

# Bioseparations Science And Engineering

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*Bioseparations Science And Engineering* 2022-11-28

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**CANTRELL HUFFMAN**

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## Magnetic Nanomaterials Elsevier

Membrane systems are finding increasing application worldwide in the purification of potable and industrial water, and their design and use is set to grow considerably in years to come. This comprehensive book is written in a practical style with emphasis on process description, key unit operations, plant equipment description, equipment installation, safety and maintenance, process control, plant start-up, operation and troubleshooting. It is supplemented by case studies and useful engineering rules-of-thumb. The author is a chemical engineer with many years experience in the field and his technical knowledge and practical know-how in the water purification industry are summarised succinctly in this volume. This book... \* Will ensure your system design is fit for its purpose \* Informs readers of which membranes to use; why, where and when \* Will help readers to trouble-shoot and improve performance \* Provides case studies help understanding through real-life situations This book... \* Will ensure your system design is fit for its purpose \* Informs readers of which membranes to use; why, where and when \* Will help readers to trouble-shoot and improve performance \* Provides case studies help understanding through real-life situations

## Bioseparations Science and Engineering Elsevier

This systematically organized and well-balanced book compresses within the covers of a single volume the theoretical principles and techniques involved in bio-separations, also called downstream processing. These techniques are derived from a range of subjects, for example, physical chemistry, analytical chemistry, bio-chemistry, biological science and chemical engineering. Organized in its 15 chapters, the text covers in the first few chapters topics related to chemical engineering unit operations such as filtration, centrifugation, adsorption, extraction and membrane separation as applied to bioseparations. The use of chromatography as practiced at laboratory as well as industrial scale operation and related techniques such as gel filtration, affinity and pseudoaffinity chromatography, ion-exchange chromatography, electrophoresis and related methods have been discussed. The important applications of these techniques have also been highlighted.

## Bioseparations Science and Engineering Springer

The rapid growth of industries has resulted in the generation of high volume of solid and liquid waste. Today, there is a need of Clean and Green technology for the sustainable waste management. Biochemical and Environmental Bioprocessing: Challenges and Developments explore the State-of-art green technologies to manage the waste and to recover value added products. Microbes play an important role in the bioremediation. Bioprocess engineering an interdisciplinary connects the Science and Technology. The bioconversion and bioremediation is essentially required for the management of various hazardous substances in the environment. This book will give an intensive knowledge on the application of Biochemical and Bioprocess technologies for the eco-friendly management of pollution. This book serves as a fundamental to the students, researchers, academicians and Engineers working in the area of Environmental Bioremediation and in the exploration of various bioproducts from waste. Features Reviews various biological methods for the treatment of effluents from Industries by using biomass and biopolymers. Highlights the applications of various bioreactors like Anaerobic Sequential Batch Reactor, Continuously stirred anaerobic digester, Up-flow anaerobic sludge blanket reactor, Fluidized and expanded bed reactors. Presents the cultivation of algae in Open Pond, Closed loop System, and Photo-bioreactors for bioenergy production. Discusses the intensified and integrated biorefinery approach by Microwave Irradiation, Pyrolysis, Acoustic cavitation, Hydrodynamic cavitation, Electron beam irradiation, High pressure Autoclave reactor, Steam explosion and photochemical oxidation. Outlines the usage of microbial fuel cell (MFC) for the production bioelectricity generation in different modules Tubular MFC, Stacked MFC, Separate electrode

modules Cutting edge research of synthesis of biogenic nanoparticles and Pigments by green route for the health care and environment management.

## Process Scale Bioseparations for the Biopharmaceutical Industry CRC Press

It is generally recognized that the commercial success of biotechnology products is highly dependent on the successful development and application of high-powered separation and purification methods. In this practical and authoritative handbook, the separation of proteins, nucleic acids, and oligonucleotides from biological matrices is covered from analytical to process scales. Also included in a chapter on the separation of monoclonal antibodies, which have found numerous uses as therapeutic and diagnostic agents. Analytical techniques include an interesting montage of chromatographic methods, capillary electrophoresis, isoelectric focusing, and mass spectrometry. Among separation and purification methods, liquid-liquid distribution, displacement chromatography, expanded bed adsorption, membrane chromatography, and simulated moving bed chromatography are covered at length. Regulatory and economic considerations are addressed, as are plant and process equipment and engineering process control. A chapter on future developments highlights the application of DNA chip arrays as well as evolving methodologies for a large number of drugs that are under development for treatment of cancer, AIDS, rheumatoid arthritis, and Alzheimer's disease. Handbook of Bioseparations serves as an essential reference and guidebook for separation scientists working in the pharmaceutical and biotechnology industries, academia, and government laboratories. Key Features \* Covers bioseparations of proteins, nucleic acids, and monoclonal antibodies \* Encompasses both analytical and process-scale methods \* Elucidates the importance of engineering process control \* Details selection of plant and process equipment \* Addresses economic considerations \* Discusses future developments

## Bioprocessing for Value-Added Products from Renewable Resources John Wiley & Sons

Emerging Membrane Technology for Sustainable Water Treatment provides the latest information on the impending crisis posed by water stress and poor sanitation, a timely issue that is one of the greatest human challenges of the 21st century. The book also discusses the use of membrane technology, a serious contender that can be used to confront the crisis on a global scale, along with its specific uses as a solution to this escalating problem. Provides a unique source on membrane technology and its application for water treatment Focuses on technologies designed for the treatment of seawater and brackish water Highlights the most economically and environmentally friendly membrane technologies Lists various technologies and emphasizes their link to renewable energy, energy efficiency, nanotechnology, reuse, and recycle

## Liquid Membranes Elsevier

Edited to avoid duplication and favor comprehensiveness, 20 contributors detail the recovery, separation, and purification operations of bioprocess technology. Individual chapters in this classic yet still highly relevant work emphasize concepts that are becoming more and more important when applied to the large scale versions of techniques that are considered well established. Aside from fully discussing processes, Separation Processes in Biotechnology includes sections on concentration separation and operation, purification operations, and product release and recovery. It also discusses plant operation and equipment and delves into economic considerations

## Separation Process Principles Newnes

This manual contains necessary and useful information and data in an easily accessible format relating to the use of membranes. Membranes are among the most important engineering components in use today, and each year more and more effective uses for membrane technologies are found - for example: water purification, industrial effluent treatment, solvent dehydration by per-vaporation, recovery of volatile organic compounds, protein recovery, bioseparations and many others. The pace of change in the membrane industry has been accelerating rapidly in recent years, occasioned in part by the demand of end-users, but also as a result of the investment in R&D by manufacturers. To reflect these changes the author has obtained the latest information

from some of the leading suppliers in the business. In one complete volume this unique handbook gives practical guidance to using selected membrane processes in individual industries while also providing a useful guide to equipment selection and usage.

## Current Trends and Future Developments on (Bio-) Membranes Wiley-Interscience

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

## Bioseparation John Wiley & Sons

Other unique features include basic information about bioproducts and engineering analysis and a chapter with bioseparations laboratory exercises. Bioseparations Science and Engineering is ideal for students and professionals alike."--BOOK JACKET.

## Industrial Bioseparations Oxford University Press, USA

Timely and comprehensive, this book presents recent advances in magnetic nanomaterials research, covering the latest developments, including the design and preparation of magnetic nanoparticles, their physical and chemical properties as well as their applications in different fields, including biomedicine, magnetic energy storage, wave-absorbing and water remediation. By allowing researchers to get to the forefront developments related to magnetic nanomaterials in various disciplines, this is invaluable reading for the nano, magnetic, energy, medical, and environmental communities.

## Engineering Processes for Bioseparations Butterworth-Heinemann

An all-in-one practical guide on how to efficiently use chromatographic separation methods Based on a training course that teaches the theoretical as well as practical aspects of protein

bioseparation to bioprocess professionals, this fully updated and revised new edition offers comprehensive coverage of continuous chromatography and provides readers with many relevant examples from the biopharmaceutical industry. Divided into two large parts, *Protein Chromatography: Process Development and Scale-Up, Second Edition* presents all the necessary knowledge for effective process development in chromatographic bioseparation, both on small and large scale. The first part introduces chromatographic theory, including process design principles, to enable the reader to rationalize the set-up of a bioseparation process. The second part illustrates by way of case studies and sample protocols how the theory learned in the first part may be applied to real-life problems. Chapters look at: Downstream Processing of Biotechnology Products; Chromatography Media; Laboratory and Process Columns and Equipment; Adsorption Equilibrium; Rate Processes; and Dynamics of Chromatography Columns. The book closes with chapters on: Effects of Dispersion and Rate Processes on Column Performance; Gradient Elution Chromatography; and Chromatographic Column Design and Optimization. -Presents the most pertinent examples from the biopharmaceutical industry, including monoclonal antibodies - Provides an overview of the field along with design tools and examples illustrating the advantages of continuous processing in biopharmaceutical productions -Focuses on process development and large-scale bioseparation tasks, making it an ideal guide for the professional bioengineer in the biotech and pharma industries -Offers field-tested information based on decades of training courses for biotech and chemical engineers in Europe and the U.S. *Protein Chromatography: Process Development and Scale-Up, Second Edition* will appeal to biotechnologists, analytical chemists, chromatographers, chemical engineers, pharmaceutical industry, biotechnological industry, and biochemists. Oxford University Press

Unlike extensive major reference works or handbooks, *Chemical Engineering: Trends and Developments* provides readers with a ready-reference to latest techniques in selected areas of chemical engineering where research is and will be focused in the future. These areas are: bioseparations; particle science and design; nanotechnology; and reaction engineering. The aim of the book is to provide academic and R&D researchers with an overview of the main areas of technical development and how these techniques can be applied. Each chapter focuses on a technique, plus a selection of applications or examples of where the technique could be applied. *31st European Symposium on Computer Aided Process Engineering* Elsevier

The use of biotechnology in chemical synthesis offers up numerous advantages to the engineer in the process industries, but it also presents a number of fundamental challenges and difficulties

which impinge directly on separation process requirements. The use of biochemical separations has grown significantly during the past decade, and is especially used in process industries such as healthcare and food processing. However it is becoming increasingly more important in areas such as recycling and waste-water treatment and as industry shifts towards cleaner processes biochemical separations will continue to grow. The two main objectives of this book are to focus on the application of existing separation process techniques to the recovery and purification of biologically derived products and to examine the state of knowledge of new techniques which have future potential. Within these objectives the complexities and breadth of problems associated with biological separations are discussed, specific engineering techniques are featured and their adaptation to biochemical separations are highlighted.

**Bioseparation Process Science** PHI Learning Pvt. Ltd.

Preceded by: *Bioseparations science and engineering / Roger G. Harrison ... [et al.]. c2003.*

*Biochemical and Environmental Bioprocessing* Elsevier

The 31st European Symposium on Computer Aided Process Engineering: ESCAPE-31, Volume 50 contains the papers presented at the 31st European Symposium of Computer Aided Process Engineering (ESCAPE) event held in Istanbul, Turkey. It is a valuable resource for chemical engineers, chemical process engineers, researchers in industry and academia, students and consultants in the chemical industries. Presents findings and discussions from the 31st European Symposium of Computer Aided Process Engineering (ESCAPE) event

**Comprehensive Membrane Science and Engineering** Elsevier

Bioseparations engineering deals with the scientific and engineering principles involved in large-scale separation and purification of biological products. It is a key component of most chemical engineering/biotechnology/bioprocess engineering programmes. This book discusses the underlying principles of bioseparations engineering written from the perspective of an undergraduate course. It covers membrane based bioseparations in much more detail than some of the other books on bioseparations engineering. Based largely on the lecture notes the author developed to teach the course, this book is especially suitable for use as an undergraduate level textbook, as most other textbooks are targeted at graduate students.

*Fermentation Processes Engineering in the Food Industry* Bioseparations Science and Engineering Thirty-one distinguished contributors from the major bioprocess engineering firms, and such biotechnology and pharmaceutical industry leaders as Hybritech, Celltech, Merck, and Lilly focus on the ... type of equipment required in a bib processing plant - including fermenters, centrifuges,

chromatographic columns, synthesizing and processing equipment, and such support equipment as water systems, steam generators, waste systems, air conditioning, and more ... system components - such as the pumps, filters, and valves that are ubiquitous in bioprocess facilities and not limited to certain types of equipment ... design issues - covering the planning and design of the entire facility and the requirements of the containment and validation of the process.

**Emerging Membrane Technology for Sustainable Water Treatment** CRC Press

Geometric dimensioning and tolerancing (GD&T) has become accepted around the world as the international symbolic language that allows engineers and machinists to use engineering drawings to communicate from the design stage through manufacturing and inspection. Its advantages are uniformity in design practice, ensured interchangeability, consistent interpretation, and maximum tolerance allocation. With GD&T, design requirements can be specified explicitly and the latest gaging techniques can be accommodated, contributing to higher productivity and less rework and scrap. Deductively organized, this book is a complete on-the-job reference that provides a thorough understanding to the complex ASME Y14.5M-1994 Dimensioning and Tolerancing standard. Uses a building-block approach with examples (some dimensioned and toleranced in inches and some in millimeters) to illustrate each concept. Reinforces the explanations with end-of-chapter self evaluation exercises (the answers to all questions and problems are contained in the back of the book). Includes over one hundred drawings that illustrate concepts under discussion. Provides the information needed to become conversant in the techniques of GD&T and how to smoothly integrate this knowledge into engineering design and modern inspection systems.

**Metabolic Engineering** Wiley

Synthetic materials are a tremendous potential resource for treating human disease. For the rational design of many of these biomaterials it is necessary to have an understanding of polymer chemistry and polymer physics. Equally important to those two fields is a quantitative understanding of the principles that govern rates of drug transport, reaction, and disappearance in physiological and pathological situations. This book is a synthesis of these principles, providing a working foundation for those in the field of drug delivery. It covers advanced drug delivery and contemporary biomaterials.

*Principles of Bioseparations Engineering* John Wiley & Sons

With the advent of modern tools of molecular biology and genetic engineering and new skills in metabolic engineering and synthetic biology, fermentation technology for industrial applications has developed enormously in recent years. Reflecting these advances, *Fermentation Processes Engineering in the Food Industry* explores the state of the art of