

Chemical Process Calculations By D C Sikdar

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

First published: Chemical process equipment / Stanley M. Walas. 1988.

This undergraduate textbook integrates the teaching of numerical methods and programming with problems from core chemical engineering subjects.

A compilation of the calculation procedures needed every day on the job by chemical engineers. Tables of Contents: Physical and Chemical Properties; Stoichiometry; Phase Equilibrium; Chemical-Reaction Equilibrium; Reaction Kinetics and Reactor Design; Flow of Fluids and Solids; Heat Transfer; Distillation; Extraction and Leaching; Crystallization; Filtration; Liquid Agitation; Size Reduction; Drying; Evaporation; Environmental Engineering in the Plant. Illustrations. Index.

Principles of Chemical Engineering Processes

Essentials and Applications of Food Engineering

Numerical Methods with Chemical Engineering Applications

Handbook on Material and Energy Balance Calculations in Material Processing

Neural Networks in Bioprocessing and Chemical Engineering

Advances in Chemical Engineering provides the mathematical foundations of different areas of chemical engineering and describes typical applications. The book presents the key areas of chemical engineering, their mathematical foundations, and corresponding modeling techniques. Modern industrial production is based on solid scientific methods, many of which are part of chemical engineering. To produce new substances or materials, engineers must devise special reactors and procedures, while also observing stringent safety requirements and striving to optimize the efficiency jointly in economic and ecological terms. In chemical engineering, mathematical models are considered to be driving forces of many innovations in material design and process development. Presents the main mathematical problems and models of chemical engineering and provides the reader with contemporary methods and tools to solve them Summarizes in a clear and straightforward way, the contemporary trends in the interaction between mathematics and chemical engineering vital to chemical engineers in their daily work Includes classical analytical methods, computational methods, and methods of symbolic computation Covers the latest cutting edge computational methods, like symbolic computational methods

Written in a clear, concise style, Principles of Chemical Engineering Processes provides an introduction to the basic principles and calculation techniques that are fundamental to the field. The text focuses on problems in material and energy balances in relation to chemical reactors and introduces software that employs numerical methods to solve these problems. Upon mastery of this material, readers will be able to: Understand basic processing terminology (batch, semibatch, continuous, purge, and recycle) and standard operations (reaction, distillation, absorption, extraction, and filtration) Draw and fully label a flowchart for a given process description Choose a convenient basis for calculation for both single- and multiple-unit processes Identify possible subsystems for which material and energy balances might be written Perform a degree of freedom analysis for the overall system and each possible subsystem, formulating the appropriate material and energy balance equations Apply the first law of thermodynamics, calculate energy and enthalpy changes, and construct energy balances on closed and open systems Written as a text to fully meet the needs of advanced undergraduate students, it is also suitable as a reference for chemical engineers with its wide coverage across the biochemical and electromechanical fields. Each chapter of the text provides examples, case studies, and end-of-chapter problems, and the accompanying CD-ROM contains software designed for solving problems in chemical engineering.

This sourcebook describes the latest developments and applications of chemical process design methodology. It provides reviews of a variety of topics, including catalyst design, process heat-exchange design, separation process design and process integration.

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

CHEMICAL PROCESS CALCULATIONS

Analysis, Synthesis and Design of Chemical Processes

DESIGN AND DRAWING

Principles, Practice and Economics of Plant and Process Design

Quantum Chemistry Approaches to Chemisorption and Heterogeneous Catalysis

Principles of Chemical Engineering Processes: Material and Energy Balances introduces the basic principles and calculation techniques used in the field of chemical engineering, providing a solid understanding of the fundamentals of the application of material and energy balances. Packed with illustrative examples and case studies, this book: Discusses problems in material and energy balances related to chemical reactors Explains the concepts of dimensions, units, psychrometry, steam properties, and conservation of mass and energy Demonstrates how MATLAB® and Simulink® can be used to solve complicated problems of material and energy balances Shows how to solve steady-state and transient mass and energy balance problems involving multiple-unit processes and recycle, bypass, and purge streams Develops quantitative problem-solving skills, specifically the ability to think quantitatively (including numbers and units), the ability to translate words into diagrams and mathematical expressions, the ability to use common sense to interpret vague and ambiguous language in problem statements, and the ability to make judicious use of approximations and reasonable assumptions to simplify problems This Second Edition has been updated based upon feedback from professors and students. It features a new chapter related to single- and multiphase systems and contains additional solved examples and homework problems. Educational software, downloadable exercises, and a solutions manual are available with qualifying course adoption.

Keeping the fundamentals of basic tools of process calculations—material balance and energy balance—in mind, the text prepares the students to formulate material and energy balance theory on chemical process systems. It also demonstrates how to solve the main process-related problems that crop up in chemical engineering practice. The chapters are organized in a way that enables the students to acquire an in-depth understanding of the subject. The emphasis is given to the units and conversions, basic concepts of calculations, material balance with/without chemical reactions, and combustion of fuels and energy balances. Apart from numerous illustrations, the book contains numerous solved problems and exercises which bridge the gap between theoretical learning and practical implementation. All the numerical problems are solved with block diagrams to reinforce the understanding of the concepts. Primarily intended as a text for the undergraduates students of chemical engineering, it will also be useful for other allied branches of chemical engineering such as polymer science and engineering and petroleum engineering. KEY FEATURES • Methods of calculation for stoichiometric proportions with practical examples from the Industry • Simplified method of solving numerical problems under material balance with and without chemical reactions • Conversions of chemical engineering equations from one unit to another • Solution of fuel and combustion, and energy balance problems using tabular column

Facilitates the process of learning and later mastering Aspen Plus® with step by step examples and succinct explanations Step-by-step textbook for identifying solutions to various process engineering problems via screenshots of the Aspen Plus® platforms in parallel with the related text Includes end-of-chapter problems and term project problems Includes online exam and quiz problems for instructors that are parametrized (i.e., adjustable) so that each student will have a standalone version Includes extra online material for students such as Aspen Plus®-related files that are used in the working tutorials throughout the entire textbook

Multimedia Environmental Models: The Fugacity Approach, Third Edition, takes a broad approach of viewing chemical behavior in the total biosphere of connected biotic and abiotic compartments. Chemicals are subject to the laws of "mass balance," a constraint that provides the opportunity to establish quantitative expressions for chemical fate that are central to chemical management and regulatory legislation. This book employs both the conventional concentration-based procedures and those based on application of the more elegant and powerful concept of fugacity to characterize equilibrium, steady-state distribution, and time-dependent transport between environmental phases such as air, water, and soil. Organic chemicals are emphasized because they are more easily generalized when assessing environmental behavior. Features Illustrates professional approaches to calculating the fate of chemicals in the environment Explicitly details all worked examples in an annotated step-by-step fashion

Presents real-life freely downloadable models of use to government, industry, and private consulting professionals and students alike Clarifies symbols and notation

Advanced Data Analysis and Modelling in Chemical Engineering

Proceedings of an International Conference, Held at New England College, Henniker, New Hampshire, July 6-11, 1980

Recent Developments in Chemical Process and Plant Design

Handbook of Chemical Engineering Calculations

Chemical Process Calculations Manual

A Practical Guide to Physical and Chemical Principles and Calculations for Today's Process Control Operators In Basic Principles and Calculations in Process Technology, author T. David Griffith walks process technologists through the basic principles that govern their operations, helping them collaborate with chemical engineers to improve both safety and productivity. He shows process operators how to go beyond memorizing rules and formulas to understand the underlying science and physical laws, so they can accurately interpret anomalies and respond appropriately when exact rules or calculation methods don't exist. Using simple algebra and non-technical analogies, Griffith explains each idea and technique without calculus. He introduces each topic by explaining why it matters to process technologists and offers numerous examples that show how key principles are applied and calculations are performed. For end-of-chapter problems, he provides the solutions in plain-English discussions of how and why they work. Chapter appendices provide more advanced information for further exploration. Basic Principles and Calculations in Process Technology is an indispensable, practical resource for every process technologist who wants to know "what the numbers mean" so they can control their systems and processes more efficiently, safely, and reliably. T. David Griffith received his B.S. in chemical engineering from The University of Texas at Austin and his Ph.D. from the University of Wisconsin-Madison, then top-ranked in the discipline. After working in research on enhanced oil recovery (EOR), he cofounded a small chemical company, and later in his career he developed a record-setting Electronic Data Interchange (EDI) software package. He currently instructs in the hydrocarbon processing industry. Coverage includes • Preparing to solve problems by carefully organizing them and establishing consistent sets of measures • Calculating areas and volumes, including complex objects and interpolation • Understanding Boyle's Law, Charles's Law, and the Ideal Gas Law • Predicting the behavior of gases under extreme conditions • Applying thermodynamic laws to calculate work and changes in gas enthalpy, and to recognize operational problems • Explaining phase equilibria for distillation and fractionalization • Estimating chemical reaction speed to optimize control • Balancing material or energy as they cross system boundaries • Using material balance calculations to confirm quality control and prevent major problems • Calculating energy balances and using them to troubleshoot poor throughput • Understanding fluid flow, including shear, viscosity, laminar and turbulent flows, vectors, and tensors • Characterizing the operation of devices that transport heat energy for heating or cooling • Analyzing mass transfer in separation processes for materials purification

Chemical Process Calculations: 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 process 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/DFD, simulations, and more Analyzing process performance via I/O models, performance curves, and other tools Process troubleshooting and "debugging" 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 appendices with current equipment cost data and preliminary design information for eleven chemical processes—including seven brand new to this edition.

Fuels and combustion. Gas producers. Sulfur compounds. Metallurgy. Crystallization.

Process Calculations

The Properties of Gases and Liquids Sixth Edition

Introduction to Process Calculations Stoichiometry

Selection and Design

Chemical Engineering Design

Neural networks have received a great deal of attention among scientists and engineers. In chemical engineering, neural computing has moved from pioneering projects toward mainstream industrial applications. This book introduces the fundamental principles of neural computing, and is the first to focus on its practical applications in bioprocessing and chemical engineering. Examples, problems, and 10 detailed case studies demonstrate how to develop, train, and apply neural networks. A disk containing input data files and all illustrative examples, case studies, and practice problems provides the opportunity for hands-on experience. An important goal of the book is to help the student or practitioner learn and implement neural networks quickly and inexpensively using commercially available, PC-based software tools. Detailed network specifications and training procedures are included for all neural network examples discussed in the book. Each chapter contains an introduction, chapter summary, references to further reading, practice problems, and a section on nomenclature Includes a PC-compatible disk containing input data files for examples, case studies, and practice problems Presents 10 detailed case studies Contains an extensive glossary, explaining terminology used in neural network applications in science and engineering Provides examples, problems, and ten detailed case studies of neural computing applications, including: Process fault-diagnosis of a chemical reactor Leonard Kramer fault-classification problem Process fault-diagnosis from an unsteady-state continuous stirred-tank reactor System classification of protein secondary-structure categories Quantitative prediction and regression analysis of complex chemical kinetics Software-based sensors for quantitative predictions of product compositions from fluorescent spectra in bioprocessing Quality control and optimization of an autoclave curing process for manufacturing composite materials Predictive modeling of an experimental batch fermentation process Supervisory control of the Tennessee Eastman plantwide control problem Predictive modeling and optimal design of extractive bioseparation in aqueous two-phase systems

Process Safety Calculations (second edition) remains to be an essential guide for students and practitioners in process safety engineering who are working on calculating and predicting risks and consequences. The book focuses on calculation procedures based on basic chemistry, thermodynamics, fluid dynamics, conservation equations, kinetics and practical models. It provides helpful calculations to demonstrate compliance with regulations and standards, such as Seveso directive(s)/COMAH, CLP regulation, ATEX directives, PED directives, REACH regulation, OSHA/NIOSH and UK ALARP, along with risk and consequence assessment, stoichiometry, thermodynamics, stress analysis and fluid-dynamics. This fully revised, updated and expanded second edition follows the same organization as the first, including the original three main parts, Fundamentals, Consequence Assessment and Quantitative Risk Assessment. However, the latter part is significantly expanded, including an appendix consisting of five fundamental thematic areas belonging to the risk assessment framework, including in-depth calculations methodologies for some fundamental monothematic macro-areas of process safety. Revised, updated and expanded new edition that includes newly developing areas of process safety that are relevant to QRA Provides engineering fundamentals to enable readers to properly approach the subject of process safety Includes a remarkable and broad numbers of calculation examples, which are completely resolved and fully explained Develops the subject, consistently with the methodology applied in the big projects

This best selling text prepares students to formulate and solve material and energy balances in chemical process systems and lays the foundation for subsequent courses in chemical engineering. The text provides a realistic, informative, and positive introduction to the practice of chemical engineering. The Integrated Media Edition update provides a stronger link between the text, media supplements, and new student workbook.

The present textbook is written for undergraduate students of chemical engineering as per the syllabus framed by AIChE curriculum. It explains the basic chemical process principles in a lucid manner. SI units, chemical stoichiometry and measures of composition, behaviour of gases, vapour pressure of pure substances, and humidity and saturation are covered in detail. In addition, mass and energy balances of chemical processes have also been described. Chemical processes without chemical reactions include fluid flow mixing, evaporation distillation, absorption and stripping, liquid-liquid extraction, leaching and washing, adsorption, drying, crystallization and membrane separation process. SALIENT FEATURES • Description of all concepts and principles with a rich pedagogy for easy understanding • Correct use of SI units • Over 270 solved examples for understanding the basic concepts • Answers to all chapter-end numerical problems for checking the accuracy of calculations TARGET AUDIENCE • BE/B.Tech (Chemical Engineering)

Material and Energy Balances, Second Edition

CHEMICAL PROCESS MODELLING AND COMPUTER SIMULATION

Foundations of Computer-aided Chemical Process Design

Chemical Process Equipment

Ludwig's Applied Process Design for Chemical and Petrochemical Plants

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

Essentials & Applications of Food Engineering provides a comprehensive understanding of food engineering operations and their practical and industrial utility. It presents pertinent case studies, solved numerical problems, and multiple choice questions in each chapter and serves as a ready reference for classroom teaching and exam preparations. The first part of this textbook contains the introductory topics on units and dimensions, material balance, energy balance, and fluid flow. The second part deals with the theory and applications of heat and mass transfer, psychrometry, and reaction kinetics. The subsequent chapters of the book present the heat and mass transfer operations such as evaporation, drying, refrigeration, freezing, mixing, and separation. The final section focuses on the thermal, non-thermal, and nanotechnology-based novel food processing techniques, 3D food printing, active and intelligent food packaging, and fundamentals of CFD modeling. Features Features 28 case studies to provide a substantial understanding of the practical and industrial applications of various food engineering operations Includes 178 solved numerical problems and 285 multiple choice questions Highlights the application of mass balance in food product traceability and the importance of viscosity measurement in a variety of food products Provides updated information on novel food processing techniques such as cold plasma, 3D food printing, nanospray drying, electrospraying, and electrospinning The textbook is designed for undergraduate and graduate students pursuing Food Technology and Food Process Engineering courses. This book would also be of interest to course instructors and food industry professionals.

The development of "high-tech" materials in contemporary industries is deeply related to a detailed understanding of specific surface properties of catalysts which make particular reactions possible. But this understanding presupposes that there exists a body of theory capable of explaining situations not easily accessible to experimental methods and of relating experimental findings among themselves and with theoretical constructs. For these reasons, theoretical developments in surface physics and surface chemistry of transition metal compounds have been of paramount importance in promoting progress in catalysis, electronic devices, corrosion, etc. Although a great variety of spectroscopic methods for analyzing solids and surfaces at molecular scale have been introduced in recent years, nevertheless, many questions about the adsorption sites and intermediates, the effect of promoters, the poisoning of active sites, the nature of segregation of impurities, the process of surface reconstruction, the mechanisms of reactions, etc. have remained unanswered simply because of the great complexity of surface phenomena. It is in this sense that quantum mechanical methods combined with experimental data - may shed some light on the microscopic properties of new surface materials.

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.

CHEMICAL PROCESS EQUIPMENT

Introduction to Chemical Engineering and Computer Calculations

Material Balance and Process Calculations: A Book for Chemical Engineers and Chemists

Aspen Plus

This textbook, Material Balance and Process Calculations, has been carefully written to teach you important topics in material balance and process calculations by explaining them with a mindset to fully equip you in the topics. Whether you want this book for general studies of these topics or you want this book to study for an exam, you will find it a very useful tool.This textbook is a mass balance teacher which is suitable for students in universities and students in colleges. It will also serve as a useful tool for direct entry students who are preparing for entrance examinations into colleges and universities. This book is not only for engineering students but also for chemistry students or any student who is offering a course in chemistry.The step by step explanations presented in the worked examples are easy to understand since care was taken to sufficiently explain salient points and process ideas. Efforts have been made to achieve a complete and simplified explanation of every example given in this textbook. Many worked examples have been included in each topic in order to fully cover every complexity the topic might contain. This book will boost your level of understanding of material balance and process calculations. Numerous exercises at the end of each chapter are intended to test students' understanding of the topic. Therefore students are thus presented with an effective means of self-assessment whereby they can determine their individual strengths and revision needs.The topics covered in this eBook include:

This compact, information-dense resource provides instant access to hundreds of the calculations used in chemical process plants around the world. Readers will also find a wealth of useful tables for the design of gaseous and temperature of liquids.

Lately, there has been a renewed push to minimize the waste of materials and energy that accompany the production and processing of various materials. This third edition of this reference emphasizes the fundamental principles of the conservation of mass and energy, and their consequences as they relate to materials and energy. New to this edition are numerous worked examples, illustrating conventional and novel problem-solving techniques in applications such as semiconductor processing, environmental engineering, the production and processing of advanced and exotic materials for aerospace, electronic, and structural applications. Moving from raw material to finished product, this book demonstrates how to solve the main process-related problems that crop up in chemical engineering practice. It demonstrates the steps required to determine how much of various materials and chemicals are needed to satisfy output requirements and how to compensate for energy gained or lost for each step of the process. Presenting easy-to-understand methods, illustrations, worked examples, and practice problems, that are ideal for students, it provides access to a wealth of current calculations needed by advanced process professionals in petroleum/petrochemicals and biotechnology.

Design and Economics

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

Chemical Engineering Progress

Basic Principles and Calculations in Process Technology

Perry's Chemical Engineers' Handbook, 9th Edition

CHEMICAL PROCESS CALCULATIONSSPH Learning Pvt. Ltd

This textbook is designed for undergraduate students of chemical engineering and related disciplines such as biotechnology, polymer technology, petrochemical engineering, electrochemical engineering, environmental engineering, safety engineering and industrial chemistry. The chief objective of this text is to prepare students to make analysis of chemical processes through calculations and also to develop in them systematic problem-solving skills. The students are introduced not only to the application of law of combining proportions to chemical reactions (as the word "stoichiometry" implies) but also to formulating and solving material and energy balances in processes with and without chemical reactions. The book presents the fundamentals of chemical engineering operations and processes in an accessible style to help the students gain a thorough understanding of chemical process calculations. It also covers in detail the background materials such as units and conversions, dimensional analysis and dimensionless groups, property estimation, P-V-T behaviour of fluids, vapour pressure and phase equilibrium relationships, humidity and saturation. With the help of examples, the book explains the construction and use of reference-substance plots, equilibrium diagrams, psychrometric charts, steam tables and enthalpy composition diagrams. It also elaborates on thermophysics and thermochemistry to acquaint the students with the thermodynamic principles of energy balance calculations. Key Features • SI units are used throughout the book. • Presents a thorough introduction to basic chemical engineering principles. • Provides many worked-out examples and exercise problems with answers. •Objective type questions included at the end of the book serve as useful review material and also assist the students in preparing for competitive examinations such as GATE.

Chemical Calculations of Manufacturing Processes

Chemical Process Development

The Fugacity Approach

Chemical Process Design and Integration

Process Safety Calculations