

Elements Of Chemical Reaction Engineering 3rd Edition Prentice Hall International Series In The Physical And Chemical Engineering Sciences

Access Card Package Package consists of: *0134472136 / 9780134472133 Fundamentals of Multinational Finance*0134626575 / 9780134626574 MyLab Finance with Pearson eText -- Access Card -- for Fundamentals of Multinational Finance

This book illustrates how models of chemical reactors are built up in a systematic manner, step by step. The authors also outline how the numerical solution algorithms for reactor models are selected, as well as how computer codes are written for numerical performance, with a focus on MATLAB and Fortran. Examples solved in MATLAB and simulations performed in Fortran are included for demonstration purposes. Coulson and Richardson's Chemical Engineering: Volume 3A: Chemical and Biochemical Reactors and Reaction Engineering, Fourth Edition, covers reactor design, flow modelling, gas-liquid and gas-solid reactions and reactors. Captures content converted from textbooks into fully revised reference material Includes content ranging from foundational through technical Features emerging applications, numerical methods and computational tools

'Elements of Chemical Reaction Engineering', fourth edition, presents the fundamentals of chemical reaction engineering in a clear and concise manner.

This book provides a framework to hone and polish any person's creative problem-solving skills.

The Definitive, Fully Updated Guide to Separation Process Engineering—Now with a Thorough Introduction to Mass Transfer Analysis Separation Process Engineering, Third Edition, is the most comprehensive, accessible guide available on modern separation processes and the fundamentals of mass transfer. Phillip C. Wankat teaches each key concept through detailed, realistic examples using real data—including up-to-date simulation practice and new spreadsheet-based exercises. Wankat thoroughly covers each of today's leading approaches, including flash, column, and batch distillation; exact calculations and shortcut methods for multicomponent distillation; staged and packed column design; absorption; stripping; and more. In this edition, he also presents the latest design methods for liquid-liquid extraction. This edition contains the most detailed coverage available of membrane separations and of sorption separations (adsorption, chromatography, and ion exchange). Updated with new techniques and references throughout, Separation Process Engineering, Third Edition, also contains more than 300 new homework problems, each tested in the author's Purdue University classes. Coverage includes Modular, up-to-date process simulation examples and homework problems, based on Aspen Plus and easily adaptable to any simulator Extensive new coverage of mass transfer and diffusion, including both Fickian and Maxwell-Stefan approaches Detailed discussions of liquid-liquid extraction, including McCabe-Thiele, triangle and computer simulation analyses; mixer-settler design; Karr columns; and related mass transfer analyses Thorough introductions to adsorption, chromatography, and ion exchange—designed to prepare students for advanced work in these areas Complete coverage of membrane separations, including gas permeation, reverse osmosis, ultrafiltration, pervaporation, and key applications A full chapter on economics and energy conservation in distillation Excel spreadsheets offering additional practice with problems in distillation, diffusion, mass transfer, and membrane separation

Catalytic Reactors presents several key aspects of reactor design in Chemical and Process Engineering. Starting with the fundamental science across a broad interdisciplinary field, this graduate level textbook offers a concise overview on reactor and process design for students, scientists and practitioners new to the field. This book aims to collate into a comprehensive and well-informed work of leading researchers from north America, western Europe and south-east Asia. The editor and international experts discuss state-of-the-art applications of multifunctional reactors, biocatalytic membrane reactors, micro-flow reactors, industrial catalytic reactors, micro trickle bed reactors and multiphase catalytic reactors. The use of catalytic reactor technology is essential for the economic viability of the chemical manufacturing industry. The importance of Chemical and Process Engineering and efficient design of reactors are another focus of the book. Especially the combination of advantages from both catalysis and chemical reaction technology for optimization and intensification as essential factors in the future development of reactors and processes are discussed. Furthermore, options that can drastically influence reaction processes, e.g. choice of catalysts, alternative reaction pathways, mass and heat transfer effects, flow regimes and inherent design of catalytic reactors are reviewed in detail. Focuses on the state-of-the-art applications of catalytic reactors and optimization in the design and operation of industrial catalytic reactors Insights into transfer of knowledge from laboratory science to industry For students and researchers in Chemical and Mechanical Engineering, Chemistry, Industrial Catalysis and practising Engineers

Up-to-Date Coverage of All Chemical Engineering Topics?from the Fundamentals to the State of the Art Now in its 85th Anniversary Edition, this industry-standard resource has equipped generations of engineers and chemists with vital information, data, and insights. Thoroughly revised to reflect the latest technological advances and processes, Perry's Chemical Engineers' Handbook, Ninth Edition, provides unsurpassed coverage of every aspect of chemical engineering. You will get comprehensive details on chemical processes, reactor modeling, biological processes, biochemical and membrane separation, process and chemical plant safety, and much more. This fully updated edition covers: Unit Conversion Factors and Symbols • Physical and Chemical Data including Prediction and Correlation of Physical Properties • Mathematics including Differential and Integral Calculus, Statistics, Optimization • Thermodynamics • Heat and Mass Transfer • Fluid and Particle Dynamics • Reaction Kinetics • Process Control and Instrumentation • Process Economics • Transport and Storage of Fluids • Heat Transfer Operations and Equipment • Psychrometry, Evaporative Cooling, and Solids Drying • Distillation • Gas Absorption and Gas-Liquid System Design • Liquid-Liquid Extraction Operations and Equipment • Adsorption and Ion Exchange • Gas-Solid Operations and Equipment • Liquid-Solid Operations and Equipment • Solid-Solid Operations and Equipment • Chemical Reactors • Bio-based Reactions and Processing • Waste Management including Air, Wastewater and Solid Waste Management* Process Safety including Inherently Safer Design • Energy Resources, Conversion and Utilization* Materials of Construction

Reaction Engineering clearly and concisely covers the concepts and models of reaction engineering and then applies them to real-world reactor design. The book emphasizes that the foundation of reaction engineering requires the use of kinetics and transport knowledge to explain and analyze reactor behaviors. The authors use readily understandable language to cover the subject, leaving readers with a comprehensive guide on how to understand, analyze, and make decisions related to improving chemical reactions and chemical reactor design. Worked examples, and over 20 exercises at the end of each chapter, provide opportunities for readers to practice solving problems related to the content covered in the book. Seamlessly integrates chemical kinetics, reaction engineering, and reactor analysis to provide the foundation for optimizing reactions and reactor design Compares and contrasts three types of ideal reactors, then applies reaction engineering principles to real reactor design Covers advanced topics, like microreactors, reactive distillation, membrane reactors, and fuel cells, providing the reader with a broader appreciation of the applications of reaction engineering principles and methods

Appropriate for a one-semester undergraduate or first-year graduate course, this text introduces the quantitative treatment of chemical reaction engineering. It covers both homogeneous and heterogeneous reacting systems and

examines chemical reaction engineering as well as chemical reactor engineering. Each chapter contains numerous worked-out problems and real-world vignettes involving commercial applications, a feature widely praised by reviewers and teachers. 2003 edition.

Risk Criticism is a study of literary and cultural responses to global environmental risk in an age of unfolding ecological catastrophe. In 2015, the Bulletin of the Atomic Scientists reset its iconic Doomsday Clock to three minutes to midnight, as close to the apocalypse as it has been since 1953. What pushed its hands was not just the threat of nuclear weapons, but also other global environmental risks that the Bulletin judged to have risen to the scale of the nuclear, including climate change and innovations in the life sciences. If we may once have believed that the end of days would come in a blaze of nuclear firestorm, we now suspect that the apocalypse may be much slower, creeping in as chemical toxins, climate change, or nano-technologies run amok. Taking inspiration from the questions raised by the Bulletin's synecdochical "nuclear," Risk Criticism aims to generate a hybrid form of critical practice that brings "nuclear criticism" into conversation with ecocriticism. Through readings of novels, films, theater, poetry, visual art, websites, news reports, and essays, Risk Criticism tracks the diverse ways in which environmental risks are understood and represented today. Chemical reaction engineering is concerned with the exploitation of chemical reactions on a commercial scale. Its goal is the successful design and operation of chemical reactors. This text emphasizes qualitative arguments, simple design methods, graphical procedures, and frequent comparison of capabilities of the major reactor types. Simple ideas are treated first, and are then extended to the more complex.

Solving problems in chemical reaction engineering and kinetics is now easier than ever! As students read through this text, they'll find a comprehensive, introductory treatment of reactors for single-phase and multiphase systems that exposes them to a broad range of reactors and key design features. They'll gain valuable insight on reaction kinetics in relation to chemical reactor design. They will also utilize a special software package that helps them quickly solve systems of algebraic and differential equations, and perform parameter estimation, which gives them more time for analysis. Key Features Thorough coverage is provided on the relevant principles of kinetics in order to develop better designs of chemical reactors. E-Z Solve software, on CD-ROM, is included with the text. By utilizing this software, students can have more time to focus on the development of design models and on the interpretation of calculated results. The software also facilitates exploration and discussion of realistic, industrial design problems. More than 500 worked examples and end-of-chapter problems are included to help students learn how to apply the theory to solve design problems. A web site, www.wiley.com/college/missen, provides additional resources including sample files, demonstrations, and a description of the E-Z Solve software.

Intended primarily for undergraduate chemical-engineering students, this book also includes material which bridges the gap between undergraduate and graduate requirements. The introduction contains a listing of the principal types of reactors employed in the chemical industry, with diagrams and examples of their use. There is then a brief exploration of the concepts employed in later sections for modelling and sizing reactors, followed by basic information on stoichiometry and thermodynamics, and the kinetics of homogeneous and catalyzed reactions. Subsequent chapters are devoted to reactor sizing and modelling in some simple situations, and more detailed coverage of the design and operation of the principal reactor types.

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.

Market_Desc: · Chemical Engineers in Chemical, Nuclear and Biomedical Industries Special Features: · Emphasis is placed throughout on the development of common design strategy for all systems, homogeneous and heterogeneous. This edition features new topics on biochemical systems, reactors with fluidized solids, gas/liquid reactors, and more on non ideal flow. The book explains why certain assumptions are made, why an alternative approach is not used, and to indicate the limitations of the treatment when applied to real situations About The Book: Chemical reaction engineering is concerned with the exploitation of chemical reactions on a commercial scale. Its goal is the successful design and operation of chemical reactors. This text emphasizes qualitative arguments, simple design methods, graphical procedures, and frequent comparison of capabilities of the major reactor types. Simple ideas are treated first, and are then extended to the more complex.

Laurence Belfiore's unique treatment meshes two mainstream subject areas in chemical engineering: transport phenomena and chemical reactor design. Expressly intended as an extension of Bird, Stewart, and Lightfoot's classic *Transport Phenomena*, and Froment and Bischoff's *Chemical Reactor Analysis and Design, Second Edition*, Belfiore's unprecedented text explores the synthesis of these two disciplines in a manner the upper undergraduate or graduate reader can readily grasp. *Transport Phenomena for Chemical Reactor Design* approaches the design of chemical reactors from microscopic heat and mass transfer principles. It includes simultaneous consideration of kinetics and heat transfer, both critical to the performance of real chemical reactors. Complementary topics in transport phenomena and thermodynamics that provide support for chemical reactor analysis are covered, including: Fluid dynamics in the creeping and potential flow regimes around solid spheres and gas bubbles The corresponding mass transfer problems that employ velocity profiles, derived in the book's fluid dynamics chapter, to calculate interphase heat and mass transfer coefficients Heat capacities of ideal gases via statistical thermodynamics to calculate Prandtl numbers Thermodynamic stability criteria for homogeneous mixtures that reveal that binary molecular diffusion coefficients must be positive In addition to its comprehensive treatment, the text also contains 484 problems and ninety-six detailed solutions to assist in the exploration of the subject. Graduate and advanced undergraduate chemical engineering students, professors, and researchers will appreciate the vision, innovation, and practical application of Laurence Belfiore's *Transport Phenomena for Chemical Reactor Design*.

Elayne Rapping Feminist media critic Elayne Rapping takes such varied pop culture artifacts as soap operas, Madonna, and Amy Fisher to uncover a new paradigm of feminism's interface with the media.

The old saying goes, "To the man with a hammer, everything looks like a nail." But anyone who has done any kind of project knows a hammer often isn't enough. The more tools you have at your disposal, the more likely you'll use the right tool for the job - and get it done right. The same is true when it comes to your thinking. The quality of your outcomes depends on the mental models in your head. And most people are going through life with little more than a hammer. Until now. *The Great Mental Models: General Thinking Concepts* is the first book in *The Great Mental Models* series designed to upgrade your thinking with the best, most useful and powerful tools so you always have the right one on hand. This volume details nine of the most versatile, all-purpose mental models you can use right away to improve your decision making, productivity, and how clearly you see the world. You will discover what forces govern the universe and how to focus your efforts so you can harness them to your advantage, rather than fight with them or worse yet- ignore them. Upgrade your mental toolbox and get the first volume today. AUTHOR BIOGRAPHY Farnam Street (FS) is one of the world's fastest growing websites, dedicated to helping our readers master the best of what other people have already figured out. We curate, examine and explore the timeless ideas and mental models that history's brightest minds have used to live lives of purpose. Our readers include students, teachers, CEOs, coaches, athletes, artists, leaders, followers, politicians and more. They're not defined by gender, age, income, or politics but rather by a shared passion for avoiding problems, making better decisions, and lifelong learning. AUTHOR HOME Ottawa, Ontario, Canada

This study treats the intellectual and political history of the various democratic movements in the major German states during the nineteenth century. Snell describes the origins of the democratic impulse, traces the gradual alienation of German democracy from German liberalism, and concludes with an extensive analysis of political and social institutions of the German empire as promoters or deterrents of democracy. This book is the first to focus on the history of ideas and politics during this period. Originally published in 1976. A UNC Press Enduring Edition -- UNC Press Enduring Editions use the latest in digital technology to make available again books from our distinguished backlist that were previously out of print. These editions are published unaltered from the original, and are presented in affordable paperback formats, bringing readers both historical and cultural value.

The Definitive, Fully Updated Guide to Solving Real-World Chemical Reaction Engineering Problems For decades, H. Scott Fogler's *Elements of Chemical Reaction Engineering* has been the world's dominant text for courses in chemical reaction engineering. Now, Fogler has created a new, completely updated fifth edition of his internationally respected book. The result is a refined book that contains new examples and problems, as well as an updated companion Web site. More than ever, Fogler has successfully integrated text, visuals, and computer simulations to help both undergraduate and graduate students master all of the field's fundamentals. As always, he links theory to practice through many relevant examples, ranging from standard isothermal and non-isothermal reactor design to applications, such as solar energy, blood clotting, and drug delivery, and computer chip manufacturing. To promote the transfer of key skills to real-life settings, Fogler presents the following three styles of problems: 1. Straightforward problems that reinforce the principles of chemical reaction engineering 2. Living Example Problems (LEPs) that allow students to rapidly explore the issues and look for optimal solutions 3. Open-ended problems that encourage students to practice creative problem-solving skills ABOUT THE WEB SITE The companion Web site offers extensive enrichment opportunities and additional content, including Complete PowerPoint slides for lecture notes for chemical reaction engineering classes. Links to additional software, including POLYMATH(tm), Matlab(tm), Wolfram Mathematica(tm), AspenTech(tm), and COMSOL(tm). Interactive learning resources linked to each chapter, including Learning Objectives, Summary Notes, Web Modules, Interactive Computer Games, Solved Problems, FAQs, additional homework problems, and links to Learncheme. Living Example Problems that provide more than eighty interactive simulations, allowing students to explore the examples and ask "what-if" questions. The LEPs are unique to this book.

Professional Reference Shelf, which includes advanced content on reactors, weighted least squares, experimental planning, laboratory reactors, pharmacokinetics, wire gauze reactors, trickle bed reactors, fluidized bed reactors, CVD boat reactors, detailed explanations of key derivations, and more. Problem-solving strategies and insights on creative and critical thinking.

The publication of the third edition of 'Chemical Engineering Volume 3' marks the completion of the re-orientation of the basic material contained in the first three volumes of the series. Volume 3 is devoted to reaction engineering (both chemical and biochemical), together with measurement and process control. This text is designed for students, graduate and postgraduate, of chemical engineering.

Today's Definitive, Undergraduate-Level Introduction to Chemical Reaction Engineering Problem-Solving For 30 years, H. Scott Fogler's *Elements of Chemical Reaction Engineering* has been the #1 selling text for courses in chemical reaction engineering worldwide. Now, in *Essentials of Chemical Reaction Engineering, Second Edition*, Fogler has distilled this classic into a modern, introductory-level guide specifically for undergraduates. This is the ideal resource for today's students: learners who demand instantaneous access to information and want to enjoy learning as they deepen their critical thinking and creative problem-solving skills. Fogler successfully integrates text, visuals, and computer simulations, and links theory to practice through many relevant examples. This updated second edition covers mole balances, conversion and reactor sizing, rate laws and stoichiometry, isothermal reactor design, rate data collection/analysis, multiple reactions, reaction mechanisms, pathways, bioreactions and bioreactors, catalysis, catalytic reactors, nonisothermal reactor designs, and more. Its multiple improvements include a new discussion of activation energy, molecular simulation, and stochastic modeling, and a significantly revamped chapter on heat effects in chemical reactors. To promote the transfer of key skills to real-life settings, Fogler presents three styles of problems: Straightforward problems that reinforce the principles of chemical reaction engineering Living Example Problems (LEPs) that allow students to rapidly explore the issues and look for optimal solutions Open-ended problems that encourage students to use inquiry-based learning to practice creative problem-solving skills About the Web Site (umich.edu/~elements/5e/index.html) The companion Web site offers extensive enrichment opportunities and additional content, including Complete PowerPoint slides for lecture notes for chemical reaction engineering classes Links to additional software, including Polymath, MATLAB, Wolfram Mathematica, AspenTech, and COMSOL Multiphysics Interactive learning resources linked to each chapter, including Learning Objectives, Summary Notes, Web Modules,

Interactive Computer Games, Computer Simulations and Experiments, Solved Problems, FAQs, and links to LearnChemE Living Example Problems that provide more than 75 interactive simulations, allowing students to explore the examples and ask "what-if" questions Professional Reference Shelf, containing advanced content on reactors, weighted least squares, experimental planning, laboratory reactors, pharmacokinetics, wire gauze reactors, trickle bed reactors, fluidized bed reactors, CVD boat reactors, detailed explanations of key derivations, and more Problem-solving strategies and insights on creative and critical thinking Register your product at informit.com/register for convenient access to downloads, updates, and/or corrections as they become available.

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

This is the Second Edition of the standard text on chemical reaction engineering, beginning with basic definitions and fundamental principles and continuing all the way to practical applications, emphasizing real-world aspects of industrial practice. The two main sections cover applied or engineering kinetics, reactor analysis and design. Includes updated coverage of computer modeling methods and many new worked examples. Most of the examples use real kinetic data from processes of industrial importance. This textbook is intended for courses in heat transfer for undergraduates, not only in chemical engineering and related disciplines of biochemical engineering and chemical technology, but also in mechanical engineering and production engineering. The author provides the reader with a very thorough account of the fundamental principles and their applications to engineering practice, including a survey of the recent developments in heat transfer equipment. The three basic modes of heat transfer - conduction, convection and radiation - have been comprehensively analyzed and elucidated by solving a wide range of practical and design-oriented problems. A whole chapter has been devoted to explain the concept of the heat transfer coefficient to give a feel of its importance in tackling problems of convective heat transfer. The use of the important heat transfer correlations has been illustrated with carefully selected examples.

Designed to give chemical engineers background for managing chemical reactions, this text examines the behavior of chemical reactions and reactors; conservation equations for reactors; heterogeneous reactions; fluid-fluid and fluid-solid reaction systems; heterogeneous catalysis and catalytic kinetics; diffusion and heterogeneous catalysis; and analyses and design of heterogeneous reactors. 1976 edition.

Chemical Reactor Modeling closes the gap between Chemical Reaction Engineering and Fluid Mechanics. The second edition consists of two volumes: Volume 1: Fundamentals. Volume 2: Chemical Engineering Applications In volume 1 most of the fundamental theory is presented. A few numerical model simulation application examples are given to elucidate the link between theory and applications. In volume 2 the chemical reactor equipment to be modeled are described. Several engineering models are introduced and discussed. A survey of the frequently used numerical methods, algorithms and schemes is provided. A few practical engineering applications of the modeling tools are presented and discussed. The working principles of several experimental techniques employed in order to get data for model validation are outlined. The monograph is based on lectures regularly taught in the fourth and fifth years graduate courses in transport phenomena and chemical reactor modeling and in a post graduate course in modern reactor modeling at the Norwegian University of Science and Technology, Department of Chemical Engineering, Trondheim, Norway. The objective of the book is to present the fundamentals of the single-fluid and multi-fluid models for the analysis of single and multiphase reactive flows in chemical reactors with a chemical reactor engineering rather than mathematical bias. Organized into 13 chapters, it combines theoretical aspects and practical applications and covers some of the recent research in several areas of chemical reactor engineering. This book contains a survey of the modern literature in the field of chemical reactor modeling.

Elements of Chemical Reaction Engineering Pearson Educación

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.

Charts Britain's reaction to World War II by examining 13 key films produced between 1939 and 1945. Illustrated with stills, the work analyzes each film, drawing from official documentation to explore film as a medium for propaganda. This edition features two new chapters and a filmography.

This is the first book entirely on the topic of Migration of Fine Particles in Porous Media. There are two purposes for the use of this book. First, the book is intended to serve as a comprehensive monograph for scientists and engineers concerned with problems of erosion, pollution and plugging due to migration of fines in porous media. Second, the book is recommended to be used as a reference book for courses offered at senior or graduate level on the topics of flow through porous media, soil erosion and pollution, or formation damage. The migration of fine particles in porous media is an engineering concern in oil production, soil

erosion, ground water pollution and in the operation of filter beds. As a result, the topic has been studied by researchers working in a number of disciplines. These studies in different disciplines are conducted, by and large, independently and hence there is some repetition and perhaps more importantly there is a lack of uniformity and coherence. These studies, nevertheless, complement each other. To illustrate the point, consider for example the migration of fine particles induced by hydrodynamic forces.

This book discusses and illustrates practical problem solving in the major areas of chemical and biochemical engineering and related disciplines using the novel software capabilities of POLYMATH, Excel, and MATLAB. Students and engineering/scientific professionals will be able to develop and enhance their abilities to effectively and efficiently solve realistic problems from the simple to the complex. This new edition greatly expands the coverage to include chapters on biochemical engineering, separation processes and process control. Recent advances in the POLYMATH software package and new book chapters on Excel and MATLAB usage allow for exceptional efficiency and flexibility in achieving problem solutions. All of the problems are clearly organized and many complete and partial solutions are provided for all three packages. A special web site provides additional resources for readers and special reduced pricing for the latest educational version of POLYMATH.

Learn Chemical Reaction Engineering through Reasoning, Not Memorization Essentials of Chemical Reaction Engineering is the complete, modern introduction to chemical reaction engineering for today's undergraduate students. Starting from the strengths of his classic Elements of Chemical Reaction Engineering, Fourth Edition, in this volume H. Scott Fogler added new material and distilled the essentials for undergraduate students. Fogler's unique way of presenting the material helps students gain a deep, intuitive understanding of the field's essentials through reasoning, using a CRE algorithm, not memorization. He especially focuses on important new energy and safety issues, ranging from solar and biomass applications to the avoidance of runaway reactions. Thoroughly classroom tested, this text reflects feedback from hundreds of students at the University of Michigan and other leading universities. It also provides new resources to help students discover how reactors behave in diverse situations-including many realistic, interactive simulations on DVD-ROM. New Coverage Includes Greater emphasis on safety: following the recommendations of the Chemical Safety Board (CSB), discussion of crucial safety topics, including ammonium nitrate CSTR explosions, case studies of the nitroaniline explosion, and the T2 Laboratories batch reactor runaway Solar energy conversions: chemical, thermal, and catalytic water spilling Algae production for biomass Steady-state nonisothermal reactor design: flow reactors with heat exchange Unsteady-state nonisothermal reactor design with case studies of reactor explosions About the DVD-ROM The DVD contains six additional, graduate-level chapters covering catalyst decay, external diffusion effects on heterogeneous reactions, diffusion and reaction, distribution of residence times for reactors, models for non-ideal reactors, and radial and axial temperature variations in tubular reactions. Extensive additional DVD resources include Summary notes, Web modules, additional examples, derivations, audio commentary, and self-tests Interactive computer games that review and apply important chapter concepts Innovative "Living Example Problems" with Polymath code that can be loaded directly from the DVD so students can play with the solution to get an innate feeling of how reactors operate A 15-day trial of Polymath(tm) is included, along with a link to the Fogler Polymath site A complete, new AspenTech tutorial, and four complete example problems Visual Encyclopedia of Equipment, Reactor Lab, and other intuitive tools More than 500 PowerPoint slides of lecture notes Additional updates, applications, and information are available at www.umich.edu/~essen and www.essentialsofcre.com.

The book presents in a clear and concise manner the fundamentals of chemical reaction engineering. The structure of the book allows the student to solve reaction engineering problems through reasoning rather than through memorization and recall of numerous equations, restrictions, and conditions under which each equation applies. The fourth edition contains more industrial chemistry with real reactors and real engineering and extends the wide range of applications to which chemical reaction engineering principles can be applied (i.e., cobra bites, medications, ecological engineering) Learn Chemical Reaction Engineering through Reasoning, Not Memorization Essentials of Chemical Reaction Engineering is a complete yet concise, modern introduction to chemical reaction engineering for undergraduate students. While the classic Elements of Chemical Reaction Engineering, Fourth Edition, is still available, H. Scott Fogler distilled that larger text into this volume of essential topics for undergraduate students. Fogler's unique way of presenting the material helps students gain a deep, intuitive understanding of the field's essentials through reasoning, not memorization. He especially focuses on important new energy and safety issues, ranging from solar and biomass applications to the avoidance of runaway reactions. Thoroughly classroom tested, this text reflects feedback from hundreds of students at the University of Michigan and other leading universities. It also provides new resources to help students discover how reactors behave in diverse situations. Coverage includes Crucial safety topics, including ammonium nitrate CSTR explosions, nitroaniline and T2 Laboratories batch reactor runaways, and SChE/CCPS resources Greater emphasis on safety: following the recommendations of the Chemical Safety Board (CSB) 2 case studies from plant explosions and two homework problems which discuss another explosion. Solar energy conversions: chemical, thermal, and catalytic water spilling Algae production for biomass Mole balances: batch, continuous-flow, and industrial reactors Conversion and reactor sizing: design equations, reactors in series, and more Rate laws and stoichiometry Isothermal reactor design: conversion and molar flow rates Collection and analysis of rate data Multiple reactions: parallel, series, and complex reactions; membrane reactors; and more Reaction mechanisms, pathways, bioreactions, and bioreactors Catalysis and catalytic reactors Nonisothermal reactor design: steady-state energy balance and adiabatic PFR applications Steady-state nonisothermal reactor design: flow reactors with heat exchange Chemical Reaction Engineering: Essentials, Exercises and Examples presents the essentials of kinetics, reactor design and chemical reaction engineering for undergraduate students. Concise and didactic in its approach, it features over 70 resolved examples and many exercises. The work is organized in two parts: in the first part kinetics is presented

