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Membranes for Water Treatment and Remediation **Elsevier**

Membrane Technology and Engineering for Water Purification, Second Edition is written in a practical style with emphasis on: process description; key unit operations; systems design and costs; plant equipment description; equipment installation; safety and maintenance; process control; plant start-up; and operation and troubleshooting. It is supplemented by case studies and engineering rules-of-thumb. The author is a chemical engineer with extensive experience in the field, and his technical knowledge and practical know-how in the water purification industry are summarized succinctly in this new edition. This book will inform you which membranes to use in water purification and why, where and when to use them. It will help you to troubleshoot and improve performance and provides case studies to assist understanding through real-life examples. Membrane Technology section updated to include forward osmosis, electrodialysis, and diffusion dialysis Hybrid Membrane Systems expanded to cover zero liquid discharge, salt recovery and removal of trace contaminants Includes a new section on plant design, energy, and economics

Recent Advances in Water and Wastewater Treatment with Emphasis in Membrane Treatment Operations John Wiley & Sons

The book examines the possibility of integrating different membrane unit operations (microfiltration, ultrafiltration, nanofiltration, reverse osmosis, electrodialysis and gas separation) in the same industrial cycle or in combination with conventional separation systems. It gives careful analysis of the technical aspects, and the possible fields of industrial development. The book reviews many original solutions in water desalination, agro-food productions and wastewater treatments, highlighting the advantages achievable in terms of product quality, compactness, rationalization and

optimization of productive cycles, reduction of environmental impact and energy saving. Also included are examples of membrane reactors and their integration with a fuel cell; polymeric membranes in the integrated gasification combined cycle power plants; integrating a membrane reformer into a solar system; and potential application of membrane integrated systems in the fusion reactor fuel cycle. With detailed analysis and broad coverage, the book is divided into two sections: Bio-applications and Inorganic Applications.

Harvesting the Fruits of Inquiry Springer Science & Business Media

Focuses on the application of membrane technologies in removing toxic metals\metalloids from water. Particular attention is devoted to the removal of arsenic, uranium, and fluoride. These compounds are all existing in the earth's crust at levels between two and five thousands micrograms per kg (parts per million) on average and these compounds can be considered highly toxic to humans, who are exposed to them primarily from air, food and water. In order to comply with the new maximum contaminant level, numerous studies have been undertaken to improve established treatments or to develop novel treatment technologies for removing toxic metals from contaminated surface and groundwater. Among the technologies available, applicable for water treatment, membrane technology has been identified as a promising technology to remove such toxic metals from water. The book describes both pressure driven (traditional processes, such as Nanofiltration, Reverse Osmosis, Ultrafiltration,etc) and more advanced membrane processes (such as forward osmosis, membrane distillation, and membrane bio-reactors) employed in the application of interest. Key aspect of this book is to provide information on both the basics of membrane technologies and on the results depending on the type of technology employed.

Waste Water Treatment Technologies - Volume I Nova Science Publishers

One of the major challenges for many Mediterranean and other countries is finding viable solutions to tackle water shortage. Some of the major water quality constraints derive from the high salinity of groundwater and from pollution sources such as: untreated domestic sewage, fertilizers and pesticides from irrigation drainage, industrial effluents, and solid waste disposal. Wastewater treatment processes involving physico-chemical and biological treatment, chemical oxidation, membrane technologies, along with methods of solids concentration and disposal are of special relevance in dealing with these problems. This volume contains selected lectures presented at the NATO ADVANCED TRAINING COURSE held in Oviedo (November 15-21, 2009) and sponsored by the NATO Science for Peace and Security (SPS) Programme. They cover a variety of topics from wastewater treatment methods to cleaner production strategies, as a careful management of water resources is the basis for sustainable development and to avoid potential security threats. The reader will benefit from a general view of some of the operations involved in wastewater treatment and solid concentration and disposal methods. A proper water reuse and recycling, together with efficient solid disposal, would contribute to a better use of the resources and a sustainable economic growth, particularly in many arid lands of the world.

Stantec's Water Treatment National Academies Press

With global demand for water in the 20th century expected to increase ten-fold, this work focuses on the membrane filtration issues for drinking water.

Integration of Membrane Filtration Into Water Treatment Systems McGraw Hill Professional

Membrane processes are a fast-growing wastewater treatment option. Written by key experts in the wastewater industry, this reference provides the most current membrane information available -- covering processes, equipment configurations, operation, routine monitoring, maintenance, and troubleshooting -- and includes questions and quizzes for classroom use and training.

Water, Wastewater, and Sludge Filtration American Water Works Association

Increasingly, utilities are using membrane technology to solve a wide array of water treatment challenges. The current state of knowledge regarding different aspects of membrane integration is thought to be in development, as evidenced by the continued research efforts by utilities, manufacturers, engineers, and academia. The water industry lacks specific guidance on how membranes can be integrated into a treatment process to improve treatment or capacity. The findings of this project focused on key issues of membrane integration: the benefits of pilot testing and planning, design considerations, and operation and maintenance needs. All of the participating utilities conducted pilot evaluations of membrane technologies and some continued those studies after commissioning to optimize system performance.Several of the participating utilities embarked on a comprehensive planning and approval program, which included community outreach efforts, budget planning, and scheduling for pilot testing before design. In terms of design considerations, many of the utilities experienced unique design challenges that were specific to the system being installed.

Membranes for Water and Wastewater Treatment American Water Works Association

Water Purification, a volume in the Nanotechnology in the Food Industry series, provides an in-depth review of the current technologies and emerging application of nanotechnology in drinking water purification, also presenting an overview of the common drinking water contaminants, such as heavy metals, organics, microorganisms, pharmaceuticals, and their occurrences in drinking water sources. As the global water crisis has motivated the industry to look for alternative water supplies, nanotechnology presents significant potential for utilizing previously unacceptable water sources. This books explores the practical methodologies for transforming water using nanotechnologies, and is a comprehensive reference to a wide audience of food science research professionals, professors, and students who are doing research in this field. Includes the most up-to-date information on nanotechnology applications and research methods for water purification and treatment Presents applications of nanotechnology and engineered nanomaterials in drinking water purification to improve efficiency and reduce cost Provides water purification research methods that are important to water quality, including precipitation, adsorption, membrane separation, and ion exchange Covers the potential risks of nanotechnology, such as the toxicological effects of engineered nanomaterials in water and how to minimize risks based on research studies

Water Quality & Treatment: A Handbook on Drinking Water Academic Press

This ready reference on Membrane Technologies for Water Treatment, is an invaluable source detailing sustainable, emerging processes, to provide clean, energy saving and cost effective alternatives to conventional processes. The editors are internationally renowned leaders in the field, who have put together a first-class team of authors from academia and industry to present a highly approach to the subject. The book is an instrumental tool for Process Engineers, Chemical Engineers, Process Control Technicians, Water Chemists, Environmental Chemists, Materials Scientists and Patent Lawyers.

Water treatment process for membranes Springer Nature

Water is a vital element for life and the environment. Water pollution has been documented as a contributor to a wide range of health

problems. In recent years, the water quality levels have suffered great deterioration because of rapid social and economic development and because it is used to "dump" a wide range of pollutants. This book entitled "Membranes for Water and Wastewater Treatment" contains featured research papers dealing with recent developments and advances in all aspects related to membranes for water and wastewater treatment: membrane processes, combined processes (including one membrane step), modified membranes, new materials, and the possibility to reduce fouling and to improve the efficiency of enhanced processes. The papers compiled in this Special Issue can be read as a response to the current needs and challenges in membrane development for water and wastewater treatment. Half of the research articles correspond to concrete and practical applications of the use of membrane processes in different fields of the industry, with the aim of treating and conditioning water and wastewater. The studies reveal the treatment of industrial streams, mining, recycled paper industry, olive mill, urban wastewater, etc. Another important percentage of studies are related to membrane modification processes, with the aim of obtaining new materials with better performance in the separation processes, thus describing the use of membranes modified with chitosan, nanoparticles, and other organic compounds. This field also includes studies related to fouling and its modeling.

Membrane Technologies for Water Treatment Springer Science & Business Media

Currently, the most common form of drinking water treatment for surface water sources involves the chemical/physical removal of particulate matter by coagulation, flocculation, sedimentation, and filtration processes, along with disinfection to inactivate any remaining pathogenic microorganisms. Filtration remains the cornerstone of drinking water treatment, conventionally in the form of granular media depth filters. Although granular media filters can produce high quality water, they represent a probabilistic rather than an absolute barrier; consequently, pathogens can still pass through the filters and pose a health risk. The disinfection process provides an additional measure of public health protection by inactivating these microorganisms. However, some microorganisms, such as Cryptosporidium, are resistant to common primary disinfection practices such as chlorination and chloramination. Furthermore, drinking water regulations have established maximum contaminant levels (MCLs) for disinfection byproducts (DBPs) that may create incentive for drinking water utilities to minimize the application of some disinfectants. As a result of the concern over chlorine-resistant microorganisms and DBP formation, the drinking water industry is increasingly utilizing alternative treatment technologies in an effort to balance the often-competing objectives of disinfection and DBP control. One such alternative technology that has gained broad acceptance is membrane filtration. Although the use of membrane processes has increased rapidly in recent years, the application of membranes for water treatment extends back several decades. Reverse osmosis (RO) membranes have been used for the desalination of water since the 1960s, with more widespread use of nanofiltration (NF) for softening and the removal of total organic carbon (TOC) dating to the late 1980s. However, the commercialization of backwashable hollow-fiber microfiltration (MF) and ultrafiltration (UF) membrane processes for the removal of particulate matter (i.e., turbidity and microorganisms) in the early 1990s has had the most profound impact on the use, acceptance, and regulation of all types of membrane processes for drinking water treatment. The purpose of this guidance manual is to provide technical information on the use of membrane filtration and application of the technology for compliance with the Long Term 2 Enhanced Surface Water Treatment Rule, which would require certain systems to provide additional treatment for Cryptosporidium.

Emerging Membrane Technology for Sustainable Water Treatment CRC Press

Electrochemical membrane technology has drawn extensive attention worldwide during the past decade in water and wastewater treatment.

Coupling electrochemical process with membrane technology not only enables a higher removal or decomposition of pollutants in waters, but also ensures a more effective control of membrane fouling as well as a more highly selective separation process. The recent development of electrochemical membrane technology has also extended its applications in desalination, energy harvest, and resource recovery from seawater and wastewaters. Electrochemical Membrane Technology for Water and Wastewater Treatment consolidates state-of-the-art research developments in electrochemical membrane technology in water reclamation and sustainability in terms of fundamental theories, membrane and electrode materials, reactor designs, fouling control mechanisms and applications. Electrochemical Membrane Technology for Water and Wastewater Treatment also introduces fundamental theories and applications of electrochemical membrane technology. The knowledge gaps and future research perspectives in electrochemical membrane technology are also addressed. This book is an excellent resource for the understanding of fundamental theories, latest developments and future prospects in electrochemical membrane technology, which can benefit a broad audience of researchers and engineers working in water purification, membrane technology and electrochemical process. Consolidates scattered knowledge of electrochemical membrane technology into a more accessible resource Provides a comprehensive review of fundamental theories, membrane materials and module design as well as the latest developments of electrochemical membrane technology Provides the state-of-art review on the applications of electrochemical membrane technology Includes detailed discussion on the challenges and prospects of electrochemical membrane technology in different applications

Sustainable Membrane Technology for Water and Wastewater Treatment CRC Press

Sustainable technologies for water supply are urgently needed if water has to be supplied to billions of less fortunate people with inadequate access to water. These technologies must be simple, less expensive, less energy intensive, and easy to maintain for their adaptation among the poor masses. Four appropriate technologies are discussed here: solar pasteurization, membrane desalination, natural filtration (riverbank filtration), and solar distillation. Solar pasteurization can be a useful means of producing water at remote, but sunny locations where fuel may not be easily available for boiling water. Membrane desalination will remain as a viable means of drinking water production for individual households to large communities. Various membrane filtration techniques as well as the means to “democratize” membrane filtration have been presented. Riverbank filtration is a “natural” filtration technique where drinking water is produced by placing wells on the banks of rivers. The riverbed/bank material and the underlying aquifer act as natural filters to remove pollutants from river water. Solar distillation can be a viable method of drinking water production for individual households to small communities without the input of external energy. Sustainability framework and technology transfer are discussed through transdisciplinary analysis.

Patent Landscape Report on Membrane Filtration and UV Water Treatment Createspace Independent Publishing Platform

Proceedings of the 2006 AWWA Annual Conference and Exposition held June 2006 in San Antonio TX CD-ROM provides current information on all aspects of drinking water Topics include water quality water resources and conservation water utility security water utility vulnerability assessments conventional and advanced water treatment desalination water reclamation and reuse water transmission and distribution system infrastructure water utility management water plant operations privatization and competition automation regulations benchmarking

Reverse Osmosis Process WIPO

The definitive water quality and treatment resource--fully revised and updated Comprehensive, current, and written by leading experts, Water Quality & Treatment: A Handbook on Drinking Water, Sixth Edition covers state-of-the-art technologies and methods for water treatment and quality control. Significant revisions and new material in this edition reflect the latest advances and critical topics in water supply and treatment. Presented by the American Water Works Association, this is the leading source of authoritative information on drinking water quality and treatment. NEW CHAPTERS ON: Chemical principles, source water composition, and watershed protection Natural treatment systems Water reuse for drinking water augmentation Ultraviolet light processes Formation and control of disinfection by-products DETAILED COVERAGE OF: Drinking water standards, regulations, goals, and health effects Hydraulic characteristics of water treatment reactors Gas-liquid processes and chemical oxidation Coagulation, flocculation, sedimentation, and flotation Granular media and membrane filtration Ion exchange and adsorption of inorganic contaminants Precipitation, coprecipitation, and precipitative softening Adsorption of organic compounds by activated carbon Chemical disinfection Internal corrosion and deposition control Microbiological quality control in distribution systems Water treatment plant residuals management

Electrochemical Membrane Technology for Water and Wastewater Treatment Walter de Gruyter GmbH & Co KG

The present Special Issue brings together recent research findings from renowned scientists in the field of water treatment and assembled contributions on advanced technologies applied to the treatment of wastewater and drinking water, with emphasis on novel membrane treatment technologies. 12 research contributions have highlighted various processes and technologies, which can achieve effective treatment and purification of wastewater and of drinking water, aiming (occasionally) for water reuse. The main topics which are analyzed are the use of novel type membranes in bioreactors, the use of modified membranes, for example using vacuum membrane distillation, the fouling of membranes, the problem of arsenic, antimony and chromium contamination in groundwaters and its removal and the use of novel technologies for more efficient ozonation.

Membrane Technologies for Biorefining Springer

The objective of this project was to examine the process and design implications associated with the integration of membranes into existing water treatment plants and process schemes. Membrane technologies covered include microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO).

Reverse Osmosis and Nanofiltration Springer Science & Business Media

With an increasing population, use of new and diverse chemicals that can enter the water supply, and emergence of new microbial pathogens, the U.S. federal government is faced with a regulatory dilemma: Where should it focus its attention and limited resources to ensure safe drinking water supplies for the future? Identifying Future Drinking Water Contaminants is based on a 1998 workshop on emerging drinking water contaminants. It includes a dozen papers that were presented on new and emerging microbiological and chemical drinking water contaminants, associated analytical and water treatment methods for their detection and removal, and existing and proposed environmental databases to assist in their proactive identification and regulation. The papers are preceded by a conceptual approach and related recommendations to EPA for the periodic creation of future Drinking Water Contaminant Candidate Lists (CCLsâ€"produced every five yearsâ€"include currently unregulated chemical and microbiological substances that are known or anticipated to occur in public water systems and that may pose health risks).

Membrane Technology and Engineering for Water Purification Elsevier

Water and Wastewater Treatment Technologies theme is a component of

Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The Theme on Water and Wastewater Treatment Technologies deals, in three volumes, and covers several topics, with several issues of great relevance to our world such as: Urban Wastewater Treatment; Characteristics of Effluent Organic Matter in Wastewater; Filtration Technologies in wastewater treatment; Air Stripping in Industrial Wastewater Treatment; Dissolved air flotation in industrial wastewater treatment; Membrane Technology for Organic Removal in Wastewater; Adsorption and Biological Filtration in Wastewater Treatment; Physico-chemical processes for Organic removal from wastewater effluent; Deep Bed Filtration: Modelling Theory And Practice ; Specific options in biological wastewater treatment for reclamation and reuse ; Biological Phosphorus Removal Processes For Wastewater Treatment ; Sequencing Batch Reactors: Principles, Design/Operation And Case Studies ; Wastewater stabilization ponds (WSP)for wastewater treatment; Treatment of industrial wastewater by membrane bioreactors; Stormwater treatment technologies; Sludge Treatment Technologies ; Wastewater Treatment Technology For Tanning Industry; Palm Oil And Palm Waste Potential In Indonesia ; Recirculating Aquaculture Systems – A Review ; Upflow anaerobic sludge blanket (UASB)reactor in wastewater treatment; Applied Technologies In Municipal Solid Waste Landfill Leachate Treatment; Water Mining: Planning and Implementation Issues for a successful project; Assessment methodologies for water reuse scheme and technology; Nanotechnology for Wastewater Treatment. These three volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, Managers, and Decision makers and NGOs W

Scaling and Particulate Fouling in Membrane Filtration Systems CRC Press

The book focuses on Application of Nanotechnology in Membranes for Water Treatment but not only provides a series of innovative solutions for water reclamation through advanced membrane technology but also serves as a medium to promote international cooperation and networking for the development of advanced membrane technology for Universal well-being and to achieve the common goal of supplying economically, environmentally and societally sustainable freshwater and better sanitation systems. This book is unique because the chapters were authored by established researchers all around the globe based on their recent research findings. In addition, this book provides a holistic coverage of membrane development for water treatment, from the membrane preparation and characterizations to the performance for specific processes and applications. Since that water scarcity has become a global risk and one of the most serious challenges for the scientific community in this century, the publication of this book is therefore significant as it will serve as a medium for a good reference of an alternative solution in water reclamation. This book will provide the readers with a thorough understanding of the different available approaches for manufacturing membranes both with innovative polymeric systems and inorganic nano-materials which could give enhanced functionalities, catalytic and antimicrobial activities to improve the performance of the existing membranes. It will be useful for leading decision and policy makers, water sector representatives and administrators, policy makers from the governments, business leaders, business houses in water treatment, and engineers/ scientists from both industrialized and developing countries as well.