Biological Denitrification Of High Nitrate Wastewaters A

With Africa's water resources constantly threatened by an increasing population and the resultant rise in water demand, together with the stresses of water use for various activities, desertification, climate change, and other interventions in the water cycle by man, it is vital that the water resources in arid and semi-arid regions are developed a

Biological Denitrification of High Nitrate Industrial Streams

The 9th International Conference on Bioinformatics and Biomedical Engineering (iCBBE 2015) was held on September 18-20, 2015, Shanghai, China. This proceedings volume assembles papers from various professionals engaged in the fields of Biomedical Engineering, Bioinformatics and Computational Biology. The conference had special sessio

Nitrification and Denitrification in the Activated Sludge Process,the first in a series on the microbiology of wastewater treatment,comprises the critical topics of cost-effective operation, permitcompliance, process control, and troubleshooting in wastewatertreatment plants. Avoiding the technical jargon, chemicalequations, and kinetics that typically accompany such texts,Nitrification and Denitrification in the Activated Sludge Processdirectly addresses plant operators and technicians, providingnecessary information for understanding the microbiology andbiological conditions that occur in the treatment process. Of special interest to wastewater treatment plant operators arethe bacteria that degrade nitrogenous wastes–the nitrifyingbacteria–and the bacteria that degrade carbonaceouswastes–the cBOD-removing bacteria. Both groups of bacterianeed to be routinely monitored and operational conditions favorablyadjusted to ensure desired nitrification. Each chapter in thisgroundbreaking study offers a better understanding of theimportance of nitrification and denitrification and the bacteriainvolved in these crucial processes. Chapters include: Organotrophs The Wastewater Nitrogen Cycle Nitrite Ion Accumulation Dissolved Oxygen Denitrifying Bacteria Gaseous End Products Free Molecular Oxygen The Occurrence of Denitrification

Nitrification and denitrification are essential processes for aquatic ecological system and vital for human health. While ammonia is applied for disinfection together with chlorine to produce chloramine, excessive ammonia may cause nitrification and bacteria growth in water transmission pipeline. Since excessive discharge may cause eutrophication and deterioration of aquatic system, nitrate is regulated for wastewater discharge in sensitive areas. Further, nitrate needs to be monitored and controlled in drinking water treatment to protect against methemoglobinemia in bottle-fed infants.

Microbial electrochemical systems (MESs, also known as bioelectrochemical systems (BESs) are promising technologies for energy and products recovery coupled with wastewater treatment, and have attracted increasing attention. Many studies have been conducted to expand the application of MESs for contaminants degradation and bioremediation, and increase the efficiency of electricity production by optimizing architectural structure of MESs, developing new electrode materials, etc. However, one of the big challenges for researchers to overcome, before MESs can be used commercially, is to improve the performance of the biofilm on electrodes so that ‘electron transfer’ can be enhanced. This would lead to greater production of electricity, energy or other products. Electrochemically active microorganisms (EAMs) are a group of microorganisms which are able to release electrons from inside their cells to an electrode or accept electrons from an electron donor. The way in which EAMs do this is called ‘extracellular electron transfer’ (EET). So far, two EET mechanisms have been identified: direct electron transfer from microorganisms physically attached to an electrode, and indirect electron transfer from microorganisms that are not physically attached to an electrode. 1) Direct electron transfer between microorganisms and electrode can occur in two ways: a) when there is physical contact between outer membrane structures of the microbial cell and the surface of the electrode, b) when electrons are transferred between the microorganism and the electrode through tiny projections (called pili or nanowires) that extend from the outer membrane of the microorganism and attach themselves to the electrode. 2) Indirect transfer of electrons from the microorganisms to an electrode occurs via long-range electron shuttle compounds that may be naturally present (in wastewater, for example), or may be produced by the microorganisms themselves. The electrochemically active biofilm, which degrades contaminants and produces electricity in MESs, consists of diverse community of EAMs and other microorganisms. However, up to date only a few EAMs have been identified, and most studies on EET have focused on the two model species of Shewanella oneidensis and Geobacter sulfurreducens.

Anthropogenic activity has clearly altered the N cycle contributing (among other factors) to climate change. This book aims to provide new biotechnological approach representing innovative strategies to solve specific problems related to the imbalance originating in the N cycle. Aspects such as new conceptions in agriculture, wastewater treatment, and greenhouse gas emissions are discussed in this book with a multidisciplinary vision. A team of international authors with wide experience have contributed up-to-date reviews, highlighting scientific principles and their environmental importance and integrating different biotechnological processes in environmental technology.

YNO and[small letter mu][subscriptmax]NO of the sample and synthetic nitrate solution are obtained from the absorbance and NO3N measurements. The biotreatability index, BI, of the test sample is obtained by taking the ratio of[small letter mu][subscript max]NO of the sample to [small letter mu][subscript max]NO of a synthetic nitrate solution containing the same nitrate concentration. A BI value of 1 means that the test sample can be successfully denitrified, and values considerably less than 1 show that the denitrification will be very difficult.

This book highlights the impacts of emerging pollutants (both organic and inorganic) in water bodies and the role and performances of different water and wastewater treatment approaches that are presently being employed in the field of environmental engineering. Some of these approaches are focused on ‘end-of-pipe’ treatment, while most of these approaches are focused on the application of novel physic-chemical and biological techniques for wastewater treatment and reuse. The goal of this book is to present the emerging technologies and trends in the field of water and wastewater treatment. The papers in this book provide clear proof that environmentally friendly (bio)technologies are becoming more and more important and playing a critical role in removing a wide variety of organic and inorganic pollutants from water. In Focus – a book series that showcases the latest accomplishments in water research. Each book focuses on a specialist area with papers from top experts in the field. It aims to be a vehicle for in-depth understanding and inspire further conversations in the sector.

Aerobic Granular Sludge has recently received growing attention by researchers and technology developers, worldwide. Laboratory studies and preliminary field tests led to the conclusion that granular activated sludge can be readily established and profitably used in activated sludge plants, provided 'correct' process conditions are chosen. But what makes process conditions 'correct'? And what makes granules different from activated sludge flocs? Answers to these question are offered in Aerobic Granular Sludge. Major

topics covered in this book include: Reasons and mechanism of aerobic granule formation Structure of the microbial population of aerobic granules Role, composition and physical properties of EPS Diffuse limitation and microbial activity within granules Physio-chemical characteristics Operation and application of granule reactors Scale-up aspects of granular sludge reactors, and case studies Aerobic Granular Sludge provides up-to-date information about a rapidly emerging new technology of biological treatment.
Biological denitrification of nitrate solutions at concentrations of greater than one kilogram nitrate per cubic meter is accomplished anaerobically in an upflow column having as a packing material a support for denitrifying bacteria.
Biotechnology for Waste Management and Site Restoration covers: waste management - solid, gaseous, liquid; site restoration - radioactivity, organics, toxic metals; educational, economic, social and business aspects; and international collaboration. International collaboration is growing apace and many concrete projects have been started. The body of knowledge is growing. Over the long term, it is envisaged that this international collaboration will result in a long-term scientific and technological strategy, new technologies and alternative solutions, and practical implementations of biotechnology for the nuclear and industrial sectors of the economy.
Carbon nanomaterials possess special physical and chemical properties. As adsorbents, they are widely used for the purification of water and other liquids, recovery of valuable substances from liquid and gaseous media, and oil refining and also in petrochemical, wine, oil and fat, and other industries. They can be used in medicine, both for the creation of hemosorption systems that are capable of performing specific purification of blood and other physiological fluids, including removal of various exo- and endotoxicants, and for the construction of highly effective adsorbed probiotics. The creation of nanostructured carbon-containing materials is one of many rapidly developing research fields and also the theme of this book. The book focuses on the recent developments in the synthesis of nanostructured carbon multifunctional sorbents and covers topics such as fusicoccin compounds as anticancer agents, entero- and vulnerosorption, and blood purification. It will be useful for scientists, chemical industry specialists, professors, and master’s and PhD students of chemical, physical, and biological sciences.
Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.
Nitrate levels in Central Australian ground water; samples from Ti Tree and Yulara; water treatment and appropriate technology.
Eleven industrial carbon sources were evaluated for their efficiency to supply energy for biological denitrification of high nitrates (1259 mg/liter) in a single-stage continuous flow fermenter. The determination of relative efficiency was the minimum C/N ratio (grams of carbon to grams of nitrogen) necessary to achieve at least 95 percent denitrification and 90 percent total organic carbon (TOC) removal. Methanol was the most efficient carbon source evaluated, while sweet whey, corn steep liquor, acid whey and soluble potato solids followed in order of decreasing efficiency. Three of the carbon sources failed to achieve the 90 percent reduction in TOC. Sewage sludge was unusable due to lack of available carbon. This order of efficiency may change once other factors are considered such as cost of carbon source, transportation costs, handling costs, availability, and other factors. In the treatment of nitrate contaminated munitions process waters the use of alternate carbon sources will be needed not only for biological nitrate reduction but also for the biological cometabolism of many of the munition compounds themselves.
Biological denitrification appears to be one of the most effective methods to remove nitrates from wastewater streams (Christenson and Harremoes, 1975). However, most of the research and development work has been centered on removal of nitrates from sewage or agricultural drainage waters, nitrate nitrogen concentration usually less than 50 g/m/sup 3/. Work was initiated at Oak Ridge National Laboratory (ORNL) in 1974 to test the use of biological nitrification in the removal of high concentrations of nitrate (in excess of 1.0 kg NO/sub 3/-N/m/sup 3/) from uranium purification waste streams. Since then, a full-scale treatment facility, a stirred reactor, has been installed at the Y-12 plant; and a pilot-plant, using a fluidized bed, has been proposed at Portsmouth Gaseous Diffusion Plant. The objective of this manuscript is to present some applied microbiological research relating to possible constraints in biologically denitrifying certain waste streams in the nuclear industry and comparing the effectiveness of denitrification of these waste streams in three bench scale reactors, (1) a continuous flow-stirred reactor, (2) stirred bed rector, and (3) a fluidized bed reactor.
The forty papers in this book explore the state of sustainable groundwater management in a wide range of countries and cultures, climates, and geologies. They are organized in topic areas covering flow, chemical water quality, biological water quality, remediation, engineering, and socio-economics. An introductory section presents a range of integrated regional-scale studies. This volume will interest groundwater specialists in industry and research, and will provide insight for other urban specialists, including planners.
The nitrate content of drinking water is rising at an alarming rate in several regions of NATO countries and elsewhere in the world. The increase is due to lack of proper sewage treatment, and primarily to excess fertilizer application. Also, eutrophication in several coastal areas is triggered by high nitrate concentrations. The main purpose of this book is to integrate scientific knowledge related to exposure assessment, health consequences and control of nitrate contamination in water. The motivation is related to the magnitude, the possible adverse health effects, and the high cost of control ling nitrate contamination. Future research tasks are defined by an interaction among hydro logists, toxicologists and environmental engineers in an integrated framework for nitrate risk management. The target readership of this book is a mix of university colleagues, practitioners from both the private and public sectors and advanced graduate students working with the hydrological, health science or environmental engineering aspects of nitrate contamination. The main conclusions include: 1. For risk assessment purposes, knowledge and sufficiently accurate models are available to predict nitrate load and its fate in water under changes in land use. 2. Once agricultural exposure controls are implemented, the response times in ground water may be so long as to make controls unrealistic. 3. It is still unknown whether agricultural best management practice is a compromise between nitrate risk reduction and agricultural revenue. 4. The current drinking water guidelines of 10 mg/L NOrN need not be changed.
Nitrogen in the Marine Environment provides information pertinent to the many aspects of the nitrogen cycle. This book presents the advances in ocean productivity research, with emphasis on the role of microbes in nitrogen transformations with excursions to higher trophic levels. Organized into 24 chapters, this book begins with an overview of the abundance and distribution of the various forms of nitrogen in a number of estuaries. This text then provides a comparison of the nitrogen cycling of various ecosystems within the marine environment. Other chapters consider chemical distributions and methodology as an aid to those entering the field. This book discusses as well the enzymology of the initial steps of inorganic nitrogen assimilation. The final chapter deals with the philosophy and application of modeling as an investigative method in basic research on nitrogen dynamics in coastal and open-ocean marine environments. This book is a valuable resource for plant biochemists, microbiologists, aquatic ecologists, and bacteriologists.
Nitrogen containing compounds produced by industrial processes are pollutants which pose a significant environmental and health hazard. There are a number of processes that have been devised for

removing nitrogen compounds from wastewater. This reference book summarizes different denitrification methods for wastewater processing. The book introduces readers to toxic nitrogen compounds responsible for water pollution. This introduction is followed by chapters which explain different nitrogen removal methods including conventional methods, biological methods, food industry wastewater treatment and new approaches towards environmental pollution remediation: Bio Electrochemical Systems (BESs). This book is a handy reference guide for industrial and environmental engineers and students learning about wastewater management and industrial denitrification.

For more than a quarter century, Sittig's Handbook of Toxic and Hazardous Chemicals and Carcinogens has proven to be among the most reliable, easy-to-use and essential reference works on hazardous materials. Sittig's 5th Edition remains the lone comprehensive work providing a vast array of critical information on the 2,100 most heavily used, transported, and regulated chemical substances of both occupational and environmental concern. Information is the most vital resource anyone can have when dealing with potential hazardous substance accidents or acts of terror. Sittig's provides extensive data for each of the 2,100 chemicals in a uniform format, enabling fast and accurate decisions in any situation. The chemicals are presented alphabetically and classified as a carcinogen, hazardous substance, hazardous waste, or toxic pollutant. This new edition contains extensively expanded information in all 28 fields for each chemical (see table of contents) and has been updated to keep pace with world events. Chemicals classified as WMD have been included in the new edition as has more information frequently queried by first responders and frontline industrial safety personnel. *Includes and references European chemical identifiers and regulations. *The only single source reference that provides such in-depth information for each chemical. *The two volume set is designed for fast and accurate decision making in any situation.

This manual is constructed to progress from a broad discussion of nitrogen in the environment to the concepts using biological processes to control or remove nitrogen, and finally to the details of designing specific systems.

More than ever before, a compelling need exists for an encyclopedic resource about soil - the rich mix of mineral particles, organic matter, gases, and soluble compounds that foster both plant and animal growth. Civilization depends more on the soil as human populations continue to grow and increasing demands are placed upon available resources. The Encyclopedia of Soils in the Environment is a comprehensive and integrated consideration of a topic of vital importance to human societies in the past, present, and future. This important work encompasses the present knowledge of the world's variegated soils, their origins, properties, classification, and roles in the biosphere. A team of outstanding, international contributors has written over 250 entries that cover a broad range of issues facing today's soil scientists, ecologists, and environmental scientists. This four-volume set features thorough articles that survey specific aspects of soil biology, ecology, chemistry and physics. Rounding out the encyclopedia's excellent coverage, contributions cover cross-disciplinary subjects, such as the history of soil utilization for agricultural and engineering purposes and soils in relation to the remediation of pollution and the mitigation of global climate change. This comprehensive, yet accessible source is a valuable addition to the library of scientists, researchers, students, and policy makers involved in soil science, ecology, and environmental science. Also available online via ScienceDirect - featuring extensive browsing, searching, and internal cross-referencing between articles in the work, plus dynamic linking to journal articles and abstract databases, making navigation flexible and easy. For more information, pricing options and availability visit www.info.sciencedirect.com. A distinguished international group of editors and contributors Well-organized encyclopedic format providing concise, readable entries, easy searches, and thorough cross-references Abundant visual resources - photographs, figures, tables, and graphs - in every entry Complete up-to-date coverage of many important topics - essential information for scientists, students and professionals alike

Slow sand filtration is typically cited as being the first "engineered" process in drinking-water treatment. Proven modifications to the conventional slow sand filtration process, the awareness of induced biological activity in riverbank filtration systems, and the growth of oxidant-induced biological removals in more rapid-rate filters (e.g. biological activated carbon) demonstrate the renaissance of biofiltration as a treatment process that remains viable for both small, rural communities and major cities. Biofiltration is expected to become even more common in the future as efforts intensify to decrease the presence of disease-causing microorganisms and disinfection by-products in drinking water, to minimize microbial regrowth potential in distribution systems, and where operator skill levels are emphasized. Recent Progress in Slow Sand and Alternative Biofiltration Processes provides a state-of-the-art assessment on a variety of biofiltration systems from studies conducted around the world. The authors collectively represent a perspective from 23 countries and include academics, biofiltration system users, designers, and manufacturers. It provides an up-to-date perspective on the physical, chemical, biological, and operational factors affecting the performance of slow sand filtration (SSF), riverbank filtration (RBF), soil-aquifer treatment (SAT), and biological activated carbon (BAC) processes. The main themes are: comparable overviews of biofiltration systems; slow sand filtration process behavior, treatment performance and process developments; and alternative biofiltration process behaviors, treatment performances, and process developments.

This edited volume comprises the proceedings of ICACE-2015. In the recent past Chemical Engineering as a discipline has been diversifying into several frontier areas and this volume addresses the advances in core Chemical Engineering as well as allied fields. The contents of this volume focus on energy and environmental applications of chemical engineering research and on materials science aspects of chemical engineering. This book will be useful to researchers, students, and professionals, particularly those working on interdisciplinary applications of Chemical Engineering problems.

This book examines bioremediation technologies as a tool for environmental protection and management. It provides global perspectives on recent advances in the bioremediation of various environmental pollutants. Topics covered include comparative analysis of bio-gas electrification from anaerobic digesters, mathematical modeling in bioremediation, the evaluation of next-generation sequencing technologies for environmental monitoring in wastewater abatement; and the impact of diverse wastewater remediation techniques such as the use of nanofibers, microbes and genetically modified organisms; bioelectrochemical treatment; phytoremediation; and biosorption strategies. The book is targeted at scientists and researchers working in the field of bioremediation.

This time-saving book provides extensive coverage of all important aspects of nitrates in groundwater, ranging from prevention to problem assessment to remediation. It begins by highlighting the nitrogen cycle and related health concerns, providing both background information and a unique perspective on health issues. It then analyzes subsurface pr

Proceedings of the Conference on Nitrogen as a Water Pollutant