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# Chemical Technology An Integral Textbook

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Introduction to Food Process Engineering  
 Chemical Process Design and Integration  
 Perry's Chemical Engineers' Platinum Edition  
 Catalysis  
 Reactive and Membrane-Assisted Separations  
 Numerical Methods for Chemical Engineering  
 Chemical Process Technology  
 Lectures in Classical Thermodynamics with an Introduction to Statistical Mechanics  
 Properties of Polymers  
 Introduction to Chemical Engineering  
 Physical Principles of Chemical Engineering  
 Rules of Thumb for Chemical Engineers  
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 Handbook of Chemical Engineering Calculations  
 Practical PID Control  
 A TEXTBOOK OF CHEMICAL ENGINEERING THERMODYNAMICS  
 Techniques of Functional Analysis for Differential and Integral Equations  
 Microreactors in Organic Chemistry and Catalysis  
 Chemical Engineering Design  
 Starch: Chemistry and Technology  
 Chemical Technology  
 Process Dynamics and Control  
 Chemical Reaction Engineering  
 Polymer Science and Technology  
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Introduction to Food Process Engineering  
 Elsevier  
 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  
*Chemical Process Design and Integration*  
 Vikas Publishing House  
 "This book is about Technology Integration in Chemistry Education and Research (TICER)"--  
Perry's Chemical Engineers' Platinum Edition World Scientific  
 This four-volume handbook gives a state-of-the-art overview of porous materials, from synthesis and characterization and simulation all the way to manufacturing and industrial applications. The editors,

coming from academia and industry, are known for their didactic skills as well as their technical expertise. Coordinating the efforts of 37 expert authors in 14 chapters, they construct the story of porous carbons, ceramics, zeolites and polymers from varied viewpoints: surface and colloidal science, materials science, chemical engineering, and energy engineering. Volumes 1 and 2 cover the fundamentals of preparation, characterisation, and simulation of porous materials. Working from the fundamentals all the way to the practicalities of industrial production processes, the subjects include hierarchical materials, in situ and operando characterisation using NMR, X-Ray scattering and tomography, state-of-the-art molecular simulations of adsorption and diffusion in crystalline nanoporous materials, as well as the emerging areas of bio-artifical and drug delivery. Volume 3 focuses on porous materials in industrial separation applications, including adsorption separation, membrane separation, and osmotic distillation. Finally, and highly relevant to tomorrow's energy challenges, Volume 4 explains the energy engineering aspects of applying porous materials in supercapacitors, fuel cells, batteries, electrolyzers and sub-surface energy applications. The text contains many high-quality colourful illustrations and examples, as well as thousands of up-to-date references to peer-reviewed articles, reports and websites for further reading. This comprehensive and well-written handbook is a must-have reference for universities, research groups and companies working with porous materials.

**Related Link(s)**  
*Catalysis* John Wiley & Sons  
 This book is a companion volume of *A Textbook of Chemical Technology Volume-I*, written by the same author. The two books cover the complete syllabi of Chemical Engineering and Chemical Technology programmes leading to the B.Tech. degree. The book explains the basic principles of chemical engineering and operating conditions of chemical plants in India. It discusses all major organic chemical industries including petroleum technology, petro-chemicals, polymer science, pulp and paper technology. It also deals with pesticides, coal and coal chemicals and the pharmaceutical industry. Keeping the importance of environmental protection and prevention and control of hazards in mind, a few chapters on planned industrial development, environmental impact assessment and prevention of hazards in chemical industries have also been

included. This book will also serve as a reference for practicing engineers and technologists.

**Reactive and Membrane-Assisted Separations** John Wiley & Sons

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.

**Numerical Methods for Chemical Engineering** Springer Science & Business Media

With a focus on actual industrial processes, e.g. the production of light alkenes, synthesis gas, fine chemicals, polyethylene, it encourages the reader to think "out of the box" and invent and develop novel unit operations and processes. Reflecting today's emphasis on sustainability, this edition contains new coverage of biomass as an alternative to fossil fuels, and process intensification. The second edition includes: New chapters on Process Intensification and Processes for the Conversion of Biomass Updated and expanded chapters throughout with 35% new material overall Text boxes containing case studies and examples from various different industries, e.g. synthesis loop designs, Sasol I Plant, Kaminsky catalysts, production of Ibuprofen, click chemistry, ammonia synthesis, fluid catalytic cracking Questions throughout to stimulate debate and keep students awake! Richly illustrated chapters with improved figures and flow diagrams *Chemical Process Technology, Second Edition* is a comprehensive introduction, linking the fundamental theory and concepts to the applied nature of the subject. It will be invaluable to students of chemical engineering, biotechnology and industrial chemistry, as well as practising chemical engineers. From reviews of the first edition: "The authors have blended process technology, chemistry and thermodynamics in an elegant manner... Overall this is a welcome addition to books on chemical technology." - *The Chemist* "Impressively wide-ranging and comprehensive... an excellent textbook for students, with a combination of fundamental knowledge and technology." - *Chemistry in Britain* (now *Chemistry*

World)

***Chemical Process Technology*** John Wiley & Sons

*Chemical Process Technology* is a comprehensive introduction, examining both the fundamental concepts and applied nature of this subject. Modern process development relies on a knowledge of many different disciplines and an application and integration of this knowledge. The book provides an essential bridge between the chemical sciences and the chemical industry. It enables the reader to integrate fundamental knowledge of the basic disciplines, to understand the most important chemical processes, and to apply this knowledge and understanding to industrial processes. The text examines both large-scale and small-scale chemical and biotechnology industries and brings to life the concepts that form the basis of the process industry. Starting with a general look at the industry, subsequent chapters examine different processes in greater detail. Emphasis is placed on chemical reactions and the reactor, both at the heart of each process, but coverage also includes feed pre-treatment and product separation. Key Features: A comprehensive and balanced introduction, providing an essential link between chemistry and the chemical industry Includes problems with their solutions to encourage a fuller understanding of the project Many examples and case studies taken from a variety of modern industries Richly illustrated chapters, with many clearly developed flow diagrams and numerous figures

**Lectures in Classical Thermodynamics with an Introduction to Statistical Mechanics** John Wiley & Sons

*Properties of Polymers: Their Correlation with Chemical Structure; Their Numerical Estimation and Prediction from Additive Group Contributions* summarizes the latest developments regarding polymers, their properties in relation to chemical structure, and methods for estimating and predicting numerical properties from chemical structure. In particular, it examines polymer electrical properties, magnetic properties, and mechanical properties, as well as their crystallization and environmental behavior and failure. The rheological properties of polymer melts and polymer solutions are also considered. Organized into seven parts encompassing 27 chapters, this book begins with an overview of polymer science and engineering, including the typology of polymers and their properties. It then turns to a discussion of thermophysical properties, from transition

temperatures to volumetric and calorimetric properties, along with the cohesive aspects and conformation statistics. It also introduces the reader to the behavior of polymers in electromagnetic and mechanical fields of force. The book covers the quantities that influence the transport of heat, momentum, and matter, particularly heat conductivity, viscosity, and diffusivity; properties that control the chemical stability and breakdown of polymers; and polymer properties as an integral concept, with emphasis on processing and product properties. Readers will find tables that give valuable (numerical) data on polymers and include a survey of the group contributions (increments) of almost every additive function considered. This book is a valuable resource for anyone working on practical problems in the field of polymers, including organic chemists, chemical engineers, polymer processors, polymer technologists, and both graduate and PhD students.

**Properties of Polymers** Pearson Education  
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.

**Introduction to Chemical Engineering** John Wiley & Sons

For the second edition of 'Microreactors in Organic Chemistry and Catalysis' all chapters have been revised and updated to reflect the latest developments in this rapidly developing field. This new edition has 60% more content, and it remains a comprehensive publication covering most aspects of the topic. The use of microreactors in homogeneous, heterogeneous as well as biphasic reactions is covered in the main part of the book, together with catalytic, bioorganic and automation approaches. The initial chapters also provide a solid physical chemistry background on fluidics in microdevices. Finally, a chapter on industrial applications and developments covers recent progress in process chemistry. An excellent reference for beginners and experts alike.

**Physical Principles of Chemical Engineering** John Wiley & Sons

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.

**Rules of Thumb for Chemical Engineers** PHI Learning Pvt. Ltd.

**Starch: Chemistry and Technology, Second Edition** focuses on the chemistry, processes, methodologies, applications, and technologies involved in the processing of starch. The selection first elaborates on the history and future expectation of starch use, economics and future of the starch industry, and the genetics and physiology of starch development. Discussions focus on polysaccharide biosynthesis, nonmutant starch granule polysaccharide composition, cellular developmental gradients, projected future volumes of corn likely to be used by the wet-milling industry, and organization of the corn wet-milling industry. The manuscript also tackles enzymes in the hydrolysis and synthesis of starch, starch oligosaccharides, and molecular structure of starch. The publication examines the organization of starch granules, fractionation of starch, and gelatinization of starch and mechanical properties of

starch pastes. Topics include methods for determining starch gelatinization, solution properties of amylopectin, conformation of amylose in dilute solution, and biological and biochemical facets of starch granule structure. The text also takes a look at photomicrographs of starches, industrial microscopy of starches, and starch and dextrans in prepared adhesives. The selection is a vital reference for researchers interested in the processing of starch.

**Textbook of Chemical Technology Volume-II, 2nd Edition** Cambridge University Press  
**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

**Industrial Catalysis** Springer Science & Business Media

Techniques of Functional Analysis for Differential and Integral Equations describes a variety of powerful and modern tools from mathematical analysis, for graduate study and further research in ordinary differential equations, integral equations and partial differential equations. Knowledge of these techniques is particularly useful as preparation for graduate courses and PhD research in differential equations and numerical analysis, and more specialized topics such as fluid dynamics and control theory. Striking a balance between mathematical depth and accessibility, proofs involving more technical aspects of measure and integration theory are avoided, but clear statements and precise alternative references are given. The work provides many examples and exercises drawn from the literature. - Provides an introduction to mathematical techniques widely used in applied mathematics and needed for advanced research in ordinary and partial differential equations, integral equations, numerical analysis, fluid dynamics and other areas - Establishes the advanced background needed for sophisticated literature review and research in differential equations and integral equations - Suitable for use as a textbook for a two semester graduate level course for M.S. and Ph.D. students in Mathematics and Applied Mathematics

Solutions Manual to Accompany Applied Mathematics and Modeling for Chemical Engineers John Wiley & Sons

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.

*Chemical Reactor Modeling* KHANNA PUBLISHING HOUSE

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.

**Mathematical Modeling of Complex Reaction Systems in the Oil and Gas Industry** Elsevier

This textbook facilitates students’ ability to apply fundamental principles and concepts in classical thermodynamics to solve challenging problems relevant to industry and everyday life. It also introduces the reader to the fundamentals of statistical mechanics, including understanding how the microscopic properties of atoms and molecules, and their associated intermolecular interactions, can be accounted for to calculate various average properties of macroscopic systems. The author emphasizes application of the fundamental principles outlined above to the calculation of a variety of thermodynamic properties, to the estimation of conversion efficiencies for work production by heat interactions, and to the solution of practical thermodynamic problems related to the behavior of non-ideal pure fluids and fluid mixtures, including phase equilibria and chemical reaction equilibria. The book contains detailed solutions to many challenging sample problems in classical thermodynamics and statistical mechanics that will help the reader crystallize the material taught. Class-tested and perfected over 30 years of use by nine-

time Best Teaching Award recipient Professor Daniel Blankschtein of the Department of Chemical Engineering at MIT, the book is ideal for students of Chemical and Mechanical Engineering, Chemistry, and Materials Science, who will benefit greatly from in-depth discussions and pedagogical explanations of key concepts. Distills critical concepts, methods, and applications from leading full-length textbooks, along with the author's own deep understanding of the material taught, into a concise yet rigorous graduate and advanced undergraduate text; Enriches the standard curriculum with succinct, problem-based learning strategies derived from the content of 50 lectures given over the years in the Department of Chemical Engineering at MIT; Reinforces concepts covered with detailed solutions to illuminating and challenging homework problems.

Energy Technology John Wiley & Sons  
Designed as an undergraduate-level textbook in Chemical Engineering, this student-friendly, thoroughly class-room tested book, now in its second edition, continues to provide an in-depth analysis of chemical engineering thermodynamics. The book has been so organized that it gives comprehensive coverage of basic concepts and applications of the laws of thermodynamics in the initial chapters, while the later chapters focus at length on important areas of study falling under the realm of chemical thermodynamics. The reader is thus introduced to a thorough analysis of the fundamental laws of thermodynamics as well as their

applications to practical situations. This is followed by a detailed discussion on relationships among thermodynamic properties and an exhaustive treatment on the thermodynamic properties of solutions. The role of phase equilibrium thermodynamics in design, analysis, and operation of chemical separation methods is also deftly dealt with. Finally, the chemical reaction equilibria are skillfully explained. Besides numerous illustrations, the book contains over 200 worked examples, over 400 exercise problems (all with answers) and several objective-type questions, which enable students to gain an in-depth understanding of the concepts and theory discussed. The book will also be a useful text for students pursuing courses in chemical engineering-related branches such as polymer engineering, petroleum engineering, and safety and environmental engineering. New to This Edition • More Example Problems and Exercise Questions in each chapter • Updated section on Vapour-Liquid Equilibrium in Chapter 8 to highlight the significance of equations of state approach • GATE Questions up to 2012 with answers  
Handbook of Chemical Engineering Calculations McGraw-Hill Professional Publishing

This textbook provides an integral and integrated treatment of industrial-relevant problems for students of both chemistry and chemical engineering. As such, this work combines the four disciplines of chemical technology - chemistry, thermal and mechanical unit operations, chemical reaction engineering and general chemical technology - and is organized into two main parts. The first covers the

fundamentals, as well as the analysis and design of industrial processes, while the second section presents 20 concrete processes, exemplifying the inherent applied nature of chemical technology. These are selected so that they all differ with respect to at least one important aspect, such as the type and design of the reactor, the chemistry involved or the separation process used. As a result, readers will recapitulate, deepen and exercise the chemical and engineering principles and their interplay, as well as being able to apply them to industrial practice. Instructive figures, rules of thumb for swift but reliable estimating of parameters, data of chemical media, and examples utilizing data from industrial processes facilitate and enhance the study process. A small general survey of selected modern trends, such as multifunctional and micro reactors, or new solvents for homogeneous catalysis, such as ionic liquids, point out to the reader that this is not a concluded discipline, but a developing field with many challenges waiting to be solved.

Practical PID Control Elsevier

This book focuses on those functionalities that can provide significant improvements in Proportional-integral-derivative (PID) performance in combination with parameter tuning. In particular, the choice of filter to make the controller proper, the use of a feedforward action and the selection of an anti-windup strategy are addressed. The book gives the reader new methods for improving the performance of the most widely applied form of control in industry.

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