

Chemical Engineering Volume 1 Sixth Edition Fluid Flow Heat Transfer And Mass Transfer Coulson And Richardsons Chemical Engineering

An introduction to the art and practice of design as applied to chemical processes and equipment. It is intended primarily as a text for chemical engineering students undertaking the design projects that are set as part of undergraduate courses in chemical engineering in the UK and USA. It has been written to complement the treatment of chemical engineering fundamentals given in Chemical Engineering volumes 1, 2 and 3. Examples are given in each chapter to illustrate the design methods presented.

Coulson and Richardson's Chemical Engineering: Volume 2A: Particulate Systems and Particle Technology, Sixth Edition, has been fully revised and updated to provide practitioners with an overview of chemical engineering, including clear explanations of theory and thorough coverage of practical applications, all supported by case studies. A worldwide team of contributors has pooled their experience to revise old content and add new content. The content has been updated to be more useful to practicing engineers. This complete reference to chemical engineering will support you throughout your career, as it covers every key chemical engineering topic. Fluid Flow, Heat Transfer and Mass Transfer has been developed from the series' volume 1, 6th edition. This volume covers the three main transport process of interest to chemical engineers: momentum transfer (fluid flow), heat transfer and mass transfer and the relationships between them. Particulate Systems and Particle Technology has been developed from the series' volume 2, 5th edition. This volume covers the properties of particulate systems, including the character of individual particles and their behavior in fluids. Sedimentation of particles, both singly and at high concentrations, flow in packed and fluidized beds and filtration are then examined. Separation Processes has been developed from the series' volume 2, 5th edition. This volume covers distillation and gas absorption, which illustrate applications of the fundamental principles of mass transfer. Several techniques-adsorption, ion exchange, chromatographic and membrane separations, and process intensification-are described. Chemical and Biochemical Reactors and Reaction Engineering has been developed from the series' volume 3, 3rd edition. Features fully revised reference material converted from textbooks Covers foundational to technical topics Features emerging applications, numerical methods and computational tools

Chemical Engineering Design is one of the best-known and widely adopted texts available for students of chemical engineering. It deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, the fourth edition covers the latest aspects of process design, operations, safety, loss prevention and equipment selection, among others. Comprehensive and detailed, the book is supported by problems and selected solutions. In addition the book is widely used by professionals as a day-to-day reference. Best selling chemical engineering text Revised to keep pace with the latest chemical industry changes; designed to see

students through from undergraduate study to professional practice End of chapter exercises and solutions

Coulson and Richardson's Chemical Engineering has been fully revised and updated to provide practitioners with an overview of chemical engineering. Each reference book provides clear explanations of theory and thorough coverage of practical applications, supported by case studies. A worldwide team of editors and contributors have pooled their experience in adding new content and revising the old. The authoritative style of the original volumes 1 to 3 has been retained, but the content has been brought up to date and altered to be more useful to practicing engineers. This complete reference to chemical engineering will support you throughout your career, as it covers every key chemical engineering topic. Coulson and Richardson's Chemical Engineering: Volume 1A: Fluid Flow: Fundamentals and Applications, Seventh Edition, covers momentum transfer (fluid flow) which is one of the three main transport processes of interest to chemical engineers. Covers momentum transfer (fluid flow) which is one of the three main transport processes of interest to chemical engineers Includes reference material converted from textbooks Explores topics, from foundational through technical Includes emerging applications, numerical methods, and computational tools

Fluid Mechanics, Heat Transfer, and Mass Transfer

Design, Analysis, Simulation, Integration, and Problem Solving with Microsoft Excel-UniSim Software for Chemical Engineers, Heat Transfer and Integration, Process Safety, and Chemical Kinetics

Fuel Cell Engineering

Rules of Thumb for Chemical Engineers

A Manual of Quick, Accurate Solutions to Everyday Process Engineering Problems

Production of Functional and Flexible Materials

The most complete guide of its kind, this is the standard handbook for chemical and process engineers. All new material on fluid flow, long pipe, fractionators, separators and accumulators, cooling towers, gas treating, blending, troubleshooting field cases, gas solubility, and density of irregular solids. This substantial addition of material will also include conversion tables and a new appendix, "Shortcut Equipment Design Methods." This convenient volume helps solve field engineering problems with its hundreds of common sense techniques, shortcuts, and calculations. Here, in a compact, easy-to-use format, are practical tips, handy formulas, correlations, curves, charts, tables, and shortcut methods that will save engineers valuable time and effort. Hundreds of common sense techniques and calculations help users quickly and accurately solve day-to-day design, operations, and equipment problems.

Coulson and Richardson's Chemical Engineering: Volume 2B, Separation Processes, Sixth Edition, covers distillation and gas absorption, illustrating applications of the fundamental principles of mass transfer. Several techniques, including adsorption, ion exchange, chromatographic membrane separations and process intensification are comprehensively covered and explored. Presents content converted from textbooks into fully revised reference material Provides content that ranges from foundational to technical Includes new additions, such as emerging applications, numerical methods, and computational tools

Coulson and Richardson's Chemical Engineering has been fully revised and updated to provide practitioners with an overview of chemical engineering. Each reference book provides clear explanations of theory and thorough coverage of practical applications, supported by case studies. A worldwide team of editors and contributors have pooled their experience in adding new content and revising the old. The authoritative style of the original volumes 1 to 3 has been retained, but the content has been brought up to date and altered to be more useful to practicing engineers. This complete reference to chemical engineering will support you throughout your career, as it covers every key chemical engineering topic. Coulson and Richardson's Chemical Engineering: Volume 1B: Heat and Mass Transfer: Fundamentals and Applications, Seventh Edition, covers two of the main transport processes of interest to chemical engineers: heat transfer and mass transfer, and the relationships among them. Covers two of the three main transport processes of interest to chemical engineers: heat transfer and mass transfer, and the relationships between them Includes reference material converted from textbooks Explores topics, from foundational through technical Includes emerging applications, numerical methods, and computational tools

The Fourth Edition of Applied Process Design for Chemical and Petrochemical Plants Volume 2 builds upon the late Ernest E. Ludwig's classic chemical engineering process design manual. Volume Two focuses on distillation and packed towers, and presents the methods and fundamentals of plant design along with supplemental mechanical and related data, nomographs, data charts and heuristics. The Fourth Edition is significantly expanded and updated, with new topics that ensure readers can analyze problems and find practical design methods and solutions to accomplish their process design objectives. A true application-driven book, providing clarity and easy access to essential process plant data and design information Covers a complete range of basic day-to-day petrochemical operation topics Extensively revised with new material on distillation process performance; complex-mixture fractionating, gas processing, dehydration, hydrocarbon absorption and stripping; enhanced distillation types

Chemical Engineering

An Introduction to Chemical Engineering Design

Bridge Engineering

Environmentally Conscious Design of Chemical Processes

Chemical Engineering Design

Volume 3A: Chemical and Biochemical Reactors and Reaction Engineering

Outlines the concepts of chemical engineering so that non-chemical engineers can interface with and understand basic chemical engineering concepts **Overviews the difference between laboratory and industrial scale practice of chemistry, consequences of mistakes, and approaches needed to scale a lab reaction process to an operating scale** **Covers basics of chemical reaction engineering, mass, energy, and fluid energy balances, how economics are scaled, and the nature of various types of flow sheets and how they are developed vs. time of a project** **Details the basics of fluid flow and transport, how fluid flow is characterized and explains the difference between positive displacement and centrifugal pumps along with their limitations and safety aspects of these differences** **Reviews the importance and approaches to controlling chemical processes and the safety aspects of controlling chemical processes.** **Reviews the important chemical engineering design aspects of unit operations including distillation, absorption and stripping, adsorption, evaporation and crystallization, drying and solids handling, polymer manufacture, and the basics of tank and agitation system design**

A Dictionary of Chemical Engineering is one of the latest additions to the market leading Oxford Paperback Reference series. In over 3,400 concise and authoritative A to Z entries, it provides definitions and explanations for chemical engineering terms in areas including: materials, energy balances, reactions, separations, sustainability, safety, and ethics. Naturally, the dictionary also covers many pertinent terms from the fields of chemistry, physics, biology, and mathematics. Useful entry-level web links are listed and regularly updated on a dedicated companion website to expand the coverage of the dictionary. Comprehensively cross-referenced and complemented by over 60 line drawings, this excellent new volume is the most authoritative dictionary of its kind. It is an essential reference source for students of chemical engineering, for professionals in this field (as well as related disciplines such as applied chemistry, chemical technology, and process engineering), and for anyone with an interest in the subject.

This volume in the Coulson and Richardson series in chemical engineering contains full worked solutions to the problems posed in volume 1. Whilst the main volume contains illustrative worked examples throughout the text, this book contains answers to the more challenging questions posed at the end of each chapter of the main text. These questions are of both a standard and non-standard nature, and so will prove to be of interest to both academic staff teaching courses in this area and to the keen student. Chemical engineers in industry who are looking for a standard solution to a real-life problem will also find the book of considerable interest. * An invaluable source of information for the student studying the material contained in Chemical Engineering Volume 1 * A helpful method of learning - answers are explained in full

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.**

Applied Chemistry and Chemical Engineering, Volume 1

Volume 2A: Particulate Systems and Particle Technology

Coulson & Richardson's Chemical Engineering

Chemical Engineering Volume 2

Chemical Process Engineering Volume 2

Chemical Engineering: Visions of the World

Fuel cells are attractive electrochemical energy converters featuring potentially very high thermodynamic efficiency factors. The focus of this volume of Advances in Chemical Engineering is on quantitative approaches, particularly based on chemical engineering principles, to analyze, control and optimize the steady state and dynamic behavior of low and high temperature fuel cells (PEMFC, DMFC, SOFC) to be applied in mobile and stationary systems. Updates and informs the reader on the latest research findings using original reviews Written by leading industry experts and scholars Reviews and analyzes developments in the field

This comprehensive work shows how to design and develop innovative, optimal and sustainable chemical processes by applying the principles of process systems engineering, leading to integrated sustainable processes with 'green' attributes. Generic systematic methods are employed, supported by intensive use of computer simulation as a powerful tool for mastering the complexity of physical models. New to the second edition are chapters on product design and batch processes with applications in specialty chemicals, process intensification methods for designing compact equipment with high energetic efficiency, plantwide control for managing the key factors affecting the plant dynamics and operation, health, safety and environment issues, as well as sustainability analysis for achieving high environmental performance. All chapters are completely rewritten or have been revised. This new edition is suitable as teaching material for Chemical Process and Product Design courses for graduate MSc students, being compatible with academic requirements world-wide. The inclusion of the newest design methods will be of great value to professional chemical engineers. Systematic approach to developing innovative and sustainable chemical processes Presents generic principles of process simulation for analysis, creation and assessment Emphasis on sustainable development for the future of process industries

A Practical Approach to Chemical Engineering for Non-Chemical Engineers is aimed at people who are dealing with chemical engineers or those who are involved in chemical processing plants. The book demystifies complicated chemical engineering concepts through daily life examples and analogies. It contains many illustrations and tables that facilitate quick and in-depth understanding of the concepts handled in the book. By studying this book, practicing engineers (non-chemical), professionals, technicians and other skilled workers will gain a deeper understanding of what chemical engineers say and ask for. The book is also useful for engineering students who plan to get into chemical engineering and want to know more on the topic and any related jargon. Provides numerous graphs, images, sketches, tables, help better understanding of concepts in a visual way Describes complicated chemical engineering concepts by daily life examples and analogies, rather than by formula Includes a virtual tour of an imaginary process plant Explains the majority of units in chemical engineering

A chemical engineer's guide to managing and minimizing environmental impact. Chemical processes are invaluable to modern society, yet they generate substantial quantities of wastes and emissions, and safely managing these wastes costs tens of millions of dollars annually. Green Engineering is a complete professional's guide to the cost-effective design, commercialization, and use of chemical processes in ways that minimize pollution at the source, and reduce impact on health and the environment. This book also offers powerful new insights into environmental risk-based considerations in design of processes and products. First conceived by the staff of the U.S. Environmental Protection Agency, Green Engineering draws on contributions from many leaders in the field and introduces advanced risk-based techniques including some currently in use at the EPA. Coverage includes: Engineering chemical processes, products, and systems to reduce environmental impacts Approaches for evaluating emissions and hazards of chemicals and processes Defining effective environmental performance targets Advanced approaches and tools for evaluating environmental fate Early-stage design and development techniques that minimize costs and environmental impacts In-depth coverage of unit operation and flowsheet analysis The economics of environmental improvement projects Integration of chemical processes with other material processing operations Lifecycle assessments: beyond the boundaries of the plant Increasingly, chemical engineers are faced with the challenge of integrating environmental objectives into design decisions. Green Engineering gives them the technical tools they need to do so.

Elements of Chemical Reaction Engineering

Ludwig's Applied Process Design for Chemical and Petrochemical Plants

Solutions to the Problems in Volumes 2 and 3

Green Engineering

Chemical Engineering of Polymers

Volume 2B: Separation Processes

CHEMICAL PROCESS ENGINEERING Written by one of the most prolific and respected chemical engineers in the world and his co-author, also a well-known and respected engineer, this two-volume set is the "new standard" in the industry, offering engineers and students alike the most up-do-date, comprehensive, and state-of-the-art coverage of processes and best practices in the field today. This new two-volume set explores and describes integrating new tools for engineering education and practice for better utilization of the existing knowledge on process design. Useful not only for students, university professors, and practitioners, especially process, chemical, mechanical and metallurgical engineers, it is also a valuable reference for other engineers, consultants, technicians and scientists concerned about various aspects of industrial design. The text can be considered as complementary to process design for senior and graduate students as well as a hands-on reference work or refresher for engineers at entry level. The contents of the book can also be taught in intensive workshops in the oil, gas, petrochemical, biochemical and process industries. The book provides a detailed description and hands-on experience on process design in chemical engineering, and it is an integrated text that focuses on practical design with new tools, such as Microsoft Excel spreadsheets and UniSim simulation software. Written by two of the industry 's most trustworthy and well-known authors, this book is the new standard in chemical, biochemical, pharmaceutical, petrochemical and petroleum refining. Covering design, analysis, simulation, integration, and, perhaps most importantly, the practical application of Microsoft Excel-UniSim software, this is the most comprehensive and up-to-date coverage of all of the latest developments in the industry. It is a must-have for any engineer or student 's library.

Richardson et al provide the student of chemical engineering with full worked solutions to the problems posed in Chemical Engineering Volume 2 "Particle Technology and Separation Processes" 5th Edition, and Chemical Engineering Volume 3 "Chemical and Biochemical Reactors & Process Control" 3rd Edition. Whilst the main volumes contains illustrative worked examples throughout the text, this book contains answers to the more challenging questions posed at the end of each chapter of the main texts. These questions are of both a standard and non-standard nature, and so will prove to be of interest to both academic staff teaching courses in this area and to the keen student. Chemical engineers in industry who are looking for a standard solution to a real-life problem will also find the book of considerable interest. * Contains fully worked solutions to the problems posed in Chemical Engineering Volumes 2 and 3 * Enables the reader to get the maximum benefit from using Volumes 2 and 3 * An extremely effective method of learning

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

Phase Equilibria in Chemical Engineering is devoted to the thermodynamic basis and practical aspects of the calculation of equilibrium conditions of multiple phases that are pertinent to chemical engineering processes. Efforts have been made throughout the book to provide guidance to adequate theory and practice. The book begins with a long chapter on equations of state, since it is intimately bound up with the development of thermodynamics. Following material on basic thermodynamics and nonidealities in terms of fugacities and activities, individual chapters are devoted to equilibria primarily between pairs of phases. A few topics that do not fit into these categories and for which the state of the art is not yet developed quantitatively have been relegated to a separate chapter. The chapter on chemical equilibria is pertinent since many processes involve simultaneous chemical and phase equilibria. Also included are chapters on the evaluation of enthalpy and entropy changes of nonideal substances and mixtures, and on experimental methods. This book is intended as a reference and self-study as well as a textbook either for full courses in phase equilibria or as a supplement to related courses in the chemical engineering curriculum. Practicing engineers concerned with separation technology and process design also may find the book useful.

Basic Principles and Calculations in Chemical Engineering

Coulson and Richardson 's Chemical Engineering

HEAT TRANSFER

Mathematical and Analytical Techniques

Integrated Design and Simulation of Chemical Processes

Chemical Engineering Economics

This new edition follows the original format, which combines a detailed case study - the production of phthalic anhydride - with practical advice and comprehensive background information. Guiding the reader through all major aspects of a chemical engineering design, the text includes both the initial technical and economic feasibility study as well as the detailed design stages. Each aspect of the design is illustrated with material from an award-winning student design project. The book embodies the "learning by doing" approach to design. The student is directed to appropriate information sources and is encouraged to make decisions at each stage of the design process rather than simply following a design method. Thoroughly revised, updated, and expanded, the accompanying text includes developments in important areas and many new references.

This new book brings together innovative research, new concepts, and novel developments in the application of informatics tools for applied chemistry and computer science. It presents a modern approach to modeling and calculation and also looks at experimental design in applied chemistry and chemical engineering. The volume discusses the developments of advanced chemical products and respective tools to characterize and predict the chemical material properties and behavior. Providing numerous comparisons of different methods with one another and with different experiments, not only does this book summarize the classical theories, but it also exhibits their engineering applications in response to the current key issues. Recent trends in several areas of chemistry and chemical engineering science, which have important application to practice, are discussed. Applied Chemistry and Chemical Engineering: Volume 1: Mathematical and Analytical Techniques provides valuable information for chemical engineers and researchers as well as for graduate students. It demonstrates the progress and promise for developing chemical materials that seem capable of moving this field from laboratory-scale prototypes to actual industrial applications. Volume 2 will focus principles and methodologies in applied chemistry and chemical engineering.

Bridge Engineering: Classifications, Design Loading, and Analysis Methods begins with a clear and concise exposition of theory and practice of bridge engineering, design and planning, materials and construction, loads and load distribution, and deck systems. This is followed by chapters concerning applications for bridges, such as: Reinforced and Prestressed Concrete Bridges, Steel Bridges, Truss Bridges, Arch Bridges, Cable Stayed Bridges, Suspension Bridges, Bridge Piers, and Bridge Substructures. In addition, the book addresses issues commonly found in inspection, monitoring, repair, strengthening, and replacement of bridge structures. Includes easy to understand explanations for bridge classifications, design loading, analysis methods, and construction Provides an overview of international codes and standards Covers structural features of different types of bridges, including beam bridges, arch bridges, truss bridges, suspension bridges, and cable-stayed bridges Features step-by-step explanations of commonly used structural calculations along with worked out examples

In this important volume, the structures and functions of these advanced polymer and composite systems are evaluated with respect to improved or novel performance, and the potential implications of those developments for the future of polymer-based composites and multifunctional materials are discussed. It focuses exclusively on the latest research related to polymer and composite materials, especially new trends in frontal polymerization and copolymerization synthesis, functionalization of polymers, physical properties, and hybrid systems. Several chapters are devoted to composites and nanocomposites.

Chemical and Biochemical Reactors and Process Control

A Case Study Approach, Second Edition

A Practical Approach to Chemical Engineering for Non-Chemical Engineers

Chemical Engineering for Non-Chemical Engineers

Chemical Engineering Design, Vol.6,4ed.

Principles, Practice and Economics of Plant and Process Design

Chemical Engineering Volume 2 covers the properties of particulate systems, including the character of individual particles and their behaviour in fluids. Sedimentation of particles, both singly and at high concentrations, flow in packed and fluidised beds and filtration are then examined. The latter part of the book deals with separation processes, such as distillation and gas absorption, which illustrate applications of the fundamental principles of mass transfer introduced in Chemical Engineering Volume 1. In conclusion, several techniques of growing importance - adsorption, ion exchange, chromatographic and membrane separations, and process intensification - are described. A logical progression of chemical engineering concepts, volume 2 builds on fundamental principles contained in Chemical Engineering volume 1 and these volumes are fully cross-referenced Reflects the growth in complexity and stature of chemical engineering over the last few years Supported with further reading at the end of each chapter and graded problems at the end of the book

Coulson and Richardson's Chemical Engineering: Volume 3B: Process Control, Fourth Edition, covers reactor design, flow modeling, and gas-liquid and gas-solid reactions and reactors. Converted from textbooks into fully revised reference material Content ranges from foundational through to technical Added emerging applications, numerical methods and computational tools

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.

This book presents six visionary essays on the past, present and future of the chemical and process industries, together with a critical commentary. Our world is changing fast and the visions explore the implications for business and academic institutions, and for the professionals working in them. The visions were written and brought together for the 6th World Congress of Chemical Engineering in Melbourne, Australia in September 2001. · Identifies trends in the chemicals business environment and their consequences · Discusses a wide variety of views about business and technology · Describes the impact of newly developing technologies

Volume 2: Distillation, packed towers, petroleum fractionation, gas processing and dehydration

Volume 1A: Fluid Flow: Fundamentals and Applications

PRINCIPLES AND APPLICATIONS

Classifications, Design Loading, and Analysis Methods

Chemical Engineering: Solutions to the Problems in Volume 1

Chemical Engineering, Volume 3

Chemical Engineering Volume 2Elsevier

least, the author wishes to thank his constantly helpful wife Maggie and his secretary Pat Weimer; the former for her patience, encouragement, and for acting as a sounding-board, and the latter who toiled endlessly, cheerfully, and most competently on the book's preparation.

CONTENTS Preface / iii 1. INTRODUCTION / 1 Frequently Used Economic Studies / 2 Basic Economic Subjects / 3 Priorities / 3 Problems / 6 Appendixes / 6 References / 6 2. EQUIPMENT COST ESTIMATING / 8 Manufacturers' Quotations / 8 Estimating Charts / 10 Size Factoring Exponents / 11 Inflation Cost Indexes / 13 Installation Factor / 16 Module Factor / 18 Estimating Accuracy / 19 Estimating Example / 19 References / 21 3. PLANT COST ESTIMATES / 22 Accuracy and Costs of Estimates / 22 Cost Overruns / 25 Plant Cost Estimating Factors / Equipment Installation / 28 Instrumentation / 30 v vi CONTENTS Piping / 30 Insulation / 30 Electrical / 30 Buildings / 32 Environmental Control / 32 Painting, Fire Protection, Safety Miscellaneous / 32 Yard Improvements / 32 Utilities / 32 Land / 33 Construction and Engineering Expense, Contractor's Fee, Contingency / 33 Total Multiplier / 34 Complete Plant Estimating Charts / 34 Cost per Ton of Product / 35 Capital Ratio (Turnover Ratio) / 35 Factoring Exponents / 37 Plant Modifications / 38 Other Components of Total Capital Investment / 38 OF Facilities / 38 Distribution Facilities / 39 Research and Development, Engineering, Licensing / 40 Working Capital / 40

This broad-based book covers the three major areas of Chemical Engineering. Most of the books in the market involve one of the individual areas, namely, Fluid Mechanics, Heat Transfer or Mass Transfer, rather than all the three. This book presents this material in a single source. This avoids the user having to refer to a number of books to obtain information. Most published books covering all the three areas in a single source emphasize theory rather than practical issues. This book is written with emphasis on practice with brief theoretical concepts in the form of questions and answers, not adopting stereo-typed question-answer approach practiced in certain books in the market, bridging the two areas of theory and practice with respect to the core areas of chemical engineering. Most parts of the book are easy understandable by those who are not experts in the field. Fluid Mechanics chapters include basics on non-Newtonian systems which, for instance find importance in polymer and food processing, flow through piping, flow measurement, pumps, mixing technology and fluidization and two phase flow. For example it covers types of pumps and valves, membranes and areas of their use, different equipment commonly used in chemical industry and their merits and drawbacks. Heat Transfer chapters cover the basics involved in conduction, convection and radiation, with emphasis on insulation, heat exchangers, evaporators, condensers, reboilers and fired heaters. Design methods, performance, operational issues and maintenance problems are highlighted. Topics such as heat pipes, heat pumps, heat tracing, steam traps, refrigeration, cooling of electronic devices, NOx control find place in the book. Mass transfer chapters cover basics such as diffusion, theories, analogies, mass transfer coefficients and mass transfer with chemical reaction, equipment such as tray and packed columns, column internals including structural packings, design, operational and installation issues, drums and separators are discussed in good detail. Absorption, distillation, extraction and leaching with applications and design methods, including emerging practices involving Divided Wall and Petluk column arrangements, multicomponent separations, supercritical solvent extraction find place in the book.

"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.

Fluid flow, heat transfer and mass transfer

Volume 3B: Process Control

Phase Equilibria in Chemical Engineering

A Dictionary of Chemical Engineering

Perry's Chemical Engineers' Handbook, 9th Edition

Volume 1B: Heat and Mass Transfer: Fundamentals and Applications

Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, this edition has been specifically developed for the U.S. market. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards. It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data, and Excel spreadsheet calculations, plus over 150 Patent References for downloading from the companion website. Extensive instructor resources, including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for students or practicing engineers working on design projects. New discussion of conceptual plant design, flowsheet development and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of batch processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data and Excel spreadsheet calculations plus over 150 Patent References, for downloading from the companion website Extensive instructor resources: 1170 lecture slides plus fully worked solutions manual available to adopting instructors

Based on the popular course of the same title, Concepts of Chemical Engineering 4 Chemists outlines the basic aspects of chemical engineering for chemistry professionals. It clarifies the terminology used and explains the systems methodology approach to process design and operation for chemists with limited chemical engineering knowledge. The book provides practical insights into all areas of chemical engineering, including such aspects as pump design and the measurement of key process variables. The calculation of design parameters, such as heat and mass transfer coefficients, and reaction scale-up are also discussed, as well as hazard analysis, project economics and process control. Designed as a reference guide, it is fully illustrated and includes worked examples as well as extensive reference and bibliography sections. Concepts of Chemical Engineering 4 Chemists is ideal for those who either work alongside chemical engineers or who are embarking on chemical engineering-type projects.

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Supported with further reading at the end of each chapter and graded problems at the end of the book

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

Coulson and Richardson's Chemical Engineering

Chemical Engineering Design Project

Chemical Engineering Practice

Fluid Flow for the Practicing Chemical Engineer

Concepts of Chemical Engineering 4 Chemists

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 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 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 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 be 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 has been illustrated with carefully selected examples.