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# Industrial Membrane Separation Technology 1st Edition

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Separation of Functional Molecules in Food by Membrane Technology  
Membrane and Desalination Technologies  
Membrane Technology  
Membrane Technology  
Nano and Micro Engineered Membrane Technology  
Applications of Membrane Technology for Food Processing Industries  
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*Industrial Membrane Separation  
Technology 1st Edition*

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**NOELLE DECKER**

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**Separation of Functional Molecules in Food by Membrane Technology** CRC Press

The contamination of environment and water resources by Selenium (Se) and its oxyanions from various sources are emerging contaminants of significant health and environmental concern. The primary sources include agricultural drainage water, mine drainage, residues from fossil fuels, thermoelectric power plants, oil refineries, and metal ores. Various methods and technologies have been developed which focus on the treatment of selenium-containing waters and wastewater. High concentrations of selenium in water cause various adverse impact to human health, such as carcinogenic, genotoxic, and cytotoxic effects. But in the lower concentrations, it is a useful constituent of the biological system. The range between toxicity and deficiency of selenium is minimal (40 to 400 µg per day), due to its dual nature. Selenium Contamination in Water contains the latest status and information on selenium's origin, its chemistry and its toxicity to humans. The book represents a comprehensive and advanced reference book for students, researchers, practitioners, and policymakers in working in the field of metalloids, in particular selenium. A special emphasis is given on its geological distribution, monitoring techniques, and remedial technologies. As such, the authors critically analyze the various techniques used for the monitoring and removal of selenium from water. Featuring chapters arranged according to the major themes of the latest research, with specific case-studies from industrial experiences of selenium detection and removal, Selenium Contamination in Water will be particularly valued by researchers, practitioners, and policymakers in working in the field of metalloids including selenium.

**Membrane and Desalination Technologies** Butterworth-Heinemann

The chapters of this book are based upon lectures presented at the NATO Advanced Study Institute on Membrane Processes in

Separation and Purification (March 21 - April 2, 1993, Curia, Portugal), organized as a successor and update to a similar Institute that took place 10 years ago (p.M.Bungay, H.K. Lonsdale, M.N. de Pinho (Eds.): Synthetic Membranes: Science, Engineering and Applications, NATO ASI Series, Reidel, Dordrecht, 1986). The decade between the two NATO Institutes witnesses the transition from individually researched membrane processes to an applied and established membrane separation technology, as is reflected by the contents of the corresponding proceeding volumes. By and large, the first volume presents itself as a textbook on membrane processes, still valid, while the present volume focuses on areas of separation need as amenable to membrane processing: Biotechnology and Environmental Technology. Accordingly, the contributions to this volume are grouped into "Membranes in Biotechnology" (11 papers), "Membranes in Environmental Technology" (6 papers), and "New Concepts" (4 papers). This is followed by one contribution each on "Energy Requirements" and "Education", i.e., membrane processes within an academic curriculum. The book thus amounts to a state of the art of applied membrane processing and may well augment the more fundamental approach of its predecessor.

**Membrane Technology** John Wiley & Sons

The book explains fundamental and advanced topics related to the field of membrane science including extensive coverage of material selection, preparation, characterization and applications of various membranes. Explores both preparation and wide range of applications for all possible membranes, contains an exclusive chapter on functionalized membranes and incorporation of stimuli responsive membranes in each type and includes exercise problems after each chapter It also discusses new membrane operations as membrane reactors and membrane contactors

**Membrane Technology** John Wiley & Sons

Membrane technology is a rapidly developing area, with key growth accross the process sector, including biotech separation and biomedical applications (e.g. haemodialysis, artificial lungs), through to large scale industrial applications in the water and waste-water processing and the food and drink industries. As processes mature, and the cost of membranes continues to

dramatically reduce, so their applications and use are set to expand. Process engineers need access to the latest information in this area to assist with their daily work and to help to develop and apply new and ever more efficient liquid processing solutions. This book covers the latest technologies and applications, with contributions from leading figures in the field. Throughout, the emphasis is on delivering solutions to practitioners. Real world case studies and data from leading organizations -- including Cargill, Lilly, Microbach, ITT -- mean this book delivers the latest solutions as well as a critical working reference to filtration and separation professionals. - Covers the latest technologies and applications in this fast moving bioprocessing sector - Presents a wide range of case studies that ensure readers benefit from the hard-won experience of others, saving time, money and effort - World class author team headed up by the Chair of Chemical Engineering at Oxford University, UK and the VP of Plant Operations and Process Technology at Cargill Corp, the food services company and largest privately owned company in the US **Nano and Micro Engineered Membrane Technology** Elsevier 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).

#### **Applications of Membrane Technology for Food Processing Industries** Elsevier

The Handbook of Membrane Separations: Chemical, Pharmaceutical, Food, and Biotechnological Applications, Second Edition provides detailed information on membrane separation technologies from an international team of experts. The handbook fills an important gap in the current literature by providing a comprehensive discussion of membrane application

#### *MEMBRANE SEPARATION PROCESSES* CRC Press

The field of membrane separation technology is presently in a state of rapid growth and innovation. Many different membrane separation processes have been developed during the past half century and new processes are constantly emerging from academic, industrial, and governmental laboratories. While new membrane separation processes are being conceived with remarkable frequency, existing processes are also being constantly improved in order to enhance their economic competitiveness. Significant improvements are currently being made in many aspects of membrane separation technology: in the development of new membrane materials with higher selectivity and/or permeability, in the fabrication methods for high-flux asymmetric or composite membranes, in membrane module construction and in process design. Membrane separation

technology is presently being used in an impressive variety of applications and has generated businesses totalling over one billion U.S. dollars annually. The main objective of this book is to present the principles and applications of a variety of membrane separation processes from the unique perspectives of investigators who have made important contributions to their fields. Another objective is to provide the reader with an authoritative resource on various aspects of this rapidly growing technology. The text can be used by someone who wishes to learn about a general area of application as well as by the knowledgeable person seeking more detailed information. *Industrial Membrane Separation Technology* National Academies Press

*Advances in Membrane Technologies for Water Treatment: Materials, Processes and Applications* provides a detailed overview of advanced water treatment methods involving membranes, which are increasingly seen as effective replacements for a range of conventional water treatment methods. The text begins with reviews of novel membrane materials and advances in membrane operations, then examines the processes involved with improving membrane performance. Final chapters cover the application of membrane technologies for use in water treatment, with detailed discussions on municipal wastewater and reuse in the textile and paper industries. - Provides a detailed overview of advanced water treatment methods involving membranes - Coverage includes advancements in membrane materials, improvement in membrane performance, and their applications in water treatment - Discusses the use of membrane technologies in the production of drinking water, desalination, wastewater treatment, and recovery

#### *Selenium Contamination in Water* Elsevier

This first book to offer a practical overview of zeolites and their commercial applications provides a practical examination of zeolites in three capacities. Edited by a globally recognized and acclaimed leader in the field with contributions from major industry experts, this handbook and ready reference introduces such novel separators as zeolite membranes and mixed matrix membranes. The first part of the book discusses the history and chemistry of zeolites, while the second section focuses on separation processes. The third and final section treats zeolites in

the field of catalysis. The three sections are unified by an examination of how the unique properties of zeolites allow them to function in different capacities as an adsorbent, a membrane and as a catalyst, while also discussing their impact within the industry.

#### *Advances in Membrane Technologies* CRC Press

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.

#### **Membrane Separation Principles and Applications** CRC Press

A valuable presentation of theoretical and practical information in the area of liquid-solid filtration. The development of theoretical models is highlighted with practical design data and problem-related examples. Modern trends, e.g., membrane systems, are reported together with the fundamental aspects of particulate technology. The increasing interest in pollution control and environmental protection provides an expansive market for this book. Chemical engineers, chemists, physicists, water treatment/sewage engineers, civil engineers and all those concerned with filtration and pollution will find this book of tremendous value and practical use.

#### *Basic Principles of Membrane Technology* Elsevier

Membrane technologies are currently the most effective and sustainable methods utilized in diversified water filtration, wastewater treatment, as well as industrial and sustainable energy applications. This book covers essential subsections of membrane separation and bioseparation processes from the perspectives of technical innovation, novelty, and sustainability. The book offers a comprehensive overview of the latest improvements and concerns with respect to membrane fouling remediation techniques, issues of bioincompatibility for biomedical applications, and various subareas of membrane separation processes, which will be an efficient resource for

engineers.

**Membrane Technology and Applications** Elsevier

*Membrane-Based Hybrid Processes for Wastewater Treatment* analyzes and discusses the potential of membrane-based hybrid processes for the treatment of complex industrial wastewater, the recovery of valuable compounds, and water reutilization. In addition, recent and future trends in membrane technology are highlighted. Industrial wastewater contains a large variety of compounds, such as heavy metals, salts and nutrients, which makes its treatment challenging. Thus, the use of conventional water treatment methods is not always effective. Membrane-based hybrid processes have emerged as a promising technology to treat complex industrial wastewater. - Discusses the properties, mechanisms, advantages, limitations and promising solutions of different types of membrane technologies - Addresses the optimization of process parameters - Describes the performance of different membranes - Presents the potential of Nanotechnology to improve the treatment efficiency of wastewater treatment plants (WWTPs) - Covers the application of membrane and membrane-based hybrid treatment technologies for wastewater treatment - Includes forward osmosis, electrodialysis, and diffusion dialysis - Considers hybrid membrane systems expanded to cover zero liquid discharge, salt recovery, and removal of trace contaminants

*Advances in Functional Separation Membranes* Elsevier

An eye-opening exploration of membrane contactors from a group of industry leaders In *Membrane Contactor Technology: Water Treatment, Food Processing, Gas Separation, and Carbon Capture*, an expert team of researchers delivers an up-to-date and insightful explanation of membrane contactor technology, including transport phenomena, design aspects, and diverse process applications. The book also includes explorations of membrane synthesis, process, and module design, as well as rarely discussed process modeling and simulation techniques. The authors discuss the technical and economic aspects of this increasingly important technology and examine the geometry, flow, energy and mass transport, and design aspects of membrane contactor modules. They also cover a wide range of application opportunities for this technology, from the materials sciences to process engineering. *Membrane Contactor Technology* also includes: A thorough introduction to the membrane contactor

extraction process, including dispersion-free membrane extraction processes and supported liquid membrane processes Comprehensive explorations of membrane transport theory, including discussions of diffusional mass and heat transfer modeling, as well as numerical modeling In-depth examinations of module configuration and geometry, including design and flow configuration Practical discussions of modes of operation, including membrane distillation, osmotic evaporation, and forward osmosis Perfect for process engineers, biotechnologists, water chemists, and membrane scientists, *Membrane Contactor Technology* also belongs in the libraries of chemical engineers, polymer chemists, and chemists working in the environmental industry.

**Thermal Induced Membrane Separation Processes** Elsevier

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*Membrane Technologies and Applications* CRC Press

Nanotechnology has been established in membrane technology for decades. In this book, comprehensive coverage is given to nanotechnology applications in synthetic membrane processes, which are used in different fields such as water treatment,

separation of gases, the food industry, military use, drug delivery, air filtration, and green chemistry. Nanomaterials such as carbon nanotubes, nanoparticles, and dendrimers are contributing to the development of more efficient and cost-effective water filtration processes. Gas separation and carbon capture can be significantly improved in flue gas applications. Nanoporous membrane systems engineered to mimic natural filtration systems are being actively developed for use in smart implantable drug delivery systems, bio artificial organs, and other novel nano-enabled medical devices. The microscopic structure of nanoporous ceramic membranes, mainly focusing on zeolite materials, as well as the energy-saving effect of membrane separation, contribute to various chemical synthesis processes. In the food industry, nanotechnology has the potential to create new tools for pathogen detection and packaging. For each application, nanotechnology is mostly used to make composite membranes, and the book provides a detailed look at the mechanisms by which the composite membrane works in each application area.

**Membrane Technology and Engineering for Water Purification** CRC Press

Membrane technology has received great popularity in many industrial sectors and significantly enhanced our abilities to restructure production processes, protect the environment and public health, and provide competitive strategies for separation and purification. However, the need for sustainable development has imposed new targets for this technology, such as more effective/precise separation and stricter admissible limits for the discharge of contaminants into the environment. Focusing on hot topic environment-related applications, *Advances in Functional Separation Membranes* introduces emerging membranes nanoengineered with attractive functions and discusses their key features. It also provides a comprehensive guide to various design strategies for such functional membranes, making it useful reference for environmental chemists and membrane engineers alike.

**Liquid Membranes** Academic Press

*Synthetic Membranes and Membrane Separation Processes* addresses both fundamental and practical aspects of the subject. Topics discussed in the book cover major industrial membrane separation processes, including reverse osmosis, ultrafiltration, microfiltration, membrane gas and vapor separation, and



pervaporation. Membrane materials, membrane preparation, membrane structure, membrane transport, membrane module and separation design, and applications are discussed for each separation process. Many problem-solving examples are included to help readers understand the fundamental concepts of the theory behind the processes. The book will benefit practitioners and students in chemical engineering, environmental engineering, and materials science.

[Advances in Membrane Technologies for Water Treatment](#)  
Woodhead Publishing

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  
*Membrane Technology* Springer Nature  
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.

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