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Reverse Osmosis Membrane Research

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Membrane-based Hybrid Processes for Wastewater Treatment

Membrane-Based Salinity Gradient Processes for Water Treatment and Power Generation

Santa Barbara Oil Pollution

Annual Conference on Advanced Pollution Control for the Metal Finishing Industry

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Evaluation of reverse osmosis membranes for treatment of electroplating rinsewater

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Water Treatment Membrane Processes Development of an Improved Tubular Reverse Osmosis Module for Water Treatment

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Demonstration of Rapid Membrane Characterization and Real-time Membrane Module Performance Analysis Using an Automated Reverse Osmosis Desalination Pilot Plant

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Pollution of waters by toxic metals is accelerating worldwide due to industrial and population growth, notably in countries having poor environmental laws, resulting in many diseases such as cancer. Classical remediation techniques are limited. This book reviews new, advanced or improved techniques for metal removal, such as hybrid treatments, nanotechnologies and unconventional adsorbents, e.g. metal-organic frameworks. Contaminants include rare earth elements, arsenic, lead, cadmium, chromium, copper and effluents from the electronic, textile, agricultural and pharmaceutical industries.

Saline Water Program Authorization, 1970

This book comprehensively covers corrosion and corrosion protection in China in the areas including infrastructure, transportation, energy, water environment, as well as manufacturing and public utilities. Furthermore, it presents a major consulting project of Chinese Academy of Engineering, which was the largest corrosion investigation project in Chinese history, including the corresponding methods, processes and corrosion protection strategies, and provides valuable information for numerous industries. Sharing essential insights into corrosion prediction and decision-making, this book will help to decrease costs and extend the service life of equipment and facilities; accordingly, it will benefit scientists and engineers working on corrosion research and protection, as well as economists and government employees.

Saline Water Conversion Report

Saline Water Conversion Program, 1970 Committee Serial No. 91-3. Considers H.R. 6716 and companion S. 1011, to amend the Saline Water Conversion Act to authorize appropriations for the saline water conversion program during FY70.

Water Pollution and Remediation: Heavy Metals

EPA 600/2 Seawater desalination is a rapidly growing coastal industry that is increasingly threatened by algal blooms. Depending on the severity of algal blooms, desalination systems may be forced to shut down because of...
clogging and/or poor feed water quality. To maintain stable operation and provide good feed water quality to seawater reverse osmosis (SWRO) systems, ultrafiltration (UF) pre-treatment is proposed. This research focused on assessing the ability of UF and other pre-treatment technologies to reduce biofouling in SWRO systems. An improved method to measure bacterial regrowth potential (BRP) was developed and applied at laboratory, pilot and full scale to assess the ability of conventional UF (150 kDa) and tight UF (10 kDa) alone and in combination with a phosphate adsorbent to reduce regrowth potential and delay the onset of biofouling in SWRO. The improved bacterial regrowth potential method employs a natural consortium of marine bacteria as inoculum and flow cytometry. The limit of detection of the BRP method was lowered to 43,000 ± 12,000 cells/mL, which is equivalent to 9.3 ± 2.6 μg-C glucose/L. The reduction in bacterial regrowth potential after tight UF (10 kDa) was 3 to 4 times higher than with conventional UF (150 kDa). It was further reduced after the application of a phosphate adsorbent, independent of pore size of the UF membrane. Pilot studies demonstrated that the application of tight UF (10 kDa) coupled with a phosphate adsorbent consistently lowered the bacterial regrowth potential and no feed channel pressure drop increase was observed in membrane fouling simulators (MFS) over a period of 21 days. The study also showed that non-backwashable fouling of UF membranes varied strongly with the type of algal species and the algal organic matter (AOM) they release. The presence of polysaccharide (stretching -OH) and sugar ester groups (stretching S=O) was the main cause of non-backwashable fouling. In conclusion, this study showed that an improved BRP method is suitable for the assessment of SWRO pre-treatment systems and it can be a useful tool to develop potential strategies to mitigate biofouling and improve the sustainability of SWRO systems.

Reverse Osmosis Concentration of Dilute Pulp & Paper Effluents

Reverse Osmosis Membrane Research Best water filtration strategies for the '90s. Get the engineering savvy you need to capitalize on membrane technology for effective water filtration. Water Treatment Membrane Processes, by the American Water Works Association Research Foundation, enables you to use membrane filtration methods for purifying drinking water--and utilize new research for wastewater treatment. This richly illustrated guide shows you how to apply membrane processes in numerous water treatment applications. . .model membrane performance. . .and take charge of field evaluation and piloting. You'll see how to implement nanofiltration, ultrafiltration, microfiltration, and electrodialysis techniques--and make the most of membrane reactors, bioreactors and ion exchange membrane reactors.

Second Conference on Advanced Pollution Control for the Metal Finishing Industry, Presented at Orlando Hyatt House, Kissimmee, Fl., February 5-7, 1979

Membrane-based Hybrid Processes for Wastewater Treatment

Membrane-Based Salinity Gradient Processes for Water Treatment and Power Generation

Santa Barbara Oil Pollution

Annual Conference on Advanced Pollution Control for the Metal Finishing Industry

Monthly Catalog of United States Government Publications “Blue is the new green.” This is an all-new revised edition of a modern classic on one of the most important subjects in engineering: Water. Featuring a total revision of the initial volume, this is the most comprehensive and up-to-date coverage of the process of desalination in industrial and municipal applications, a technology that is becoming increasingly more important as more and more companies choose to “go green.” This book covers all of the processes and equipment necessary to design, operate, and troubleshoot desalination systems, from the fundamental principles of desalination technology and membranes to the much more advanced engineering principles necessary for designing a desalination system. Earlier chapters cover the basic principles, the economics of desalination, basic terms and definitions, and essential equipment. The book then goes into the thermal processes involved in desalination, such as various methods of evaporation, distillation, recompression, and multi-stage flash. Following that is an exhaustive discussion of the membrane processes involved in desalination, such as reverse osmosis, forward osmosis, and electrodialysis. Finally, the book concludes with a chapter on the future of these technologies and their place in industry and how they can be of use to society. This book is a must-have for anyone working in water, for engineers, technicians, scientists working in research and development, and operators. It is also useful as a textbook for graduate classes studying industrial
water applications.

Authorization for Military Procurement, Research, and Development, Fiscal Year 1971, and Reserve Strength Considers S. 1011, to authorize FY70 appropriation for Interior Dept's Saline Water Conversion Program.

Hearings, Reports and Prints of the Senate Committee on Interior and Insular Affairs Membrane-Based Salinity Gradient Processes for Water Treatment and Power Generation focuses on the various types of membrane-based salinity gradient processes that can be applied for desalination. Topics cover salinity gradient processes for desalination, such as Forward Osmosis (FO) and Pressure Retarded Osmosis (PRO), with chapters selected exclusively from a number of world-leading experts in various disciplines and from different continents. Sections include discussions on the theoretical and fundamental approaches to salinity gradient processes, various types of membrane materials and development, i.e., flat sheet and hollow fiber, various salinity water sources for an economically feasible process, and large-scale applications. Finally, the book focuses on economically feasible process optimization when both operational and capital costs are considered. Features specific details on salinity gradient techniques for various desalination applications of industrial and academic interest Contains unique discussions on membrane development and process optimization that normally only appear briefly in research articles Includes examples of internationally best practices for the evaluation of several system parameters, including thermodynamic optimization, high power density membrane development, and more Discusses large-scale applications and provides examples of such implementations, such as Statkraft, Japanese Megaton, and Korean GMVP

Evaluation of reverse osmosis membranes for treatment of electroplating rinsewater

Hearings

Scientific and Technical Aerospace Reports

Research and Development Progress Report

Water Treatment Membrane Processes This book had its origin in the symposium on "Polymers for Desalination" sponsored by the Division of Polymer Chemistry of the American Chemical Society and held in September, 1971 in Washington D. C. at the 162nd national meeting of the Society. However, the book is not simply the proceedings of that symposium. A number of additional papers were contributed by other workers in the field, and the original papers presented at the symposium have, for the most part, been expanded. The book thus represents a broad cross section of membrane research and development activities in the United States and abroad within the field of reverse osmosis. The purposes of the book are to bring attention to important new developments in this field, to suggest what the next generation of reverse osmosis equipment may look like, and to indicate where further research and development are needed. The vast majority of the papers collected here represent work supported by the Office of Saline Water of the United States Department of the Interior, and the emphasis here is clearly on the application of the reverse osmosis process to water purification. However, many of the concepts, methods, and conclusions are expected to be useful in other areas of membrane science and technology.

Development of an Improved Tubular Reverse Osmosis Module for Water Treatment

The Cost of Corrosion in China

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Hearings

New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents

Controlling Biofouling in Seawater Reverse Osmosis Membrane Systems
Saline Water Conversion Report for Reverse Osmosis Systems 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

Legislative History

Annual Report

Hearings, Reports and Prints of the House Committee on Interior and Insular Affairs

Saline Water Conversion Report for This book describes in depth knowledge of designing and operating reverse osmosis (RO) systems for water desalination, and covers issues which will effect the probability for the long-standing success of the application. It also provides guidelines that will increase the performance of seawater RO desalination systems by avoiding errors in the design and operation and suggest corrective measures and troubleshooting of the problems encountered during RO operation. This book also provides guidelines for the best RO design and operational performance. In the introductory section, the book covers the history of RO along with the fundamentals, principles, transport models, and equations. Following sections cover the practical areas such as pretreatment processes, design parameters, design software programs (WAVE, IMSDesign, TORAYDS2, Lewaplus, ROAM Ver. 2.0, Winflows etc.), RO performance monitoring, normalization software programs (RODataXL and TorayTrak), troubleshooting as well as system engineering. Simplified methods to use the design software programs are also properly illustrated and the screenshots of the results, methods etc. are also given here along with a video tutorial. The final section of the book includes the frequently asked questions along with their answers. Moreover, various case studies carried out and recent developments related to RO system performance, membrane fouling, scaling, and degradation studies have been analyzed. The book also has several work out examples, which are detailed in a careful as well as simple manner that help the reader to understand and follow it properly. The information presented in some of the case studies are obtained from existing commercial RO desalination plants. These topics enable the book to become a perfect tool for engineers and plant operators/technicians, who are responsible for RO system design, operation, maintenance, and troubleshooting. With the right system design, proper operation, and maintenance program, the RO system can offer high purity water for several years. Provides guidelines for the optimum design and operational performance of reverse osmosis desalination plants. Examines recent developments related to system performance, membrane desalination pretreatment processes, design parameters, system performance monitoring, and normalization software programs.
fouling, and scaling studies Presents case studies related to commercial reverse osmosis desalination plants Perfect training guide for engineers and plant operators, who are responsible for reverse osmosis system design, operation and maintainance

Saline Water Conversion Program--1970

Demonstration of Zinc Cyanide Recovery Using Reverse Osmosis and Evaporation

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