
Separation Process Principles 2nd Edition

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Fundamentals CRC Press

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.

Engineering and Chemical Thermodynamics

Woodhead Publishing

Separation Process Principles with Applications Using Process Simulator, 3rd Edition is the most comprehensive and up-to-date treatment of the major separation operations in the chemical industry. The 3rd edition focuses on using process simulators to design separation processes and prepares readers for professional practice. Completely rewritten to enhance clarity, this third edition provides engineers with a strong understanding of the field. With

the help of an additional co-author, the text presents new information on bioseparations throughout the chapters. A new chapter on mechanical separations covers settling, filtration and centrifugation including mechanical separations in biotechnology and cell lysis. Boxes help highlight fundamental equations. Numerous new examples and exercises are integrated throughout as well.

John Wiley & Sons

Gibbs' Entropic Paradox and Problems of Separation Processes reviews the so-called Gibb's Paradox observed during the mixing of two systems. During the last 150 years, many physicists and specialists in thermodynamics, statistical and quantum mechanics been engaged in the solution of the Gibbs paradox. Many books and journal articles have written on this topic, but a widely accepted answer is still lacking. In this book, the author reviews and analyzes all this data. Based on findings, the book formulates a different approach to this paradox and substantiates it on the basis of physical and statistical principles. The book clearly shows that entropy consists of two parts, static and dynamic. Up to now, entropy has been connected only with the process dynamics. However, the Gibbs paradox is caused by the change in the static component of entropy. Finally, the book includes examples of separation processes and how to optimize them in various fields, including biology, cosmology, crystallography and the social sciences. Provides a precise definition of entropy and allows the formulation of criteria for optimization of separation processes Explains the role of entropy in many processes, facilitating an in-depth analysis and understanding of complicated systems and processes Provides solutions to scientific and applied problems in various scientific

disciplines related to separation processes Elucidates entropy's role in many separation systems
Separation Process Essentials Walter de Gruyter
Bioconjugate Techniques, 3rd Edition, is the essential guide to the modification and cross linking of biomolecules for use in research, diagnostics, and therapeutics. It provides highly detailed information on the chemistry, reagent systems, and practical applications for creating labeled or conjugate molecules. It also describes dozens of reactions, with details on hundreds of commercially available reagents and the use of these reagents for modifying or crosslinking peptides and proteins, sugars and polysaccharides, nucleic acids and oligonucleotides, lipids, and synthetic polymers. Offers a one-stop source for proven methods and protocols for synthesizing bioconjugates in the lab Provides step-by-step presentation makes the book an ideal source for researchers who are less familiar with the synthesis of bioconjugates Features full color illustrations Includes a more extensive introduction into the vast field of bioconjugation and one of the most thorough overviews of immobilization chemistry ever presented

Chemical Process Design and Integration PHI Learning Pvt. Ltd.
Today, membranes and membrane processes are used as efficient tools for the separation of liquid mixtures or gases in the chemical and biomedical industry, in water desalination and wastewater purification. Despite the fact that various membrane processes, like reverse osmosis, are described in great detail in a number of books, processes involving ion-exchange membranes are only described in a fragmented way in scientific journals and patents; even though large industrial applications, like electrodialysis, have been around for over half a century.

Therefore, this book is emphasizing on the most relevant aspects of ion-exchange membranes. This book provides a comprehensive overview of ion-exchange membrane separation processes covering the fundamentals as well as recent developments of the different products and processes and their applications. The audience for this book is heterogeneous, as it includes plant managers and process engineers as well as research scientists and graduate students. The separate chapters are based on different topics. The first chapter describes the relevant Electromembrane processes in a general overview. The second chapter explains thermodynamic and physicochemical fundamentals. The third chapter gives information about ion-exchange membrane preparation techniques, while the fourth and fifth chapter discusses the processes as unit operations giving examples for the design of specific plants. First work on the principles and applications of electrodialysis and related separation processes Presently no other comprehensive work that can serve as both reference work and text book is available Book is suited for teaching students and as source for detailed information

(includes Unit Operations) Elsevier

Chemical Engineering Volume 2 covers the properties of particulate systems, including the character of individual particles and their behaviour in fluids. Sedimentation of particles, both singly and at high concentrations, flow in packed and fluidised beds and filtration are then examined. The latter part of the book deals with separation processes, such as distillation and gas absorption, which illustrate applications of the fundamental principles of mass

transfer introduced in Chemical Engineering Volume 1. In conclusion, several techniques of growing importance - adsorption, ion exchange, chromatographic and membrane separations, and process intensification - are described. A logical progression of chemical engineering concepts, volume 2 builds on fundamental principles contained in Chemical Engineering volume 1 and these volumes are fully cross-referenced Reflects the growth in complexity and stature of chemical engineering over the last few years Supported with further reading at the end of each chapter and graded problems at the end of the book

Centrifugal Separations in Biotechnology Elsevier

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.

Principles, Phenomena and Processes CRC Press

The impending crisis posed by water stress and poor sanitation represents one of greatest human challenges for the 21st century, and membrane technology has emerged as a serious contender to confront the crisis. Yet, whilst there are countless texts on wastewater treatment and on membrane technologies, none address the boron problem and separation processes for boron elimination. Boron Separation Processes fills this gap and provides a unique and single source that highlights the growing and competitive importance of these processes. For the first time, the reader is able to see in one reference work the state-of-the-art research in this rapidly growing field. The book focuses on four main areas: Effect of boron on humans and plants Separation of boron by ion exchange and adsorption processes Separation of boron by membrane processes Simulation and optimization studies for boron separation Provides in one source a state-of-the-art overview of this compelling area Reviews the environmental impact of boron before introducing emerging boron separation processes Includes simulation and optimization studies for boron separation processes Describes boron separation processes applicable to specific sources, such as seawater, geothermal water and wastewater

Principles of Chemical Engineering Processes John Wiley & Sons

The Definitive, Fully Updated Guide to Separation Process Engineering—Now with a Thorough Introduction to Mass Transfer Analysis Separation Process Engineering, Third Edition, is the most comprehensive, accessible guide available on modern separation processes and the fundamentals of mass transfer. Phillip C. Wankat teaches each key concept through detailed, realistic examples using

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

Chemical Engineering Volume 2 Elsevier

Appropriate for one-year transport phenomena (also called transport processes) and separation processes course. First semester covers fluid mechanics, heat and mass transfer; second semester covers separation process principles

(includes unit operations). The title of this Fourth Edition has been changed from Transport Processes and Unit Operations to Transport Processes and Separation Process Principles (Includes Unit Operations). This was done because the term Unit Operations has been largely superseded by the term Separation Processes which better reflects the present modern nomenclature being used. The main objectives and the format of the Fourth Edition remain the same. The sections on momentum transfer have been greatly expanded, especially in the sections on fluidized beds, flow meters, mixing, and non-Newtonian fluids. Material has been added to the chapter on mass transfer. The chapters on absorption, distillation, and liquid-liquid extraction have also been enlarged. More new material has been added to the sections on ion exchange and crystallization. The chapter on membrane separation processes has been greatly expanded especially for gas-membrane theory.

Cambridge University Press

Surveys the selection, design, and operation of most of the industrially important separation processes. Discusses the underlying principles on which the processes are based, and provides illustrative examples of the use of the processes in a modern context. Features thorough treatment of newer separation processes based on membranes, adsorption, chromatography, ion exchange, and chemical complexation. Includes a review of historically important separation processes such as distillation,

absorption, extraction, leaching, and crystallization and considers these techniques in light of recent developments affecting them.

Elementary Principles of Chemical Processes, 3rd Edition 2005 Edition Integrated Media and Study Tools, with Student Workbook Elsevier

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.

Separation Methods in Drug Synthesis and Purification Elsevier

Separation processes—or processes that use physical, chemical, or electrical forces to isolate or concentrate selected constituents of a mixture—are essential to the chemical, petroleum refining, and materials processing industries. In this volume, an expert panel reviews the separation process needs of seven industries and identifies technologies that hold promise for meeting these needs, as

well as key technologies that could enable separations. In addition, the book recommends criteria for the selection of separations research projects for the Department of Energy's Office of Industrial Technology.

Equilibrium-Stage Separation Operations in Chemical Engineering
Prentice Hall

Membrane Separation Principles and Applications: From Material Selection to Mechanisms and Industrial Uses, the latest volume in the Handbooks in Separation Science series, is the first single resource to explore all aspects of this rapidly growing area of study. Membrane technology is now accepted as one of the most effective tools for separation and purification, primarily due to its simple operation. The result has been a proliferation of studies on this topic; however, the relationships between fundamental knowledge and applications are rarely discussed. This book acts as a guideline for those who are interested in exploring membranes at a more progressive level.

Covering methods of pressure driving force, partial pressure driving force, concentration driving force, electrical potential driving force, hybrid processes, and more, this volume is more complete than any other known resource on membrane separations. Covers membrane material selection, membrane fabrication, membrane characterization, separation mechanisms and applications in each chapter. Authored by contributors who are internationally recognized as experts in their respective fields. Organized by the driving force behind each type of membrane separation—a unique approach that more clearly links fundamental principles with their dominant applications.

Separation Process Principles John Wiley & Sons
Incorporated

Market_Desc: · Chemical Engineers · Students of Engineering
Special Features: · A new section on Dimensions and Units to facilitate the use of the SI, AE, and

CGS systems, which permeate applications to separation processes.· Increased emphasis on the many ways used to express the composition of chemical mixtures.· New material on the thermodynamics of difficult mixtures, including electrolytes, polymer solutions, and mixtures of light gases and polar organic compounds.· New sections on the hybrid systems and membrane cascades.· New section on optimal control as a third mode of operation for batch distillation.· New discussion on concentration polarization and fouling. About The Book: Updated to reflect advances in the field, the second edition of this highly respected text examines rate-based and equilibrium-based approaches to separation operations. It describes the fundamentals of all separation operations of commercial interest, and includes theory and application examples in each chapter, as well as over 600 exercises.

Industrial Separation Processes CRC Press

This concise and systematically organized text, now in its second edition, gives a clear insight into various membrane separation processes. It covers the fundamentals as well as the recent developments of different processes along with their industrial applications and the products. It includes the basic principles, operating parameters, membrane hardware, flux equation, transport mechanism, and applications of membrane-based technologies. Membrane separation processes are largely rate-controlled separations which require rate analysis for complete understanding. Moreover, a higher level of mathematical analysis, along with the understanding of mass transfer, is also required. These are amply treated in different chapters of the book to make the students comprehend the membrane separation principles with ease. This

textbook is primarily designed for undergraduate students of chemical engineering, biochemical engineering and biotechnology for the course in membrane separation processes. Besides, the book will also be useful to process engineers and researchers. **KEY FEATURES** • Provides sufficient number of examples of industrial applications related to chemical, metallurgical, biochemical and food processing industries. • Focuses on important biomedical applications of membrane-based technologies such as blood oxygenator, controlled drug delivery, plasmapheresis, and bioartificial organs. • Includes chapter-end short questions and problems to test students' comprehension of the subject. **NEW TO THIS EDITION** • A new section on membrane cleaning is included. Membrane fabrication methods are supplemented with additional information (Chapter 2). • Additional information on silt density index, forward osmosis and sea water desalination (Chapter 3). • Physicochemical parameters affecting nanofiltration, determination of various resistances using resistance in series model and few more industrial applications with additional short questions (Chapter 4). • Membrane cross-linking methods used in pervaporation, factors affecting pervaporation and few more applications (Chapter 9). • Membrane distillation, membrane reactor with different modules, types of membranes and reactions for membrane reactor (Chapter 13).

Separation Technologies for the Industries of the Future Elsevier Separation Process Principles with Applications Using Process Simulator, 4th Edition is the most comprehensive and up-to-date treatment of the major separation operations in the chemical industry. The 4th edition focuses on using process simulators to design separation processes and prepares readers for professional practice. Completely rewritten to enhance clarity, this fourth edition provides engineers with a strong understanding of the field. With the help of an additional co-author, the text presents new information on bioseparations throughout the chapters. A new chapter on mechanical separations covers settling, filtration and centrifugation including

mechanical separations in biotechnology and cell lysis. Boxes help highlight fundamental equations. Numerous new examples and exercises are integrated throughout as well.

Industrial Separation Processes PHI Learning Pvt. Ltd. Centrifugal Separations in Biotechnology, Second Edition, is the only book on the market devoted to centrifugal separation in biotechnology. Key topics covered include a full introduction to centrifugation, sedimentation and separation; detailed coverage of centrifuge types, including batch and semi-batch centrifuges, disk-stack and tubular decanter centrifuges; methods for increasing solids concentration; laboratory and pilot testing of centrifuges; selection and sizing centrifuges; scale-up of equipment, performance prediction and analysis of test results using numerical simulation. Centrifugal Separations in Biotechnology, Second Edition, provides guidance on troubleshooting and optimizing centrifuges, and then goes on to explore the commercial applications of centrifuges in biotechnology. It gives detailed process information and data to assist in the development of particular processes from existing systems. It is of value to professionals in the chemical, bioprocess, and biotech sectors, and all those concerned with bioseparation, bioprocessing, unit-operations and process engineering. Provides a comprehensive guide to centrifuges, their optimal development, and their operation in the biotechnology industry Updated throughout based on developments in industrial applications and advances in our understanding of

centrifugal separations in biotechnology Discusses applications for the separation of proteins, DNA, mitochondria, ribosomes, lysosomes and other cellular elements Includes new sections on use of optimal polymer dosage in waste treatment, new centrifuge designs for applications in algae processing, biopharma, and more
From Material Selection to Mechanisms and Industrial Uses
John Wiley & Sons

Mass transfer along with separation processes is an area that is often quite challenging to master, as most volumes currently available complicate the learning by teaching mass transfer linked with heat transfer, rather than focusing on more relevant techniques. With this thoroughly updated second edition, *Mass Transfer and Separation Processes: Principles and Applications* presents a highly thoughtful and instructive introduction to this sophisticated material by teaching mass transfer and separation processes as unique though related entities. In an ever increasing effort to demystify the subject, with this edition, the author— Avoids more complex separation processes Places a greater emphasis on the art of simplifying assumptions Conveys a greater sense of scale with the inclusion of numerous photos of actual installations Makes the math only as complicated as necessary while reviewing fundamental principles that may have been forgotten The book explores essential principles and reinforces the concepts with classical and contemporary illustrations drawn from the engineering, environmental, and biological sciences. The

theories of heat conduction and transfer are utilized not so much to draw analogies but rather to make fruitful use of existing solutions not seen in other texts on the subject. Both an introductory resource and a reference, this important text serves environmental, biomedical, and engineering professionals, as well as anyone wishing to gain a grasp on this subject and its increasing relevance across a number of fields. It fills a void in traditional chemical engineering literature by providing access to the principles and working practices that allow mass transfer theory to be applied to separation processes.

SEPARATION PROCESS PRINCIPLES, 2ND ED National Academies Press
SEPARATION PROCESS PRINCIPLES, 2ND ED John Wiley & Sons