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Chemical Engineering Education CRC Press

This book teaches the fundamentals of fluid flow by including both theory and the applications of fluid flow in chemical engineering. It puts fluid flow in the context of other transport phenomena such as mass transfer and heat transfer, while covering the basics, from elementary flow mechanics to the law of conservation. The book then examines the applications of fluid flow, from laminar flow to filtration and ventilation. It closes with a discussion of special topics related to fluid flow, including environmental concerns and the economic reality of fluid flow applications.

Engineering with Mathcad Springer Science & Business Media

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

Proceedings Butterworth-Heinemann

The 18th European Symposium on Computer Aided Process Engineering contains papers presented at the 18th European Symposium of Computer Aided Process Engineering (ESCAPE 18) held in Lyon, France, from 1-4 June 2008. The ESCAPE series brings the latest innovations and achievements by leading professionals from the industrial and

academic communities. The series serves as a forum for engineers, scientists, researchers, managers and students from academia and industry to: - present new computer aided methods, algorithms, techniques related to process and product engineering, - discuss innovative concepts, new challenges, needs and trends in the area of CAPE. This research area bridges fundamental sciences (physics, chemistry, thermodynamics, applied mathematics and computer sciences) with the various aspects of process and product engineering. The special theme for ESCAPE-18 is CAPE for the Users! CAPE systems are to be put in the hands of end users who need functionality and assistance beyond the scientific and technological capacities which are at the core of the systems. The four main topics are: - off-line systems for synthesis and design, - on-line systems for control and operation, - computational and numerical solutions strategies, - integrated and multi-scale modelling and simulation, Two general topics address the impact of CAPE tools and methods on Society and Education. * CD-ROM that accompanies the book contains all research papers and contributions *

International in scope with guest speeches and keynote talks from leaders in science and industry * Presents papers covering the latest research, key top areas and developments in Computer Aided Process Engineering

Chemical Engineering Progress John Wiley & Sons

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.

Basic Principles and Calculations in Chemical Engineering Trafford Publishing

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.

Modeling Tools for Environmental Engineers and Scientists Elsevier

Rules of Thumb for Chemical Engineers, Fifth Edition, provides solutions, common sense techniques, shortcuts, and calculations to help chemical and process engineers deal with practical on-the-job problems. It discusses physical properties for proprietary materials, pharmaceutical and biopharmaceutical sector heuristics, and process design, along with closed-loop heat transfer systems, heat exchangers, packed columns, and structured packings. Organized into 27 chapters, the book begins with an overview of formulae and data for sizing piping systems for incompressible and compressible flow. It then moves to a discussion of design recommendations for heat exchangers, practical equations for solving fractionation problems, along with design of reactive absorption processes. It also considers different types of pumps and presents narrative as well as tabular comparisons and application notes for various types of fans, blowers, and compressors. The book also walks the reader through the general rules of thumb for vessels, how cooling towers are sized based on parameters such as return temperature and supply temperature, and specifications of refrigeration systems. Other chapters focus on pneumatic conveying, blending and agitation, energy conservation, and process modeling. Chemical engineers faced with fluid flow problems will find this book extremely useful. Rules of Thumb for Chemical Engineers brings together solutions, information and work-arounds that engineers in the process industry need to get their job done. New

material in the Fifth Edition includes physical properties for proprietary materials, six new chapters, including pharmaceutical, biopharmaceutical sector heuristics, process design with simulation software, and guidelines for hazardous materials and processes Now includes SI units throughout alongside

Beyond the Fundamentals Elsevier

A practical, concise guide to chemical engineering principles and applications Chemical Engineering: The Essential Reference is the condensed but authoritative chemical engineering reference, boiled down to principles and hands-on skills needed to solve real-world problems. Emphasizing a pragmatic approach, the book delivers critical content in a convenient format and presents on-the-job topics of importance to the chemical engineer of tomorrow—OM&I (operation, maintenance, and inspection) procedures, nanotechnology, how to purchase equipment, legal considerations, the need for a second language and for oral and written communication skills, and ABET (Accreditation Board for Engineering and Technology) topics for practicing engineers. This is an indispensable resource for anyone working as a chemical engineer or planning to enter the field. Praise for Chemical Engineering: The Essential Reference:

“ Current and relevant...over a dozen topics not normally addressed...invaluable to my work as a consultant and educator.” —Kumar Ganesan, Professor and Department Head, Department of Environmental Engineering, Montana Tech of the University of Montana “ A much-needed and unique book, tough not to like...loaded with numerous illustrative examples...a book that looks to the future and, for that reason alone, will be of great interest to practicing engineers.”

—Anthony Buonicore, Principal, Buonicore Partners Coverage includes: Basic calculations and key tables Process variables Numerical methods and optimization Oral and written communication Second language(s) Chemical engineering processes Stoichiometry Thermodynamics Fluid flow Heat transfer Mass transfer operations Membrane technology Chemical reactors Process control Process design Biochemical technology Medical applications Legal considerations Purchasing equipment Operation, maintenance, and inspection (OM&I) procedures Energy management Water management Nanotechnology Project management Environment management Health, safety, and accident management Probability and statistics Economics and finance Ethics Open-ended problems

Introduction to Software for Chemical Engineers, Second Edition FT Press

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.

Principles and Modern Applications of Mass Transfer Operations John Wiley & Sons

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
Effective Learning and Teaching in Engineering
 McGraw Hill Professional
 Filling a longstanding gap for graduate courses in the field, *Chemical Reaction Engineering: Beyond the Fundamentals* covers basic concepts as well as complexities of chemical reaction engineering, including novel techniques for process intensification. The book is divided into three parts: Fundamentals Revisited, Building on Fundamentals, and Beyond the Fundamentals. Part I: Fundamentals Revisited reviews the salient features of an undergraduate course, introducing concepts essential to reactor design, such as mixing, unsteady-state operations, multiple steady states, and complex reactions. Part II: Building on Fundamentals is devoted to "skill building," particularly in the area of catalysis and catalytic reactions. It covers chemical thermodynamics, emphasizing the thermodynamics of adsorption and complex reactions; the fundamentals of chemical kinetics, with special emphasis on microkinetic analysis; and heat and mass transfer effects in catalysis, including transport between phases, transfer across interfaces, and effects of external heat and mass transfer. It also contains a chapter that provides readers with tools for making accurate kinetic measurements and analyzing the data obtained. Part III: Beyond the Fundamentals presents material not commonly covered in textbooks, addressing aspects of reactors involving more than one phase. It discusses solid catalyzed fluid-phase reactions in fixed-bed and fluidized-bed reactors, gas – solid noncatalytic reactions, reactions involving at least one liquid phase (gas – liquid and liquid – liquid), and multiphase reactions. This section also describes membrane-assisted reactor engineering, combo reactors, homogeneous catalysis, and phase-transfer catalysis. The final chapter provides a perspective on future trends in reaction engineering.

NASA Tech Briefs Butterworth-Heinemann
 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.
Solving Mass Transfer Problems on the Computer Using Mathcad Elsevier
 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
The Essential Reference John Wiley & Sons
 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
Computer Generated Physical Properties CRC Press
 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.

Scientific Computing in Chemical Engineering II Butterworth-Heinemann

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.

Computational Fluid Dynamics, Reaction Engineering, and Molecular Properties CRC Press

"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
Chemical Engineering CRC Press

Computer Generated Physical Properties offers the environmental scientist a basis to predict the properties of molecules and reengineer them to remove those properties that are harmful to the environment. This technology is currently used in other fields and is now becoming popular in the environmental engineering field because of its pollution prevention and waste reduction capabilities. This book, interdisciplinary in scope, treats the physical properties of matter as generated by computers. It covers a wide variety of topics pointing towards synthesizing new molecules to substitute for reactants, intermediaries, and products in industrial processes with better physical and environmental properties than the original. The author achieves this with a spreadsheet program called SYNPROPS that operates on a PC computer with optimization features. A radar type graph - one for each property - visually sorts the various groups in order of their contribution to the property, creating the necessity for a computer to obtain answers for the structure of the optimum molecules for substitution or synthesis. The author discusses applications to biologically active molecules without side effects, including antineoplastic drugs.

Additionally, he demonstrates model compounds and the applications of SYNPROPS' optimization and substitution. This book has everything you need to know about deriving properties and combinational chemistry from molecular structure.

Introduction to Modeling and Numerical Methods for Biomedical and Chemical Engineers Elsevier

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
InfoWorld Prentice Hall

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.

Using Mathcad to Create and Organize your Engineering Calculations I. K. International Pvt Ltd

This text combines the basic principles and theories of transport in biological systems with fundamental bioengineering. It contains real world applications in drug delivery systems, tissue engineering, and artificial organs. Considerable significance is placed on developing a quantitative understanding of the underlying physical, chemical, and biological phenomena. Therefore, many mathematical methods are developed using compartmental approaches. The book is replete with examples and problems.