Advanced Membrane Technology and Applications

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Advanced Membrane Technology and Applications

Advanced membranes—from fundamentals and membrane chemistry to manufacturing and applications: A hands-on reference for practicing professionals, Advanced Membrane Technology and Applications covers the fundamental principles and theories of...
separation and purification by membranes, the important membrane processes and systems, and major industrial applications. It goes far beyond the basics to address the formulation and industrial manufacture of membranes and applications. This practical guide: Includes coverage of all the major types of membranes: ultrafiltration; microfiltration; nanofiltration; reverse osmosis (including the recent high-flux and low-pressure membranes and anti-fouling membranes); membranes for gas separations; and membranes for fuel cell uses. Addresses six major topics: membranes and applications in water and wastewater; membranes for biotechnology and chemical/biomedical applications; gas separations; membrane contractors and reactors; environmental and energy applications; and membrane materials and characterization. Includes discussions of important strategic issues and the future of membrane technology. With chapters contributed by leading experts in their specific areas and a practical focus, this is the definitive reference for professionals in industrial manufacturing and separations and research and development; practitioners in the manufacture and applications of membranes; scientists in water treatment, pharmaceutical, food, and fuel cell processing industries; process engineers; and others. It is also an excellent resource for researchers in industry and academia and graduate students taking courses in separations and membranes and related fields.

Membrane Technologies for Water Treatment Membranes play a crucial role in ensuring the optimum use and recovery of materials in manufacturing. In the process industries, they are required for efficient production and minimization of environmental impact. They are also essential for the efficient production of clean water, a significant global issue. Membrane Fabrication brings together ex

Membrane Technology and Applications 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.
Membrane Processes Presenting a useful reference to the current state of membrane technology and its likely future growth, this book covers all aspects of the technology and its applications in the water industry. Drawing on the experience of international experts, Membrane Technology in Water and Wastewater Treatment encompasses many practical applications of specific membranes, including MF, UF, NF, RO and EDR, in the treatment of ground and surface water, backwash water, seawater, and industrial and domestic wastewater. Novel applications, process enhancements and the latest systems are also discussed. This book is an excellent guide to membrane technology and will be of great interest to water companies, industrialists, legislative bodies and anyone with an interest in the technology or its applications.


Advances in Membrane Technologies for Water Treatment 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
Membrane and Desalination Technologies 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.

Saline Water Conversion Report for Discussing the technology and its applications, Membrane Processes: A Technology Guide investigates the differing requirements of industry today. Driven by increasing water quality demands, the technological spotlight is now on the application of membranes to potable water, and several significant examples of filtration processes are given. Encompassing the fundamentals of design and operation of membranes, feasibility of use and economics as well as applications in water, paint and other industries, this coverage of the key aspects of membrane technology will be welcomed by technologists, engineers and scientists in a variety of disciplines.
Nanocomposite Membrane Technology 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.

Renewable Resources for Functional Polymers and Biomaterials Membranes play a central role in our daily life, or as indicated by one of my foreign colleagues, Richard Bowen, 'If you are tired of membranes, you are tired of life'. Biological membranes are hardly used in industrial applications, but separations with synthetic membranes have become increasingly important. Today, membrane processes are used in a wide range of applications and their numbers will certainly increase. Therefore, there is a need for well educated and qualified engineers, chemists, scientists and technicians who have been taught the basic principles of membrane technology. However, despite the growing importance of membrane processes, there are only a few universities that include membrane technology in their regular curricula. One of the reasons for this may be the lack of a comprehensive textbook. For me, this was one of the driving forces for writing a textbook on the basic principles of membrane technology which provides a broad view on the various aspects of membrane technology. I realise that membrane technology covers a broad field but nevertheless I have tried to describe the basic principles of the various disciplines. Although the book was written with the student in mind it can also serve as a first introduction for engineers, chemists, and technicians in all kind of industries who wish to learn the basics of membrane technology.

Saline Water Conversion Summary Report 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
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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.

Membrane Technology for Water and Wastewater Treatment in Rural Regions

Realizing that water, energy, and food are the three pillars to sustain the growth of human population in the future, this book deals with all the above aspects with particular emphasis on water and energy. In particular, the book addresses applications of membrane science and technology for water and wastewater treatment, energy, and environment. Th

Membrane Technology for Water and Wastewater Treatment, Energy and Environment

This book details polysaccharides and other important biomacromolecules covering their source, production, structures, properties, and current and potential application in the fields of biotechnology and medicine. It includes a systematic discussion on the general strategies of isolation, separation, and characterization of polysaccharides and proteins. Subsequent chapters are devoted to polysaccharides obtained from various sources, including botanical, algal, animal, and microbial. In the area of botanical polysaccharides, separate chapters are devoted to the sources, structure, properties, and medical applications of cellulose and its derivatives, starch and its derivatives, pectins, and exudate gums, notably gum arabic. Another chapter discusses the potential of hemicelluloses (xylans and xylan derivatives) as a new source of functional biopolymers for biomedical and industrial applications. The algal polysaccharide, alginate, has significant application in food, pharmaceuticals, and the medical field, all of which are reviewed in a separate chapter. Polysaccharides of animal origin are included with separate chapters on the sources, production, biocompatibility, biodegradability, and biomedical applications of chitin (chitosan) and hyaluronan. With the increasing knowledge and applications of genetic engineering, there is also an introduction in the book to nucleic acid polymers, the genome research, and genetic engineering. Proteins and protein conjugates are covered, with one chapter providing a general review of structural glycoproteins, fibronectin, and laminin, together with their role in the promotion of cell adhesion in vascular grafts, implants, and tissue engineering. Another chapter discusses general aspects of a number of industrial proteins, including casein, caseinates, whey protein, gluten, and soy proteins, with
emphasis on their medical applications, and with reference to the potential of bacterial proteins. Another natural polymer resource, microbial polyesters, although small compared with polysaccharides and proteins, is also gaining increasing interest in biomedical technology and other industrial sectors. One chapter, therefore, is devoted to microbial polyesters, with comprehensive coverage of their biosynthesis, properties, enzymic degradation and applications. By dealing with biopolymers at the molecular level, the book is aimed at the biomedical and wider materials science communities and provides an advanced overview of biopolymers at the graduate and postgraduate level. In addition it will appeal to both academic and industrial life scientists who are involved in research and development activities in the medical and biotechnology field.

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Reverse Osmosis 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.

Emerging Membrane Technology for Sustainable Water Treatment Presents new and innovative bio-based monomers to replace traditional petrochemical-based building blocks. Featuring contributions from top experts in the field, this book discusses new developments in the area of bio monomers and green polymeric composite materials. It covers bio monomers, green polymeric composites, composites from renewable resources, bio-sourced polymers, green composites, biodegradation, processing methods, green polymeric gels, and green polymeric membranes. Each chapter in Bio M onomers for Green Polymeric Composites Materials presents the most recent research and technological ideas in a comprehensive style. It examines bio monomers for green polymer and the processing methods for the bio nanocomposites. It covers the preparation, characterization, and applications of bio-polymeric materials based blends, as well as the applications of biopolymeric gels in medical biotechnology. The book also explores the properties and applications of gelatins, pectins, and carrageenans gels. Additionally, it offers a plethora of information on green polymeric membranes; the bio-degradation of green polymeric composites materials; applications of green polymeric composites materials; hydrogels used for biomedical applications; and the use of natural aerogels as thermal insulations. Introduces readers to the innovative, new bio-based monomers that are taking the place of traditional petrochemical-based building blocks. Covers green polymers, green composites, bio-sourced polymers, bio nanocomposites, biodegradable polymers, green polymer gels, and membranes. Features input from leading researchers immersed in the area of study. Bio M onomers for Green Polymeric Composites Materials is suitable for academics, researchers, scientists, engineers and advanced students in the field of bio monomers and green polymeric composites materials.

Basic Principles of Membrane Technology A detailed look at the most recent developments in sustainable membrane technology for use in energy, water, and the environment. A collection of twenty-seven groundbreaking papers on important ideas about the development of membrane science and technology. Sustainable Membrane Technology for Energy, Water,
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and Environment brings together contributions from leading international experts in one comprehensive volume. Covering the latest developments and most innovative ideas in the field, this book is a unique resource for understanding the growing interest in using membranes across several industries. Divided into six chapters that cover new membrane materials and membrane development; membrane applications for gas and vapor separation; membrane applications in water treatment; environmental applications of membranes; energy applications of membranes; and other industrial membrane applications, the book looks at the current and emerging applications for membrane science and technology in detail. As the Association of Southeast Asian Nations (ASEAN) and the Middle East emerge as the next generation of membrane research and development centers, in part due to their need for water and natural gas production technology, this book provides invaluable insights into the cutting-edge work taking place in these regions. Additional topics covered also include new membrane materials, membrane applications for food processing, and much more. Designed for engineers, scientists, professors, and graduate students who are engaged in membrane R&D activities, as well as for anyone interested in sustainable development, Sustainable Membrane Technology for Energy, Water, and Environment is a cutting-edge look at membrane applications.

Membrane Technology Enhancement for Environmental Protection and Sustainable Industrial Growth

Sustainable Membrane Technology for Energy, Water, and Environment This book presents a detailed discussion of the fundamentals and practical applications of membrane technology enhancement in a range of industrial processes, energy recovery, and resource recycling. To date, most books on the applications of membrane technology have mainly focused on gas pollution removal or industrial wastewater treatment. In contrast, the enhancement of various membrane processes in the areas of energy and the environment has remained largely overlooked. This book highlights recent works and industrial products using membrane technology, while also discussing experiments and modeling studies on the membrane enhancement process.

Sustainable Membrane Technology for Water and Wastewater Treatment Membranes processing techniques are used to help separate chemical components based on molecular size under specific pressure. A great advantage of membrane processing techniques is that it is a non-thermal processing technique, which can retain enormous bioactive constituents to a greater
extent. Being a less energy intensive process, this technique is widely used in several food processing industries such as in the clarification of fruit juices and wine; the concentration of milk; the preparation of whey protein concentrate; and water and waste treatment, among others. Applications of Membrane Technology for Food Processing Industries introduces membrane processing techniques, presenting principles, theory and operational conditions for achieving efficient quality product. It discusses different types of membrane processing techniques viz. reverse osmosis, nanofiltration, ultrafiltration, electro dialysis, microfiltration, pervaporation, including its applications, advantages and disadvantages. Key Features: Deals with the retention of antioxidants by using novel membrane processing techniques Includes the application of membrane processing techniques in whey processing Explains the method for degumming, dewaxing and decolorization of edible crude oils Narrates application of membrane processing techniques in waste water treatment for efficient use Readers, such as professors, scientist, research scholars, students and industrial personnel, will come to know about the current trends in use of membrane processing techniques for its application in several food processing industries. This book can be a ready reference for the food industrial industry for manufacturing of deacidified clarified fruit juices and wine by using integrated membrane technique approach. In a nutshell, this book will benefit food scientist, academicians, students and food industrial persons by providing in-depth knowledge about membrane processing of foods for quality retention and also for efficient consumer acceptability.

Water Pollution and Remediation: Heavy Metals In this essential new volume, Volume 13: Membrane and Desalination Technologies, a panel of expert researchers provide a wealth of information on membrane and desalination technologies. An advanced chemical and environmental engineering textbook as well as a comprehensive reference book, this volume is of high value to advanced graduate and undergraduate students, researchers, scientists, and designers of water and wastewater treatment systems. This is an essential part of the Handbook of Environmental Engineering series, an incredible collection of methodologies that study the effects of pollution and waste in their three basic forms: gas, solid, and liquid. Chapters adopt the series format, employing methods of practical design and calculation illustrated by numerical examples, including pertinent cost data whenever possible, and exploring in great detail the fundamental principles of the field. Volume 13: Membrane and Desalination Technologies is an essential guide for researchers, highlighting the latest developments in principles of membrane technology, membrane systems planning and design, industrial and municipal waste treatments,
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desalination requirements, wastewater reclamation, biofiltration, and more.

Membrane Fabrication

Bio Monomers for Green Polymeric Composite Materials

Nanoscale Materials in Water Purification This book analyses the sustainability of membrane operations applied on an industrial scale, as well as that of those under investigation on lab/pilot scales, covering also the preparation of both polymeric and inorganic membranes. It presents reverse osmosis in desalination, membrane bioreactors for municipal wastewater treatment and pressure-driven industrial wastewater treatment in agrofood and textile fields as examples of industrial membrane operations. Regarding the membrane processes still on a lab/pilot scale, the analysis includes membrane operations for the recovery of valuable products from wastewater streams, for the removal of toxic compounds from water/wastewater, and for zero liquid discharge approaches in desalination. The book offers a useful guide for scientists and engineers working in various fields, including membrane technology, separation, desalination, and wastewater treatment. Alberto Figoli and Alessandra Criscuoli are both Senior Researchers at the Institute on Membrane Technology (ITM-CNR), Italy.

Membrane Technology in Water and Wastewater Treatment

Membrane Technology and Applications The primary objective of this book is to support t

Hybrid Membrane Systems for Water Purification 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 scaled-up counterparts

Reverse Osmosis and Nanofiltration, (M 46) As a basic human need, water and its treatment are of the utmost importance. However, some rural areas are disadvantaged and have difficulty in effectively treating their water supply, which can affect the health and safety of their region. To protect and defend citizens, research must supply effective and applicable methods in securing the
safety and drinkability of water. Membrane Technology for Water and Wastewater Treatment in Rural Regions is an essential publication that discusses the fabrication and characterization of membranes, processes and operations, and specific applications of membranes on water and wastewater treatment. Moreover, the book discusses selected promising aspects of membrane usage in the industry with a focus on palm oil mill industry, sewage management and treatment, and water treatment in rural areas. Featuring coverage on a broad range of topics including membrane processes, water production, and transport resistances, this book is ideally designed for engineers, chemists, environmentalists, public officials, researchers, academicians, students, and industry professionals.

Bibliography of Membrane Technology Pertaining to Saline Water Desalination This multivolume work covers all aspects of membrane science and technology - from basic phenomena to the most advanced applications and future perspectives. Modern membrane engineering is critical to the development of process-intensification strategies and to the stimulation of industrial growth. The work presents researchers and industrial managers with an indispensable tool toward achieving these aims. Covers membrane science theory and economics, as well as applications ranging from chemical purification and natural gas enrichment to potable water Includes contributions and case studies from internationally recognized experts and from up-and-coming researchers working in this multi-billion dollar field Takes a unique, multidisciplinary approach that stimulates research in hybrid technologies for current (and future) life-saving applications (artificial organs, drug delivery)

Membrane-based Hybrid Processes for Wastewater Treatment 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
Applications of Membrane Technology for Food Processing Industries

Membrane Technology

Membranes for Water Treatment 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.

Membrane Technology and Engineering for Water Purification 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.

Membrane Technology in Water Treatment in the Mediterranean Region (ProMembrane) This outstanding reference is ideal for those who require in-depth and accurate information about reverse osmosis technology and water chemistry. Professionals in this rapidly expanding field will appreciate the features of this outstanding resource. The book features a full description of the RO process, a comprehensive review of membrane technology and system design, and describes the economic benefits of RO and other desalination
technologies. System designers, membrane manufacturers, water purification experts, consultants, separations technologists, and chemical engineers will find Reverse Osmosis an invaluable tool.

Bibliography of Membrane Technology Pertaining to Saline Water Desalination 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

Catalog of Research Projects Nanocomposite Membrane Technology: Fundamentals and Applications is the first book to deliver an extensive exploration of nanocomposite membrane technology. This groundbreaking text offers an eloquent introduction to the field as well as a comprehensive overview of fundamental aspects and application areas. Approaching the subject from the material

Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment Novel nanoscale materials are now an essential part of meeting the current and future needs for clean water, and are at the heart of the development of novel technologies to desalinate water. The unique properties of nanomaterials and their convergence with current treatment technologies present great opportunities to revolutionize water and wastewater treatment. Nanoscale Materials for Water Purification brings together sustainable solutions using novel nanomaterials to alleviate the physical effects of water scarcity. This book covers a wide range of nanomaterials, including noble
metal nanoparticles, magnetic nanoparticles, dendrimers, bioactive nanoparticles, polysaccharide-based nanoparticles, nanocatalysts, and redox nanoparticles for water purification. Significant properties and characterization methods of nanomaterials such as surface morphology, mechanical properties, and adsorption capacities are also investigated. Explains how the unique properties of a range of nanomaterials make them important water purification agents. Shows how the use of nanotechnology can help create cheaper, more reliable, less energy-intensive, more environmentally friendly water purification techniques. Includes case studies to show how nanotechnology has successfully been integrated into water purification system design.

Waste Water Treatment Technologies - Volume III Despite significant progress in water and sanitation, much still remains to be done. This report shows how the world has changed since 1990. It provides an assessment of progress towards the MDG target and insight into the remaining challenges. Section A provides an overview of progress against the parameters specified in the MDG target for water and sanitation in both urban and rural areas. It presents data for the world as a whole and compares progress across regions. The report goes on to examine trends over the MDG period by region and by level of service. It pays particular attention to the numbers of people who have gained the highest level of service in drinking water supply - piped water on premises - and those with no service at all who use surface water for drinking and practice open defecation. In order to understand the nature of progress, it is important to look carefully at the way improvements in water and sanitation have benefited different socioeconomic groups. This report sheds light on equality gaps between urban and rural dwellers and between the richest and poorest segments of the population. It presents several new ways to visualize progress on extending service to the poor designed to reveal the nature of inequalities and give the reader insight into the great challenge that still exists in ensuring that progress reaches everyone. The JMP was established in 1990 and is celebrating its Jubilee Year in 2015. Section B provides a retrospective analysis of the evolution of water sanitation and hygiene monitoring over the past 25 years.

Water Treatment Membrane Processes: This A to Z guide to membrane science, technology, and applications provides comprehensive coverage of membrane preparation, modules, and transport theory. Highly illustrated with comprehensive and current reference listings, the resource provides practical uses and how-to's for a broad range of application areas. Single author work.
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presenting a unified treatment Comprehensive coverage of membrane preparation, modules and transport theory A 'how-to' book giving practical advice Highly illustrated with comprehensive and current reference listings

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