

Introduction To Chemical Equipment Design Mechanical Aspects

The fourth edition of Ludwig's Applied Process Design for Chemical and Petrochemical Plants, Volume Three is a core reference for chemical, plant, and process engineers and provides an unrivalled reference on methods, process fundamentals, and supporting design data. New to this edition are expanded chapters on heat transfer plus additional chapters focused on the design of shell and tube heat exchangers, double pipe heat exchangers and air coolers. Heat tracer requirements for pipelines and heat loss from insulated pipelines are covered in this new edition, along with batch heating and cooling of process fluids, process integration, and industrial reactors. The book also looks at the troubleshooting of process equipment and corrosion and metallurgy. Assists engineers in rapidly analyzing problems and finding effective design methods and mechanical specifications Definitive guide to the selection and design of various equipment types, including heat exchanger sizing and compressor sizing, with established design codes Batch heating and cooling of process fluids supported by Excel programs

Comprehensive and practical guide to the selection and design of a wide range of chemical process equipment. Emphasis is placed on real-world process design and performance of equipment. Provides examples of successful applications, with numerous drawings, graphs, and tables to show the functioning and performance of the equipment. Equipment rating forms and manufacturers' questionnaires are collected to illustrate the data essential to process design. Includes a chapter on equipment cost and addresses economic concerns. * Practical guide to the selection and design of a wide range of chemical process equipment. Examples of successful, real-world applications are provided. * Fully revised and updated with valuable shortcut methods, rules of thumb, and equipment rating forms and manufacturers' questionnaires have been collected to demonstrate the design process. Many line drawings, graphs, and tables illustrate performance data. * Chapter 19 has been expanded to cover new information on membrane separation. Approximately 100 worked examples are included. End of chapter references also are provided.

Tools for Chemical Product Design: From Consumer Products to Biomedicine describes the challenges involved in systematic product design across a variety of industries and provides a comprehensive overview of mathematical tools aimed at the design of chemical products, from molecular design to customer products. Chemical product design has become increasingly important over the past decade and includes a wide range of sectors including gasoline additives and blends in the petroleum industry, active ingredients and excipients in the pharmaceutical industry, and a variety of consumer products and specialty chemicals. Traditionally, such products have been designed through trial and error methods, which not only are time-consuming, but more importantly only provide limited knowledge that can be translated into next generation products. Features an impressive collection of contributions from leading researchers in the field Presents the latest tools available across a variety of industries Describes the challenges involved in systematic product design as well as the latest methods for solving such problems Covers a wide range of sectors including gasoline additives and blends in the petroleum industry, active ingredients and excipients in the pharmaceutical industry, and a variety of consumer products and specialty chemicals

Familiarizes the student or an engineer new to process safety with the concept of process safety management Serves as a comprehensive reference for Process Safety topics for student chemical engineers and newly graduate engineers Acts as a reference material for either a stand-alone process safety course or as supplemental materials for existing curricula Includes the evaluation of SACHE courses for application of process safety principles throughout the standard Ch.E. curricula in addition to, or as an alternative to, adding a new specific process safety course Gives examples of process safety in design

Manufacturing, reduced to its simplest form, involves the sequencing of product forms through a number of different processes. Each individual step, known as an unit manufacturing process, can be viewed as the fundamental building block of a nation's manufacturing capability. A committee of the National Research Council has prepared a report to help define national priorities for research in unit processes. It contains an organizing framework for unit process families, criteria for determining the criticality of a process or manufacturing technology, examples of research opportunities, and a prioritized list of enabling technologies that can lead to the manufacture of products of superior quality at competitive costs. The study was performed under the sponsorship of the National Science Foundation and the Defense Department's Manufacturing Technology Program.

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.

Introduction to Chemical Equipment Design: Mechanical Aspects Chemical Engineering Design Principles, Practice and Economics of Plant and Process Design Elsevier

Process Equipment and Plant Design: Principles and Practices takes a holistic approach towards process design in the chemical engineering industry, dealing with the design of individual process equipment and its configuration as a complete functional system. Chapters cover typical heat and mass transfer systems and equipment included in a chemical engineering curriculum, such as heat exchangers, heat exchanger networks, evaporators, distillation, absorption, adsorption, reactors and more. The authors expand on additional topics such as industrial cooling systems, extraction, and topics on process utilities, piping and hydraulics, including instrumentation and safety basics that supplement the equipment design procedure and help to arrive at a complete plant design. The chapters are arranged in sections pertaining to heat and mass transfer processes, reacting systems, plant hydraulics and process vessels, plant auxiliaries, and engineered safety as well as a separate chapter showcasing examples of process design in complete plants. This comprehensive reference bridges the gap between industry and academia, while exploring best practices in design, including relevant theories in process design making this a valuable primer for fresh graduates and professionals working on design projects in the industry. Serves as a consolidated resource for process and plant design, including process utilities and engineered safety Bridges the gap between industry and academia by including practices in design and summarizing relevant theories Presents design solutions as a complete functional system and not merely the design of major equipment

Provides design procedures as pseudo-code/flow-chart, along with practical considerations

This volume is a valuable reference work for the student and the practising engineer in the chemical, pharmaceutical, minerals, food, plastics, paper and metallurgical industries. The second edition of this successful text has been thoroughly rewritten and updated. Based on the long running post-experience course produced by the University of Bradford, in association with the Institution of Chemical Engineers, it covers all aspects of mixing, from fundamentals through to design procedures in single and multi-phase systems. Experts from both industry and academia have contributed to this work giving both a theoretical practical approach. It covers dry and wet powders, single and two-phase liquids, solid/liquid and gas/liquid systems. The range of mixers available for such diverse duties is dealt with, including tumbler mixers for powders, mechanically agitated vessels, in-line continuous mixers and jet mixers. Coverage is given of the range of mixing objectives, varying from achieving product uniformity to obtaining optimum conditions for mass transfer and chemical reactions. This volume is a valuable reference work for the student and the practising engineer in the chemical, pharmaceutical, minerals, food, plastics, paper and metallurgical industries. The second edition of this successful text has been thoroughly rewritten and updated. Based on the long running post-experience course produced by the University of Bradford, in association with the Institution of Chemical Engineers, it covers all aspects of mixing, from fundamentals through to design procedures in single and multi-phase systems. Experts from both industry and academia have contributed to this work giving both a theoretical practical approach. It covers dry and wet powders, single and two-phase liquids, solid/liquid and gas/liquid systems. The range of mixers available for such diverse duties is dealt with, including tumbler mixers for powders, mechanically agitated vessels, in-line continuous mixers and jet mixers. Coverage is given of the range of mixing objectives, varying from achieving product uniformity to obtaining optimum conditions for mass transfer and chemical reactions.

A comprehensive and example oriented text for the study of chemical process design and simulation Chemical Process Design and Simulation is an accessible guide that offers information on the most important principles of chemical engineering design and includes illustrative examples of their application that uses simulation software. A comprehensive and practical resource, the text uses both Aspen Plus and Aspen Hysys simulation software. The author describes the basic methodologies for computer aided design and offers a description of the basic steps of process simulation in Aspen Plus and Aspen Hysys. The text reviews the design and simulation of individual simple unit operations that includes a mathematical model of each unit operation such as reactors, separators, and heat exchangers. The author also explores the design of new plants and simulation of existing plants where conventional chemicals and material mixtures with measurable compositions are used. In addition, to aid in comprehension, solutions to examples of real problems are included. The final section covers plant design and simulation of processes using nonconventional components. This important resource: Includes information on the application of both the Aspen Plus and Aspen Hysys software that enables a comparison of the two software systems Combines the basic theoretical principles of chemical process and design with real-world examples Covers both processes with conventional organic chemicals and processes with more complex materials such as solids, oil blends, polymers and electrolytes Presents examples that are solved using a new version of Aspen software, ASPEN One 9 Written for students and academics in the field of process design, Chemical Process Design and Simulation is a practical and accessible guide to the chemical process design and simulation using proven software. Written by a highly regarded author with industrial and academic experience, this new edition of an established bestselling book provides practical guidance for students, researchers, and those in chemical engineering. The book includes a new section on sustainable energy, with sections on carbon capture and sequestration, as a result of increasing environmental awareness; and a companion website that includes problems, worked solutions, and Excel spreadsheets to enable students to carry out complex calculations.

Chemical Projects Scale Up: How to Go from Laboratory to Commercial covers the chemical engineering steps necessary for taking a laboratory development into the commercial world. The book includes the problems associated with scale up, equipment sizing considerations, thermal characteristics associated with scale up, safety areas to consider, recycling considerations, operability reviews and economic viability. In addition to the process design aspects of commercializing the laboratory development, consideration is given to the utilization of a development in an existing plant. Explains how heat removal for exothermic reactions can be scaled up Outlines how a reactor can be sized from batch kinetic data Discusses how the plant performance of a new catalyst can be evaluated Presents how the economics of a new product/process can be developed Discusses the necessary evaluation of recycling in commercial plants

This handbook has been prepared as a working reference for the safety officer, the environmental engineer, and the consultant. For the safety officer, this handbook provides detailed guidelines and instructions in preparing Right-to-Know Reporting Audits, establishing programs and training employees on hazard awareness, and developing and implementing emergency response programs in the workplace and at off-site operations. For the environmental engineer, this handbook provides extensive technical data on toxic chemical properties and detailed instructional aid on how to properly prepare toxic chemical release inventory reporting. For the environmental consultant, an extensive overview of corrective action technologies is provided.

This 1998 book introduces the basics of engineering design and analysis for beginning chemical engineering undergraduate students.

Ground-breaking text on chemical product design covering needs, ideas, selection, manufacture.

This concise book is a broad and highly motivational introduction for first-year engineering students to the exciting of field of chemical engineering. The material in the text is meant to precede the traditional second-year topics. It provides students with, 1) materials to assist them in deciding whether to major in chemical engineering; and 2) help for future chemical engineering majors to recognize in later courses the connections between advanced topics and relationships to the whole discipline. This text, or portions of it, may be useful for the chemical engineering portion of a broader freshman level introduction to engineering course that examines multiple engineering fields.

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.

Combines academic theory with practical industry experience Updated to include the latest regulations and references Covers hazard identification, risk assessment, and inherent safety Case studies and problem sets enhance learning Long-awaited revision of the industry best seller. This fully revised second edition of Chemical Process Safety: Fundamentals with Applications combines rigorous academic methods with real-life industrial experience to create a unique resource for students and professionals alike. The primary focus on technical fundamentals of chemical process safety provides a solid groundwork for understanding, with full coverage of both prevention and mitigation measures. Subjects include: Toxicology and industrial hygiene Vapor and liquid releases and dispersion modeling Flammability characterization Relief and explosion venting In addition to an overview of government regulations, the book introduces the resources of the AIChE Center for Chemical Process Safety library. Guidelines are offered for hazard identification and risk assessment. The book concludes with case histories drawn directly from the authors' experience in the field. A perfect reference for industry professionals, Chemical Process Safety: Fundamentals with Applications, Second Edition is also ideal for teaching at the graduate and senior undergraduate levels. Each chapter includes 30 problems, and a solutions manual is now available for instructors.

The field of chemical engineering is undergoing a global "renaissance," with new processes, equipment, and sources changing literally every day. It is a dynamic, important area of study and the basis for some of the most lucrative and integral fields of science. Introduction to Chemical Engineering offers a comprehensive overview of the concept, principles and applications of chemical engineering. It explains the distinct chemical engineering knowledge which gave rise to a general-purpose technology and broadest engineering field. The book serves as a conduit between college education and the real-world chemical engineering practice. It answers many questions students and young engineers often ask which include: How is what I studied in the classroom being applied in the industrial setting? What steps do I need to take to become a professional chemical engineer? What are the career diversities in chemical engineering and the engineering knowledge required? How is chemical engineering design done in real-world? What are the chemical engineering computer tools and their applications? What are the prospects, present and future challenges of chemical engineering? And so on. It also provides the information new chemical engineering hires would need to excel and cross the critical novice engineer stage of their career. It is expected that this book will enhance students understanding and performance in the field and the development of the profession worldwide. Whether a new-hire engineer or a veteran in the field, this is a must—have volume for any chemical engineer's library.

A complete overview and considerations in process equipment design Handling and storage of large quantities of materials is crucial to the chemical engineering of a wide variety of products. Process Equipment Design explores in great detail the design and construction of the containers – or vessels – required to perform any given task within this field. The book provides an introduction to the factors that influence the design of vessels and the various types of vessels, which are typically classified according to their geometry. The text then delves into design and other considerations for the construction of each type of vessel, providing in the process a complete overview of process equipment design.

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 updated version of one of the most popular and widely used CCPS books provides plant design engineers, facility operators, and safety professionals with key information on selected topics of interest. The book focuses on process safety issues in the design of chemical, petrochemical, and hydrocarbon processing facilities. It discusses how to select designs that can prevent or mitigate the release of flammable or toxic materials, which could lead to a fire, explosion, or environmental damage. Key areas to be enhanced in the new edition include inherently safer design, specifically concepts for design of inherently safer unit operations and Safety Instrumented Systems and Layer of Protection Analysis. This book also provides an extensive bibliography to related publications and topic-specific information, as well as key information on failure modes and potential design solutions.

This text introduces the student to the practices and standards of making drawings for equipment used in chemical industries. The textbook follows the Bureau of Indian Standards (BIS) 696–1972 specifications and methodology of equipment drawings. It uses the symbolic representations of the equipment as used in the industry and provides the detailed drawings of some commonly used equipment. It includes numerous orthographic and assembled views of equipment, and provides several photographs to relate these drawings to equipment used in industries. Finally, the book includes several assignments to reinforce the concepts discussed in the text. The text is intended for the undergraduate students of chemical engineering and its related branches such as polymer engineering, petroleum engineering, and pipeline engineering.

Over the last 20 years, fundamental design concepts and advanced computer modeling have revolutionized process design for chemical engineering. Team work and creative problem solving are still the building blocks of successful design, but new design concepts and novel mathematical programming models based on computer-based tools have taken out much of the guess-work. This book presents the new revolutionary knowledge, taking a systematic approach to design at all levels.

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 This text introduces the students and practicing engineers to the practices and standards of drafting the equipment used in chemical, food processing, polymer engineering, and pharmaceuticals processing industries. The textbook follows the Bureau of Indian Standards BIS 696–1972 specifications and methodology of equipment drawing. It introduces to the symbolic representations of the equipment as used in the chemical, food processing and pharma industries. It provides the detailed drawings of some commonly used equipment that are repeatedly used in different sizes and shapes.

Orthographic and assembled views are illustrated. Several assignments have been suggested for practicing the drawing. In this second edition, a new chapter on computerized drawing method has been introduced. For this solid edge software has been used. Though the software itself guides the readers through the making of drawing of the parts and their assemblies, guidelines to use software is also given. The text is intended for the undergraduate students of chemical and its related branches such as polymer engineering, petroleum engineering and pipeline engineering.

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. The Concise, Easy-to-Use Guide to Designing Chemical Process Equipment and Evaluating Its Performance Trends such as shale-gas resource development call for a deeper understanding of chemical engineering equipment and design. Chemical Process Equipment Design complements leading texts by providing concise, focused coverage of these topics, filling a major gap in undergraduate chemical engineering education. Richard Turton and Joseph A. Shaeiwitz present relevant design equations, show how to analyze operation of existing equipment, and offer a practical methodology for designing new equipment and for solving common problems. Theoretical derivations are avoided in favor of working equations, practical computational strategies, and approximately eighty realistic worked examples. The authors identify which equation applies to each situation, and show exactly how to use it to design equipment. By the time undergraduates have worked through this material, they will be able to create preliminary designs for most process equipment found in a typical chemical plant that processes gases and/or liquids. They will also learn how to evaluate the performance of that equipment, even when operating conditions differ from the design case. Coverage includes Process fluid mechanics: designing and evaluating pumps, compressors, valves, and other piping systems Process heat transfer: designing and evaluating heat exchange equipment Separation equipment: understanding fundamental relationships underlying separation devices, designing them, and assessing their performance Reactors: basic equations and specific issues relating to chemical reactor equipment design and performance Other equipment: preliminary analysis and design for pressure vessels, simple phase-separators (knock-out drums), and steam ejectors This guide draws on fifty years of innovative chemical engineering instruction at West Virginia University and elsewhere. It complements popular undergraduate textbooks for practical courses in fluid mechanics, heat transfer, reactors, or separations; supports senior design courses; and can serve as a core title in courses on equipment design.

Part I: Process design -- Introduction to design -- Process flowsheet development -- Utilities and energy efficient design -- Process simulation -- Instrumentation and process control -- Materials of construction -- Capital cost estimating -- Estimating revenues and production costs -- Economic evaluation of projects -- Safety and loss prevention -- General site considerations -- Optimization in design -- Part II: Plant design -- Equipment selection, specification and design -- Design of pressure vessels -- Design of reactors and mixers -- Separation of fluids -- Separation columns (distillation, absorption and extraction) -- Specification and design of solids-handling equipment -- Heat transfer equipment -- Transport and storage of fluids.

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

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

Experimental Methods and Instrumentation for Chemical Engineers, Second Edition, touches many aspects of engineering practice, research, and statistics. The principles of unit operations, transport phenomena, and plant design constitute the focus of chemical engineering in the latter years of the curricula. Experimental methods and instrumentation is the precursor to these subjects. This resource integrates these concepts with statistics and uncertainty analysis to define what is necessary to measure and to control, how precisely and how often. The completely updated second edition is divided into several themes related to data: metrology, notions of statistics, and design of experiments. The book then covers basic principles of sensing devices, with a brand new chapter covering force and mass, followed by pressure, temperature, flow rate, and physico-chemical properties. It continues with chapters that describe how to measure gas and liquid concentrations, how to characterize solids, and finally a new chapter on spectroscopic techniques such as UV/Vis, IR, XRD, XPS, NMR, and XAS. Throughout the book, the author integrates the concepts of uncertainty, along with a historical context and practical examples. A problem solutions manual is available from the author upon request. Includes the basics for 1st and 2nd year chemical engineers, providing a foundation for unit operations and transport phenomena Features many practical examples Offers exercises for students at the end of each chapter Includes up-to-date detailed drawings and photos of equipment

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

This book has been designed for Chemical Engineering students to introduce them to the detailed mechanical design of equipments, frequently used in the Chemical Process Industry. It also caters to the needs of professional design engineers in industry. T

Industrial Chemical Process Analysis and Design uses chemical engineering principles to explain the transformation of basic raw materials into major chemical products. The book discusses traditional processes to create products like nitric acid, sulphuric acid, ammonia, and methanol, as well as more novel products like bioethanol and biodiesel. Historical perspectives show how current chemical processes have developed over years or even decades to improve their yields, from the discovery of the chemical reaction or physico-chemical principle to the industrial process needed to yield commercial quantities. Starting with an introduction to process design, optimization, and safety, Martin then provides stand-alone chapters—in a case study fashion—for commercially important chemical production processes. Computational software tools like MATLAB®, Excel, and Chemcad are used throughout to aid process analysis. Integrates principles of chemical engineering, unit operations, and chemical reactor engineering to understand process synthesis and analysis Combines traditional computation and modern software tools to compare different solutions for the same problem Includes historical perspectives and traces the improving efficiencies of commercially important chemical production processes Features worked examples and end-of-chapter problems with solutions to show the application of concepts discussed in the text

Introduction to Process Engineering and Design covers basic principles to design alternate systems, develop process diagrams and select the best alternative to be adopted. Multiple industrial examples provided in the book will enhance the skills of the readers for innovative designs. Salient Features: • Focuses on process design of chemical plants and equipment • State-of-the-art technique of supercritical extraction, reactive distillation, short path distillation discussed • Process Flow-charts are provided throughout the book

"The most complete, up-to-date, problem-solving toolkit for chemical engineers and process designers. Industrial Chemical Process Design, Second Edition provides a step-by-step methodology and 25 downloadable, customizable, needs-specific software applications that offer quick, accurate solutions to complex process design problems. These applications uniquely fill the gaps left by large, very expensive commercial process simulation software packages used to select, size, and design industrial chemical process equipment. Written by a hands-on industry consultant and featuring more than 200 illustrations, this book thoroughly details: Sizing and cost estimating of process unit operation equipment Design and rating of fractionation equipment and three-phase separation equipment Chemical optimization Commercial

distillation Packaged plant cost analysis Estimating cost for modular packages Performing operations such as liquid-liquid extraction and gas liquid separation vessel sizing and rating Green engineering New to the Second Edition: Added focus on sustainability with new green engineering coverage: crude oil database; vegetable oils and plant greenhouse production for use in automobile fuels; gasoline and diesel fuel database; greenhouse fuels; water removal treatment in three-phase vessel design New focus on engineering economics Simplified shell/tube design method and improved shell/tube exchanger software improvements Fluid flow coverage includes both single- and two-phase flow and the very desirable addition of complete process engineering of NO_x removal and catalytic SCR reactor processes necessary in all electric generator power plants and refinery furnace systems (per mandatory EPA regulations) Coverage of the Fischer-Tropsch process converting natural methane gas to crude oil products, liquids, gasoline, diesel, and jet fuel - all sulfur-free! Includes a plan to decrease reliance on crude oil imports Contains a packaged cost analysis natural gas-to-liquids plant turn-key software program "--

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.

Chemical Process Engineering presents a systematic approach to solving design problems by listing the needed equations, calculating degrees-of-freedom, developing calculation procedures to generate process specifications- mostly pressures, temperatures, compositions, and flow rates- and sizing equipment. This illustrative reference/text tabulates numerous easy-to-follow calculation procedures as well as the relationships needed for sizing commonly used equipment.

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