SECOND EDITION

Handbook of Membrane Separations

Chemical, Pharmaceutical, Food, and Biotechnological Applications



Edited by

Anil K. Pabby Syed S.H. Rizvi Ana Maria Sastre



Anil K. Pabby

Handbook of Membrane Separations Anil K. Pabby, Syed S.H. Rizvi, Ana-Maria Sastre, 2015-04-09 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 Handbook of Membrane Separations Anil K. Pabby, S. Ranil Wickramasinghe, Ana-Maria Sastre, 2023-12-22 The third edition of the Handbook of Membrane Separations Chemical Pharmaceutical Food and Biotechnological Applications provides a comprehensive discussion of membrane applications Fully updated to include the latest advancements in membrane science and technology it is a one of its kind overview of the existing literature This fully illustrated handbook is written by experts and professionals in membrane applications from around the world Key Features Includes entirely new chapters on organic solvent resistant nanofiltration membrane condensers membrane reactors in hydrogen production membrane materials for haemodialysis and integrated membrane distillation Covers the full spectrum of membrane technology and its advancements Explores membrane applications in a range of fields from biotechnological and food processing to industrial waste management and environmental engineering This book will appeal to both newcomers to membrane science as well as engineers and scientists looking to expand their knowledge on upcoming advancements in the field Handbook of Membrane Separations Anil K. Pabby, 2008 The Handbook of Membrane Separations Chemical Pharmaceutical and Biotechnological Applications provides detailed information on membrane separation technologies as they have evolved over the past decades To provide a basic understanding of membrane technology this book documents the developments dealing with these technologies It explores chemical pharmaceutical and biotechnological applications of membrane processes ranging from selective separation to solvent and material recovery This text also presents in depth knowledge of membrane separation mechanisms transport models membrane permeability computations membrane types and modules as well as membrane reactors to Conventional Food Processing 2nd Edition Andrew Proctor, 2018-01-17 This updated edition provides a review of the current major technologies that reduce energy cost and reduce environmental impact while maintaining food safety and Application of Low Cost Ceramic Membranes in Wastewater Treatment Sibdas Bandyopadhyay, 2025-05-01 quality This book reviews the status of developing tailor made low cost membranes and membrane based separation processes for applications in wastewater treatment It also presents an overview of industry specific case studies upholding the waste to resource strategy for utilization of low cost ceramic membranes in industrial wastewater treatment This book highlights methods results and examples demonstrating that low cost ceramic membranes possess similar features and advantages comparable to the commercially available ceramic membranes thereby minimizing the prohibitive cost of their usage in

wastewater treatment Thus the readers who are looking for more economical alternatives for wastewater treatment can be introduced with the cheaper membrane materials It also discusses the selection and method of application of such membranes in the treatment processes This book can serve as a valuable reference for researchers and professionals interested in wastewater treatment and allied fields Handbook of Membrane Separations Anil Kumar Pabby, Syed S.H. Rizvi, Ana Maria Sastre Reguena, 2008-07-07 The Handbook of Membrane Separations Chemical Pharmaceutical and Biotechnological Applications provides detailed information on membrane separation technologies as they have evolved over the past decades To provide a basic understanding of membrane technology this book documents the developments dealing with these technologies It explo Industrial Separation Processes André B. de Haan, H. Burak Eral, Boelo Schuur, 2020-07-06 Separation processes on an industrial scale account for well over half of the capital and operating costs in the chemical industry Knowledge of these processes is key for every student of chemical or process engineering This book is ideally suited to university teaching thanks to its wealth of exercises and solutions. The second edition boasts an even greater number of applied examples and case studies as well as references for further reading **New Generation Studies in Electromembrane Extraction** Canan ONAC, 2020-10-08 There is a great interest in electro membrane extraction technique and the number of research papers is increasing exponentially. This book provides a comprehensive and detailed summary a general overview on the electro membrane EME system and working principle of this technique The electro membrane extraction is a combination of liquid phase micro extraction and more traditional electro extraction systems It was first designed to prepare samples for the liquid chromatography capillary electrophoresis and mass spectrometry methods but the field of use is not limited to these methods The available studies in the literature of EME focus on technical development and applications of electro membrane and discuss the future of this technology critically So this book emphasize basic and theory of electro membrane technique and use of supported liquid membrane SLM in electro membrane applications and working parameters of this technique as a potential extraction time sample solution acceptor phase and pH stirring and other parameters. One of major of this book to reveal out an answer to why researchers prefer to use polymer inclusion membrane PIM rather than supported liquid membrane in EME applications in recent years The advantages of polymer inclusion membrane and supported liquid membrane over each other in electro membrane applications were compared EME studies base on polymer inclusion membrane on stability and permeability are discussed and detailed according to the various parameters Another important issue addressed in this book is the use of nanomaterials in membrane process and new generation membranes in electro membrane studies New generation nano materials are among the most important additives affecting the membrane performance in the production of nano strong membranes Due to their extraordinary features this book provides the latest carbon nanotubes CNT studies were used as the additive of CNT in PIM and electro membrane extraction process and presents new application fields This presents many facilities and possibilities to develop this

technology in an advanced level Hollow Fiber Membrane Contactors Anil K. Pabby, S. Ranil Wickramasinghe, Kamalesh K. Sirkar, Ana-Maria Sastre, 2020-11-23 This book on hollow fiber contractors presents an up to date compilation of the latest developments and milestones in this membrane technology Hollow Fiber Membrane Contactors Module Fabrication Design and Operation and Potential Applications provides a comprehensive discussion of hollow fiber membrane applications including a few case studies in biotechnology chemical food and nuclear engineering The chapters in this book have been classified using the following based on different ways of contacting fluids with each other Gas liquid contacting Liquid liquid contacting Supported liquid membrane Supported gas membrane Fluid fluid contacting Other features include Discusses using non dispersive solvent extraction hollow fiber strip dispersion hollow fiber supported liquid membranes and role of process intensification in integrated use of these processes Provides technical and economic perspectives with several case studies related to specific scenarios Demonstrates module fabrication design operation and maintenance of hollow fiber contactors for different applications and performance Presents discussion on newer concepts like membrane emulsification membrane nanoprecipitation membrane crystallization and membrane condenser Special focus on emerging areas such as the use of hollow fiber contactor in back end of nuclear fuel cycle membrane distillation dehumidification of air and gas absorption and stripping Discusses theoretical analysis including computational modeling of different hollow fiber membrane processes and presents emphasis on newly developed area of hollow fiber membrane based analytical techniques Presents discussion on upcoming area dealing with hollow fiber contactors based technology in fermentation and enzymatic transformation and in chiral separations This book is equally suited for newcomers to the field as well as for engineers and scientists that have basic knowledge in this field but are interested in obtaining more information about specific future applications Advances in Carbon Nanostructures Adrián Silva, Sónia Carabineiro, 2016-10-05 Carbon atoms have the amazing ability to bond in remarkable different manners that can assume distinct astonishing dimensional arrangements from which absolutely diverse and interesting nanostructured carbon materials are obtained This book aims to cover the most recent advances in i Graphene and derivatives including graphene based magnetic composites membranes wafer devices and nanofibers for several applications as well as some particular properties such as light emission from graphene ii Carbon nanotubes heaters and fibers for reinforcement of cement and diamond based thin films and iii Nanofluids consisting of both graphene and carbon nanotubes apart from reporting some important case studies dealing with carbon nanostructures and their use in sensors coatings or electromagnetic wave absorbers **Handbook Of Porous Materials:** Synthesis, Properties, Modeling And Key Applications (In 4 Volumes), 2020-10-20 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 artificing 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 electrolysers 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 Membrane Technology Sundergopal Sridhar, 2018-09-03 Contributed by multiple experts the book covers the scientific and engineering aspects of membrane processes and systems It aims to cover basic concepts of novel membrane processes including membrane bioreactors microbial fuel cell forward osmosis electro dialysis and membrane contactors Maintains a pragmatic approach involving design operation and cost analysis of pilot plants as well as Continuous Biopharmaceutical Processes David Pfister, Lucrèce Nicoud, Massimo scaled up counterparts Morbidelli, 2018-10-11 Provides a coherent and critical view on the potential benefits of various continuous processes in the biopharmaceutical industry Industrial Chemical Separation Timothy C. Frank, Bruce S. Holden, 2023-08-07 A fresh new treatment written by industry insiders this work gives readers a remarkably clear view into the world of chemical separation The authors review distillation extraction adsorption crystallization and the use of membranes providing historical perspective explaining key features and offering insights from personal experience The book is for engineers and chemists with current or future responsibility for chemical separation on a commercial scale in its design operation or improvement or for anyone wanting to learn more about chemical separation from an industrial point of view The result is a compelling survey of popular technologies and the profession one that brings the art and craft of chemical separation to life Ever wonder how popular separation technologies came about how a particular process functions or how mass transfer units differ from theoretical stages Or perhaps you want some pointers on how to begin solving a separation problem You will find clear explanations and valuable insights into these and other aspects of industrial practice in this refreshing new survey

Membrane Technology in Separation Science Mihir Purkait,Randeep Singh,2018-02-19 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 **Imprinted Polymeric Membranes** Laura Donato, 2023-07-04 Higly efficient separation tools are increasingly required for satisfying the necessity of the modern society In this context for achieving optimized separation and purification of targeted compounds the typical features of the imprinting technology and membrane science for developing the so called imprinted membranes have been exploited Imprinted membranes are smart systems endowing selective recognition properties towards specific molecules and ions that exhibit better performance with respect to the traditional separation techniques The aim of this monography is to give a contribution in promoting the knowledge on the current research trend about this topic Starting from the concept of the molecular recognition the book introduces the reader to the fascinating world of the imprinting technology and membrane based processes up to discussing the development of imprinted polymers as well as imprinted membranes which represent their special format The different imprinting strategies as well as the theory and mechanisms of the separation are also explained Furthermore the application of molecularly imprinted polymeric membranes in different areas for the selective recognition of drugs active pharmaceutical ingredients pesticides other toxic compounds and proteins is discussed The attention is also devoted to their employment in enantiomeric separation sensors technology and controlled drug delivery Finally the production and application of ion imprinted membranes in the separation of metal ions rare earth element and **Petrochemical Catalyst Materials**, anions and the role of cyclodextrins in the imprinting technology are discussed Processes, and Emerging Technologies Al-Megren, Hamid, Xiao, Tiancun, 2016-02-17 Technological advancements are leading the way for innovation within the petrochemical industry New materials discovery and application process modification and automation and market and demand changes are just a few of the many changes occurring as a result of technology innovation and integration Petrochemical Catalyst Materials Processes and Emerging Technologies addresses the latest research on emerging technological applications catalyst materials for fuel upgrading in addition to safety concerns and considerations within the petrochemical industry Emphasizing critical research and emerging developments in the field this publication is an essential resource for engineers researchers and graduate level engineering students in the fields of chemical and petroleum engineering **Encyclopedia of Analytical Science**, 2019-04-02 The third edition of the Encyclopedia of Analytical Science Ten Volume Set is a definitive collection of articles covering the latest technologies in application areas such as medicine environmental science food science and geology Meticulously organized clearly written and fully interdisciplinary the Encyclopedia of Analytical Science Ten Volume Set provides foundational knowledge across the scope of modern analytical chemistry linking fundamental topics with the latest methodologies Articles will cover three broad areas analytical techniques e g mass spectrometry liquid chromatography atomic spectrometry areas of application e g

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