matrices; Data Analysis Functions; Symbolic Math Using MathCAD; Numerical Techniques. For any Engineer or Computer Scientist interested in a brief introduction to the subject.

Chemical and Engineering Thermodynamics Stanley I. Sandler 1977 A More Accessible Approach to Thermodynamics In this third edition, you'll find a modern approach to applied thermodynamics. The material is presented in sufficient detail to provide a solid understanding of the principles of thermodynamics and its classical applications. Also included are the applications of chemical engineering thermodynamics to issues such as the distribution of chemicals in the environment, safety,

polymers, and solid-state-processing. To make thermodynamics more accessible, several helpful features are included. Important concepts are emphasized in marginal notes throughout each chapter. Illustrations have also been added to demonstrate the use of these concepts and to provide a better understanding of the material. Boxes are used to highlight equations so that students can easily identify the end results of analyses. You can also visit the text's web site to download additional problem sets, computer programs to solve thermodynamic and phase behavior problems, and Mathcad(r) worksheets used for problem solving.

Basic Principles and Calculations in Chemical Engineering David Mautner Himmelblau 2012 Best-selling introductory chemical engineering book - now updated with far more coverage of biotech, nanotech, and green engineering • •Thoroughly covers material balances, gases, liquids, and energy balances. •Contains new biotech and bioengineering problems throughout. •Adds new examples and homework on nanotechnology, environmental engineering, and green engineering. •All-new student projects chapter. •Self-assessment tests, discussion problems, homework, and glossaries in each chapter. Basic Principles and Calculations in Chemical Engineering, 8/e, provides a complete, practical, and student-friendly introduction to the principles and techniques of modern chemical, petroleum, and environmental engineering. The authors introduce efficient and consistent methods for solving problems, analyzing data, and conceptually understanding a wide variety of processes. This edition has been revised to reflect growing interest in the life sciences, adding biotechnology and bioengineering problems and examples throughout. It also adds many new examples and homework assignments on nanotechnology, environmental, and green engineering, plus many updates to existing examples. A new chapter presents multiple student projects, and several chapters from the previous edition have been condensed for greater focus. This text's features include: • •Thorough introductory coverage, including unit conversions, basis selection, and process measurements. •Short chapters supporting flexible, modular learning. •Consistent, sound strategies for solving material and energy balance problems. •Key concepts ranging from stoichiometry to enthalpy. •Behavior of gases, liquids, and solids. •Many tables, charts, and reference appendices. •Self-assessment tests, thought/discussion problems, homework problems, and glossaries in each chapter.

NASA Tech Briefs 1990

Introduction to Software for Chemical Engineers Mariano Martín Martín 2014-07-01 The field of chemical engineering is in constant evolution, and access to information technology is changing the way chemical engineering problems are addressed. Inspired by the need for a user-friendly chemical engineering text that demonstrates the real-world applicability of different computer programs, Introduction to Software for Chemical Engineers acquaints readers with the capabilities of various general purpose, mathematical, process modeling and simulation, optimization, and specialized software packages, while explaining how to use the software to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, and process and equipment design and control. Employing nitric acid production, methanol and ammonia recycle loops, and SO2 oxidation reactor case studies and other practical examples, Introduction to Software for Chemical Engineers shows how computer packages such as Excel, MATLAB®, Mathcad, CHEMCAD, Aspen HYSYS®, gPROMS, CFD, DEM, GAMS, and AIMMS are used in the design and operation of chemical reactors, distillation columns, cooling towers, and more. Make Introduction to Software for Chemical Engineers your go-to guide and quick reference for the use of computer software in chemical engineering applications.

Introduction to Software for Chemical Engineers, Second Edition Mariano Martín Martín 2019-06-06 The field of Chemical Engineering and its link to computer science is in constant evolution and new engineers have a variety of tools at their disposal to tackle their everyday problems. Introduction to Software for Chemical Engineers, Second Edition provides a quick guide to the use of various computer packages for chemical engineering applications. It covers a range of software applications from Excel and general mathematical packages such as MATLAB and MathCAD to process simulators, CHEMCAD and ASPEN, equation-based modeling languages, gProms, optimization software such as GAMS and AIMS, and specialized software like CFD or DEM codes. The different packages are introduced and applied to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, process and equipment design and control. This new edition offers a wider view of packages including open source software such as R, Python and Julia. It also includes complete examples in ASPEN Plus, adds ANSYS Fluent to CFD codes, Lingo to the optimization packages, and discusses Engineering Equation Solver. It offers a global idea of the capabilities of the software used in the chemical engineering field and provides examples for solving real-world problems. Written by leading experts, this book is a must-have reference for chemical engineers looking to grow in their careers through the use of new and improving computer software. Its user-friendly approach to simulation and optimization as well as its example-based presentation of the software, makes it a perfect teaching tool for both undergraduate and master levels.

Chemical Engineering Tanase Gh. Dobre 2007-07-16 A description of the use of computer aided modeling and simulation in the development, integration and optimization of industrial processes. The two authors elucidate the entire procedure step-by-step, from basic mathematical modeling to result interpretation and full-scale process performance analysis. They further demonstrate similitude comparisons of experimental results from different systems as a tool for broadening the applicability of the calculation methods. Throughout, the book adopts a very practical approach, addressing actual problems and projects likely to be encountered by the reader, as

well as fundamentals and solution strategies for complex problems. It is thus equally useful for student and professional engineers and chemists involved in industrial process and production plant design, construction or upgrading.

Problem Solving in Chemical Engineering with Numerical Methods Michael B. Cutlip 1999 "A companion book including interactive software for students and professional engineers who want to utilize problem-solving software to effectively and efficiently obtain solutions to realistic and complex problems. An Invaluable reference book that discusses and Illustrates practical numerical problem solving in the core subject areas of Chemical Engineering. Problem Solving in Chemical Engineering with Numerical Methods provides an extensive selection of problems that require numerical solutions from throughout the core subject areas of chemical engineering. Many are completely solved or partially solved using POLYMATH as the representative mathematical problem-solving software, Ten representative problems are also solved by Excel, Maple, Mathcad, MATLAB, and Mathematica. All problems are clearly organized and all necessary data are provided. Key equations are presented or derived. Practical aspects of efficient and effective numerical problem solving are emphasized. Many complete solutions are provided within the text and on the CD-ROM for use in problem-solving exercises."--BOOK JACKET.Title Summary field provided by Blackwell North America, Inc. All Rights Reserved

Solving Mass Transfer Problems on the Computer Using Mathcad Ernest N. Bart 2005

Introduction to Mathcad 11 Ronald W. Larsen 2004 ESource-Prentice Hall's Engineering Source-provides a comprehensive, customizable introductory engineering and computing library. Featuring over 25 modules and growing, ESource allows users to fully customize their books through the ESource website. Using the ESource online BookBuild system at www.prenhall.com/esource, users can view and select book chapters, change the sequence, instantly calculate the book's net (bookstore) price, request a free examination copy, and generate an ISBN for placing a bookstore order. Mathcad as a Design Tool; Mathcad as a Mathematical Problem Solver; Mathcad Fundamentals; Mathcad Functions; Trigonometric Functions; Advanced Mathematics Functions; Mathcad's Matrix Definitions; Array Operations; Graphing With Mathcad; Programming in Mathcad; Symbolic Matrix Math; and Numerical Techniques. For professionals in General Engineering or Computer Science fields.

PC Mag 1990-11-13 PCMag.com is a leading authority on technology, delivering Labs-based, independent reviews of the latest products and services. Our expert industry analysis and practical solutions help you make better buying decisions and get more from technology.

Mathematical Modeling and Numerical Methods in Chemical Physics and Mechanics Ali V. Aliev 2016-04-27 The use of mathematical modeling in engineering allows for a significant reduction of material costs associated with design, production, and operation of technical objects, but it is important for an engineer to use the available computational approaches in modeling correctly. Taking into account the level of modern computer technology, this new volume explains how an engineer should properly define the physical and mathematical problem statement, choose the computational approach, and solve the problem by proven reliable computational approach using computer and software applications during the solution of a particular problem. This work is the result of years of the authors' research and experience in the fields of power and rocket engineering where they put into practice the methods of mathematical modeling shown in this valuable volume. The examples in the book are based on two approaches. The first approach involves the use of the relatively simple mathematical system MathCad. The second one involves the solving of problems using Intel Visual Fortran compiler with IMSL Libraries. The use of other software packages (Maple, MathLab, Mathematica) or compilers (?, ?++, Visual Basic) for code is equally acceptable in the solution of the problems given in the book. Intended for professors and instructors, scientific researchers, students, and industry professionals, the book will help readers to choose the most appropriate mathematical modeling method to solve engineering problems, and the authors also include methods that allow for the solving of nonmathematical problems as mathematical problems.

Concise Chemical Thermodynamics A.P.H. Peters 2010-07-02 The first two editions of Concise Chemical Thermodynamics proved to be a very popular introduction to a subject many undergraduate students perceive to be difficult due to the underlying mathematics. With its concise explanations and clear examples, the text has for the past 40 years clarified for countless students one of the most complicated bran

Thermal Engineering Studies with Excel, Mathcad and Internet Valery Ochkov 2016-02-05 This book provides the fundamentals of the application of mathematical methods, modern computational tools (Excel, Mathcad, SMath, etc.), and the Internet to solve the typical problems of heat and mass transfer, thermodynamics, fluid dynamics, energy conservation and energy efficiency. Chapters cover the technology for creating and using databases on various properties of working fluids, coolants and thermal materials. All calculation methods are provided with links to online computational pages where data can be inserted and recalculated. It discusses tasks involving the generation of electricity at thermal, nuclear, gas turbine and combined-cycle power plants, as well as processes of co- and trigeneration, conditioning facilities and heat pumps. This text engages students and researchers by using modern calculation tools and the Internet for thermal engineering applications.

Chemical Reactor Design Juan A. Conesa 2019-09-04 A guide to the technical and calculation problems of chemical reactor analysis, scale-up, catalytic and biochemical reactor design Chemical Reactor Design offers a guide to the myriad aspects of reactor design including the use of numerical methods for solving

engineering problems. The author - a noted expert on the topic - explores the use of transfer functions to study residence time distributions, convolution and deconvolution curves for reactor characterization, forced-unsteady-state-operation, scale-up of chemical reactors, industrial catalysis, design of multiphasic reactors, biochemical reactors design, as well as the design of multiphase gas-liquid-solid reactors. Chemical Reactor Design contains several examples of calculations and it gives special emphasis on the numerical solutions of differential equations by using the finite differences approximation, which offers the background information for understanding other more complex methods. The book is designed for the chemical engineering academic community and includes case studies on mathematical modeling by using of MatLab software. This important book: - Offers an up-to-date insight into the most important developments in the field of chemical, catalytic, and biochemical reactor engineering - Contains new aspects such as the use of numerical methods for solving engineering problems, transfer functions to study residence time distributions, and more - Includes illustrative case studies on MatLab approach, with emphasis on numerical solution of differential equations using the finite differences approximation Written for chemical engineers, mechanical engineers, chemists in industry, complex chemists, bioengineers, and process engineers, Chemical Reactor Design addresses the technical and calculation problems of chemical reactor analysis, scale-up, as well as catalytic and biochemical reactor design.

Chemical, Biochemical, and Engineering Thermodynamics Stanley I. Sandler 2017-04-24 In this newly revised 5th Edition of Chemical and Engineering Thermodynamics, Sandler presents a modern, applied approach to chemical thermodynamics and provides sufficient detail to develop a solid understanding of the key principles in the field. The text confronts current information on environmental and safety issues and how chemical engineering principles apply in biochemical engineering, bio-technology, polymers, and solid-state-processing. This book is appropriate for the undergraduate and graduate level courses.

Chemical Kinetics with Mathcad and Maple Viktor Korobov 2011-05-26 The authors explain at length the principles of chemical kinetics and approaches to computerized calculations in modern software suites — mathcad and maple. Mathematics is crucial in determining correlations in chemical processes and requires various numerical approaches. Often significant issues with mathematical formalizations of chemical problems arise and many kinetic problems can ?t be solved without computers. Numerous problems encountered in solving kinetics ? calculations with detailed descriptions of the numerical tools are given. Special attention is given to electrochemical reactions, which fills a gap in existing texts not covering this topic in detail. The material demonstrates how these suites provide quick and precise behavior predictions for a system over time (for postulated mechanisms).Examples, i.e., oscillating and non-isothermal reactions, help explain the use of mathcad more efficiently. Also included are the results of authors' own research toward effective computations.

Principles of Mass Transfer Jaime Benitez 2022-12-13 This textbook teaches the subject of mass transfer fundamentals and their applications to the design of separation processes. The level of presentation of the concepts is easy to follow by the reader, but with enough depth of coverage to guarantee that students using the book will, at the end of the course, be able to specify preliminary designs of the most common separation process equipment. Reflecting the growth of biochemical applications in the field of chemical engineering, the fourth edition expands biochemical coverage, including transient diffusion, environmental applications, electrophoresis, and bioseparations. Also new to the fourth edition is the integration of Python programs, a rapidly developing programming environment which is freely available and easily adapted to the very demanding computational needs of separation processes design. These Python programs complement the Mathcad programs of the previous edition. On the accompanying instructor's website, the online appendices contain a downloadable library of Python and Mathcad programs for the example problems in each chapter. A complete solution manual for all end-of-chapter problems, both in Mathcad and Python, is also provided.

The Thermodynamics of Phase and Reaction Equilibria Ismail Tosun 2021-06-17 The Thermodynamics of Phase and Reaction Equilibria, Second Edition, provides a sound foundation for understanding abstract concepts of phase and reaction equilibria (e.g., partial molar Gibbs energy, fugacity, and activity) and shows how to apply these concepts to solve practical problems using numerous clear examples. Available computational software has made it possible for students to tackle realistic and challenging problems from industry. The second edition incorporates phase equilibrium problems dealing with nonideal mixtures containing more than two components and chemical reaction equilibrium problems involving multiple reactions. Computations are carried out with the help of Mathcad®. Clear layout, coherent and logical organization of the content, and presentation suitable for self-study Provides analytical equations in dimensionless form for the calculation of changes in internal energy, enthalpy, and entropy as well as departure functions and fugacity coefficients All chapters have been updated primarily through new examples Includes many well-organized problems (with answers), which are extensions of the examples enabling conceptual understanding for quantitative/real problem solving Provides Mathcad worksheets and subroutines Includes a new chapter linking thermodynamics with reaction engineering A complete Instructor's Solutions Manual is available as a textbook resource

Applied Mathematics And Modeling For Chemical Engineers Richard G. Rice 2012-10-16 This Second Edition of the go-to reference combines the classical analysis and modern applications of applied mathematics for chemical engineers. The book introduces traditional techniques for solving ordinary differential equations (ODEs),

adding new material on approximate solution methods such as perturbation techniques and elementary numerical solutions. It also includes analytical methods to deal with important classes of finite-difference equations. The last half discusses numerical solution techniques and partial differential equations (PDEs). The reader will then be equipped to apply mathematics in the formulation of problems in chemical engineering. Like the first edition, there are many examples provided as homework and worked examples.

Introduction to Software for Chemical Engineers Mariano Martín Martín 2014-07-01 The field of chemical engineering is in constant evolution, and access to information technology is changing the way chemical engineering problems are addressed. Inspired by the need for a user-friendly chemical engineering text that demonstrates the real-world applicability of different computer programs, Introduction to Software for Chemical Engineers acquaints readers with the capabilities of various general purpose, mathematical, process modeling and simulation, optimization, and specialized software packages, while explaining how to use the software to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, and process and equipment design and control. Employing nitric acid production, methanol and ammonia recycle loops, and SO2 oxidation reactor case studies and other practical examples, Introduction to Software for Chemical Engineers shows how computer packages such as Excel, MATLAB®, Mathcad, CHEMCAD, Aspen HYSYS®, gPROMS, CFD, DEM, GAMS, and AIMMS are used in the design and operation of chemical reactors, distillation columns, cooling towers, and more. Make Introduction to Software for Chemical Engineers your go-to guide and quick reference for the use of computer software in chemical engineering applications.

Introduction to Software for Chemical Engineers, Second Edition Mariano Martín Martín 2019-06-06 The field of Chemical Engineering and its link to computer science is in constant evolution and new engineers have a variety of tools at their disposal to tackle their everyday problems. Introduction to Software for Chemical Engineers, Second Edition provides a quick guide to the use of various computer packages for chemical engineering applications. It covers a range of software applications from Excel and general mathematical packages such as MATLAB and MathCAD to process simulators, CHEMCAD and ASPEN, equation-based modeling languages, gProms, optimization software such as GAMS and AIMS, and specialized software like CFD or DEM codes. The different packages are introduced and applied to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, process and equipment design and control. This new edition offers a wider view of packages including open source software such as R, Python and Julia. It also includes complete examples in ASPEN Plus, adds ANSYS Fluent to CFD codes, Lingo to the optimization packages, and discusses Engineering Equation Solver. It offers a global idea of the capabilities of the software used in the chemical engineering field and provides examples for solving real-world problems. Written by leading experts, this book is a must-have reference for chemical engineers looking to grow in their careers through the use of new and improving computer software. Its user-friendly approach to simulation and optimization as well as its example-based presentation of the software, makes it a perfect teaching tool for both undergraduate and master levels.

Introduction to Chemical Engineering Kinetics and Reactor Design Charles G. Hill 2014-04-24 The Second Edition features new problems that engage readers in contemporary reactor design Highly praised by instructors, students, and chemical engineers, Introduction to Chemical Engineering Kinetics & Reactor Design has been extensively revised and updated in this Second Edition. The text continues to offer a solid background in chemical reaction kinetics as well as in material and energy balances, preparing readers with the foundation necessary for success in the design of chemical reactors. Moreover, it reflects not only the basic engineering science, but also the mathematical tools used by today's engineers to solve problems associated with the design of chemical reactors. Introduction to Chemical Engineering Kinetics & Reactor Design enables readers to progressively build their knowledge and skills by applying the laws of conservation of mass and energy to increasingly more difficult challenges in reactor design. The first one-third of the text emphasizes general principles of chemical reaction kinetics, setting the stage for the subsequent treatment of reactors intended to carry out homogeneous reactions, heterogeneous catalytic reactions, and biochemical transformations. Topics include: Thermodynamics of chemical reactions Determination of reaction rate expressions Elements of heterogeneous catalysis Basic concepts in reactor design and ideal reactor models Temperature and energy effects in chemical reactors Basic and applied aspects of biochemical transformations and bioreactors About 70% of the problems in this Second Edition are new. These problems, frequently based on articles culled from the research literature, help readers develop a solid understanding of the material. Many of these new problems also offer readers opportunities to use current software applications such as Mathcad and MATLAB®. By enabling readers to progressively build and apply their knowledge, the Second Edition of Introduction to Chemical Engineering Kinetics & Reactor Design remains a premier text for students in chemical engineering and a valuable resource for practicing engineers.

Molecular Chemistry and Biomolecular Engineering Lionello Pogliani 2019-09-30 This new volume is devoted to molecular chemistry and its applications to the fields of biology. It looks at the integration of molecular chemistry with biomolecular engineering, with the goal of creating new biological or physical properties to address scientific or societal challenges. It takes a both multidisciplinary and interdisciplinary perspective on the interface between molecular biology, biophysical chemistry, and

chemical engineering. Molecular Chemistry and Biomolecular Engineering: Integrating Theory and Research with Practice provides effective support for the development of the laboratory and data analysis skills that researchers will draw on time and again for the practical aspects and also gives a solid grounding in the broader transferable skills.

Introduction to Modeling and Numerical Methods for Biomedical and Chemical Engineers Edward Gatzke This textbook introduces the concepts and tools that biomedical and chemical engineering students need to know in order to translate engineering problems into a numerical representation using scientific fundamentals. Modeling concepts focus on problems that are directly related to biomedical and chemical engineering. A variety of computational tools are presented, including MATLAB, Excel, Mathcad, and COMSOL, and a brief introduction to each tool is accompanied by multiple computer lab experiences. The numerical methods covered are basic linear algebra and basic statistics, and traditional methods like Newton's method, Euler Integration, and trapezoidal integration. The book presents the reader with numerous examples and worked problems, and practice problems are included at the end of each chapter. Focuses on problems and methods unique to biomedical and chemical engineering; Presents modeling concepts drawn from chemical, mechanical, and materials engineering; Ancillary materials include lecture notes and slides and online videos that enable a flipped classroom or individual study.

Chemical Engineering Computation with MATLAB® Yeong Koo Yeo 2020-12-15 Chemical Engineering Computation with MATLAB®, Second Edition continues to present basic to advanced levels of problem-solving techniques using MATLAB as the computation environment. The Second Edition provides even more examples and problems extracted from core chemical engineering subject areas and all code is updated to MATLAB version 2020. It also includes a new chapter on computational intelligence and: Offers exercises and extensive problem-solving instruction and solutions for various problems Features solutions developed using fundamental principles to construct mathematical models and an equation-oriented approach to generate numerical results Delivers a wealth of examples to demonstrate the implementation of various problem-solving approaches and methodologies for problem formulation, problem solving, analysis, and presentation, as well as visualization and documentation of results Includes an appendix offering an introduction to MATLAB for readers unfamiliar with the program, which will allow them to write their own MATLAB programs and follow the examples in the book Provides aid with advanced problems that are often encountered in graduate research and industrial operations, such as nonlinear regression, parameter estimation in differential systems, two-point boundary value problems and partial differential equations and optimization This essential textbook readies engineering students, researchers, and professionals to be proficient in the use of MATLAB to solve sophisticated real-world problems within the interdisciplinary field of chemical engineering. The text features a solutions manual, lecture slides, and MATLAB program files._

Fundamental Mass Transfer Concepts in Engineering Applications Ismail Tosun 2019-06-03 Fundamental Mass Transfer Concepts in Engineering Applications provides the basic principles of mass transfer to upper undergraduate and graduate students from different disciplines. This book outlines foundational material and equips students with sufficient mathematical skills to tackle various engineering problems with confidence. It covers mass transfer in both binary and multicomponent systems and integrates the use of Mathcad® for solving problems. This textbook is an ideal resource for a one-semester course. Key Features The concepts are explained with the utmost clarity in simple and elegant language Presents theory followed by a variety of practical, fully-worked example problems Includes a summary of the mathematics necessary for mass transfer calculations in an appendix Provides ancillary Mathcad® subroutines Includes end-of-chapter problems and a solutions manual for adopting instructors

Principles and Modern Applications of Mass Transfer Operations Jaime Benitez 2016-12-16 A staple in any chemical engineering curriculum New edition has a stronger emphasis on membrane separations, chromatography and other adsorptive processes, ion exchange Discusses many developing topics in more depth in mass transfer operations, especially in the biological engineering area Covers in more detail phase equilibrium since distillation calculations are completely dependent on this principle Integrates computational software and problems using Mathcad Features 25-30 problems per chapter