

## Prediction Of Moving Bed Biofilm Reactor Mbbf

The main focus of this book is the transport mechanics of sediment particles coated with microbial biofilm, which is called bio-sediment. The book also addresses the question of how to measure and simulate the considerable variation in the properties of natural sediment associated with microbial biofilm, ranging from the micro-scale surface morphology to the macro-scale sediment transport. Nowadays most studies to elucidate the mechanisms of sediment transport have concentrated on physical-chemical sediment properties, little work explicitly coupled sediment dynamics and the environmental effects under the influence of micro-ecosystem, thus leaving a serious gap in water and sediment sciences as well as water ecological research. With respect to physical-chemical sediment properties, this book has been undertaken to evaluate and quantify the effect of biological factors - biofilm on sediment transport mechanics. The chapters cover topics including development of bio-sediment and its properties; model of biofilm growth on sediment substratum; bedform and flow resistance of bio-sediment bed; incipient velocity and settling velocity of bio-sediment; bedload and suspended load transport for bio-sediment; numerical simulation of bio-sediment transport. Besides, the measurement technology, analysis method and expression approach introduced in this book combine the characteristics of hydraulic, environmental and microbial research, having more immediate innovation. This book will be of interest to researchers, managers, practitioners, policy and decision makers, international institutions, governmental and non-governmental organizations, educators, as well as graduate and undergraduate students in the field of hydraulics and river dynamics. It will help to understand the relevance of sediment transport and biofilm growth under the role of aqueous micro-ecosystem, to introduce better tools for the simulation and prediction of bio-sediment transport, and to provide a scientific basis and application foundation for the research of interaction between sediment particles and ecological and environmental factors.

This volume offers a detailed overview of currently applied and tested wastewater treatment technologies and the integration of advanced processes to remove trace organic contaminants and microorganisms. It discusses the potential of enhanced biological treatment to produce effluent suitable for reuse, new processes for urban wastewater disinfection and the reduction of antibiotic resistant bacteria, as well as the effect of advanced oxidation processes on wastewater microbiome and chemical contaminants. It also presents membrane bioreactors, moving bed bioreactors, light and solar driven technologies, ozonation and immobilised heterogeneous photocatalysis and provides an evaluation of the potential of constructed wetlands integrated with advanced oxidation technologies to produce wastewater safe for reuse. Furthermore, the volume discusses water reuse issues and standards, the status of membrane bioreactors applications, and the treatment of reverse osmosis concentrate for enhanced water recovery during wastewater treatment. Finally, it presents recent developments in potable water reuse and addresses various important issues in this framework, like the proper protection of public health, reliability and monitoring. This volume is of interest to experts, scientists and practitioners from various fields of research, including analytical and environmental chemistry, toxicology and environmental and sanitary engineering, as well as treatment plant operators and

policymakers.

Biofilms in Wastewater Treatment: An Interdiscipli

Strategic Perspectives in Solid Waste and Wastewater Management explores conventional and advanced biotechnologies for waste management, including socio-economic aspects, techno-economic feasibility, models and modeling tools, and a detailed life-cycle assessment approach in solid waste (SW) and wastewater (WW). These innovative technologies are highly applicable to current real-world situations. The enormous increase in the quantum and diversity of SW and WW - including waste materials generated due to human activity and their potentially harmful effects on the environment and public health - have led to increasing awareness about an urgent need to adopt novel technologies for appropriate management of both SW and WW. While there is an obvious need to minimize the generation of wastes and to reuse and recycle them, the technologies for managing such wastes can play a vital role in mitigating problems. Besides recovery of substantial energy, these technologies can lead to a considerable reduction in the overall waste quantities requiring final disposal, which can be better managed for safe disposal in a controlled manner while meeting pollution control standards. Outlines appropriate technologies for solid waste and wastewater management systems and their applications Presents and evaluates the Best Available Technology (BAT) and includes global case studies Provides methods for evaluating the way to use appropriate technological systems to develop the best technically and economically feasible projects worldwide Offers an excellent resource for university students to use for their research and dissertations

The latest Methods for Wastewater Treatment Using Fixed-Film Processes This Water Environment Federation resource provides complete coverage of pure fixed-film and hybrid treatment systems, along with details on their design, performance, and operational issues. Biofilm Reactors discusses factors that affect the design of the various processes, appropriate design criteria and procedures, modeling techniques, equipment requirements, and construction methods. Operational issues associated with each type of process are presented, including potential problems and corrective actions. Real-world case studies illustrate the application of the technologies presented in this authoritative volume. Biofilm Reactors covers: Biology of fixed-film processes Trickle filter and combined trickle filter suspended-growth process design and operation Rotating biological contactors Moving-bed biofilm reactors Hybrid processes Biological filters New and emerging fixed-film technologies Clarification Effluent filtration Development and application of models for integrated fixed-film activated sludge, moving-bed reactors, biological aerated filters, and trickle filters

Soft Computing Techniques in Solid Waste and Wastewater Management is a thorough guide to computational solutions for researchers working in solid waste and wastewater management operations. This book covers in-depth analysis of process variables, their effects on overall efficiencies, and optimal conditions and procedures to improve performance using soft computing techniques. These topics coupled with the systematic analyses described will help readers understand various techniques that can be effectively used to achieve the highest performance. In-depth case studies along with discussions on applications of various soft-computing techniques help readers control waste processes and come up with short-term, mid-term and long-term strategies. Waste management is an increasingly important field due to rapidly

increasing levels of waste production around the world. Numerous potential solutions for reducing waste production are underway, including applications of machine learning and computational studies on waste management processes. This book details the diverse approaches and techniques in these fields, providing a single source of information researchers and industry practitioners. It is ideal for academics, researchers and engineers in waste management, environmental science, environmental engineering and computing, with relation to environmental science and waste management. Provides a comprehensive reference on the implementation of soft computing techniques in waste management, drawing together current research and future implications Includes detailed algorithms used, enabling authors to understand and appreciate potential applications Presents relevant case studies in solid and wastewater management that show real-world applications of discussed technologies Our interest in the microbial biodegradation of xenobiotics has increased many folds in recent years to find out sustainable ways for environmental cleanup. Bioremediation and biotransformation processes harness the naturally occurring ability of microbes to degrade, transform or accumulate a wide range of organic pollutants. Major methodological breakthroughs in recent years through detailed genomic, metagenomic, proteomic, bioinformatic and other high-throughput analyses of environmentally relevant microorganisms have provided us unprecedented insights into key biodegradative pathways and the ability of organisms to adapt to changing environmental conditions. The degradation of a wide spectrum of organic pollutants and wastes discharged into the environment by anthropogenic activities is an emerging need today to promote sustainable development of our society with low environmental impact. Microbial processes play a major role in the removal of recalcitrant compounds taking advantage of the astonishing catabolic versatility of microorganisms to degrade or transform such compounds. New breakthroughs in sequencing, genomics, proteomics, bioinformatics and imaging are generating vital information which opens a new era providing new insights of metabolic and regulatory networks, as well as clues to the evolution of degradation pathways and to the molecular adaptation strategies to changing environmental conditions. Functional genomic and metagenomic approaches are increasing our understanding of the relative importance of different pathways and regulatory networks to carbon flux in particular environments and for particular compounds. New approaches will certainly accelerate the development of bioremediation technologies and biotransformation processes in coming years for natural attenuation of contaminated environments

The first part of the book is devoted to the activated sludge process, covering the removal of organic matter, nitrogen and phosphorus. A detailed analysis of the biological reactor (aeration tank) and the final sedimentation tanks is provided. The second part of the book covers aerobic biofilm reactors, especially trickling filters, rotating biological contractors and submerged aerated biofilters. For all the systems, the book presents in a clear and informative way the main concepts, working principles, expected removal efficiencies, design criteria, design examples, construction aspects and operational guidelines.

Many standard industrial waste treatment texts sufficiently address a few major technologies for conventional in-plant environmental control strategies in the food industry. But none explore the complete range of technologies with a focus on new developments in innovative and alternative technology, design criteria, effluent standards, managerial decision methodology, and regional and global environmental conservation specific to the food industry. Until now.

Waste Treatment in the Food Processing Industry provides in-depth coverage of environmental pollution sources, waste characteristics, control technologies, management strategies, facility innovations, process alternatives, costs, case histories, effluent standards, and future trends. It delineates methodologies, technologies, and the regional and global effects of important pollution control practices. The book highlights major food processing plants or installations that have significant effects on the environment. Since the areas of food industry waste treatment are broad, no one can claim to be an expert in all of them. Reflecting this, the editors recruited collective contributions from specialists in their respective topics, rather than relying on a single author's expertise. The topics covered include dairies, seafood processing plants, olive oil manufacturing factories, potato processing plants, soft drink production plants, bakeries, and various other food processing facilities. Professors, students, and researchers in the environmental, civil, chemical, sanitary, mechanical, and public health engineering and science fields will find valuable educational materials in this book. The extensive bibliographies for each type of food waste treatment or practice will be invaluable to environmental managers, or researchers who need to trace, follow, duplicate, or improve on a specific food waste treatment practice. Comprehensive in scope, the book provides solutions that are directly applicable to the daily waste management problems specific to the food processing industry.

Master's Thesis from the year 2006 in the subject Biology - Micro- and Molecular Biology, , course: Masters Of Science in Microbiology, language: English, abstract: Variations of Winogradsky Columns were designed, i.e. soil texture, light, salts, hard substrates, carbon and energy sources, Winogradsky Tanks to simulate wind and waves, Winogradsky Fuel Cells to monitor the redox potential of the biofilms, High Pressure Winogradsky to simulate water depth, etc. The influence of the Winogradsky's environment on the biofilm patterns and vice versa were studied. The phenomenon of microbial succession was studied. The patterns were tracked by making Winogradsky Maps and mathematical data obtained by taking the Equivalent Weight of the pattern cutouts. Regression Equations were assessed to individual biofilm patterns. These equations were tested to predict the patterns. Finally a design for an all-environment simulation Winogradsky Column was laid. Innovative setups to simulate deep sea pressure were also done to see the consequent biofilm patterns.

This book focuses on biogas production by anaerobic digestion, which is the most popular bioenergy technology of today. Using anaerobic digestion for the production of biogas is a sustainable approach that simultaneously also allows the treatment of organic waste. The energy contained in the substrate is released in the form of biogas, which can be employed as a renewable fuel in diverse industrial sectors. Although biogas generation is considered an established process, it continues to evolve, e.g. by incorporating modifications and improvements to increase its efficiency and its downstream applications. The chapters of this book review the progress made related to feedstock, system configuration and operational conditions. It also addresses microbial pathways utilized, as well as storage, transportation and usage of biogas. This book is an up-to-date resource for scientists and students working on improving biogas production.

When bacteria attach to and colonise the surfaces of food processing equipment and food products themselves, there is a risk that biofilms may form. Human pathogens in biofilms can be harder to remove than free microorganisms and may therefore pose a more significant food safety risk. Biofilms in the food and beverage industries reviews the formation of biofilms in these sectors and best practices for their control. The first part of the book considers fundamental aspects such as molecular mechanisms of biofilm formation by food-associated bacteria and methods for biofilm imaging, quantification and monitoring. Part two then reviews biofilm formation by different microorganisms. Chapters in Part three focus on significant issues related to biofilm prevention and removal. Contributions on biofilms in particular food industry sectors, such as dairy and red meat processing and fresh produce, complete the

collection. With its distinguished editors and international team of contributors, *Biofilms in the food and beverage industries* is a highly beneficial reference for microbiologists and those in industry responsible for food safety. Considers fundamental aspects concerning the ecology and characteristics of biofilms and considers methods for their detection Examines biofilm formation by different micro-organisms such as salmonella and food spoilage Discusses specific issues related to biofilm prevention and removal, such as cleaning and sanitation of food contact surfaces and food processing equipment

The book discusses ways to overcome the side effects of using hydrocarbon-based products as energy sources. Hydrocarbons produce raw crude oil waste of around 600,000 metric tons per annum, with a range of uncertainty of 200,000 metric tons per year. The various chapters in this book focus on approaches to reduce these wastes through the application of potential microbes, in a process called bioremediation. The book is a one-stop reference resource on the methods, mechanisms and application of the bio-composites, in the laboratory and field. Focusing on resolving a very pressing environmental issue, it not only provides details of existing challenges, but also offers deeper insights into the possibility of solving problems using hydrocarbon bioremediation.

*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, electro dialysis, and diffusion dialysis Considers hybrid membrane systems expanded to cover zero liquid discharge, salt recovery, and removal of trace contaminants

*The Future of Effluent Treatment Plants: Biological Treatment Systems* is an advanced and updated version of existing biological technologies that includes their limitations, challenges, and potential application to remove chemical oxygen demand (COD), refractory chemical oxygen demand, biochemical oxygen demand (BOD), color removal and environmental pollutants through advancements in microbial bioremediation. The book introduces new trends and advances in environmental bioremediation with thorough discussions of recent developments. In addition, it illustrates that the application of these new emerging innovative technologies can lead to energy savings and resource recovery. The importance of respiration, nitrogen mineralization, nitrification, denitrification and biological phosphorus removal processes in the development of a fruitful and applicable solution for the removal of toxic pollutants from wastewater treatment plants is highlighted. Equally important is the knowledge and theoretical modeling of water movement through wastewater ecosystems. Finally, emphasis is given to the function of constructed wetlands and activated sludge processes. Considers different types of industrial wastewater Focuses on biological wastewater treatments Introduces new trends in bioremediation Addresses the future of WWTPs

The 10th International Symposium on Process Systems Engineering, PSE'09, will be held in Salvador-Bahia, Brazil on August 16-20, 2009. The special focus of PSE 2009 is Sustainability, Energy and Engineering. PSE 2009 is the tenth in the triennial series of international symposia on process systems engineering initiated in 1982. The meeting is brings together the

worldwide PSE community of researchers and practitioners who are involved in the creation and application of computing-based methodologies for planning, design, operation, control and maintenance of chemical and petrochemical process industries. PSE'09 will look at how the PSE methods and tools can support sustainable resource systems and emerging technologies in the areas of green engineering: environmentally conscious design of industrial processes. PSE methods and tools support: - sustainable resource systems - emerging technologies in the areas of green engineering - environmentally conscious design of industrial processes

Water is the most valuable resource for all human development. With increasing global population the demand for water increases whereas the sources of clean water are decreasing. recycling and reuse of wastewater has become an imperative which demands the development of new, efficient and environmentally friendly treatment methods. Current Trends and Future Developments in (Bio-) Membranes: Recent Achievements in Wastewater and Water Treatments provides a comprehensive coverage of the existing wastewater treatment including, but not exclusively, membrane-based methods. The book presents most common used methods compares and evaluates them depending on their particular application. It illustrates many aspects of the various treatment systems used in water and wastewater purification and lists the advantages of membrane-based methods to non-membrane based technologies. This book focuses on introducing, applications, advantages/disadvantages, evaluating of membrane-based technologies and comparing it with other non-membrane based systems. It also analyses the various limitations of each method. Hence, the book is a key reference text for R&D managers in industry interested in the development of water/waste treatment technologies as well as academic researchers and postgraduate students working in the wider area of the strategic treatment, separation and purification processes. Provides the state-of-the-art of water and wastewater treatments by various technologies Describes novel and emerging technologies for waste/water treatment Discusses a number of case studies of popular applications Offers an economic evaluation of various technologies

Over 90% of bacterial biomass exists in the form of biofilms. The ability of bacteria to attach to surfaces and to form biofilms often is an important competitive advantage for them over bacteria growing in suspension. Some biofilms are "good" in natural and engineered systems; they are responsible for nutrient cycling in nature and are used to purify waters in engineering processes. Other biofilms are "bad" when they cause fouling and infections of humans and plants. Whether we want to promote good biofilms or eliminate bad biofilms, we need to understand how they work and what works to control them. Mathematical Modeling of Biofilms provides guidelines for the selection and use of mathematical models of biofilms. The whole range of existing models - from simple analytical expressions to complex numerical models - is covered. The application of the models for the solution of typical problems is demonstrated, and the performance of the models is tested in comparative studies. With the dramatic evolution of the computational capacity still going on, modeling tools for research and practice will become more and more significant in the next few years. This report provides the foundation to understand the models and to select the most appropriate one for a given use. Mathematical Modeling of Biofilms gives a state-of-the-art overview that is especially valuable for educating students, new biofilm researchers, and design engineers. Through a series of three benchmark problems, the report demonstrates how to use the different models and indicates when simple or highly complex models are most appropriate. This is the first report to give a quantitative comparison of existing biofilm models. The report supports model-based design of biofilm reactors. The report can be used as basis for teaching biofilm-system modeling. The report provides the foundation for researchers seeking to use biofilm modeling or to develop new biofilm models. Scientific and Technical Report No.18

Presenting effective, practicable strategies modeled from ultramodern technologies and framed by the critical insights of 78 field experts, this vastly expanded Second Edition offers 32

chapters of industry- and waste-specific analyses and treatment methods for industrial and hazardous waste materials-from explosive wastes to landfill leachate to wastes produced by the pharmaceutical and food industries. Key additional chapters cover means of monitoring waste on site, pollution prevention, and site remediation. Including a timely evaluation of the role of biotechnology in contemporary industrial waste management, the Handbook reveals sound approaches and sophisticated technologies for treating textile, rubber, and timber wastes dairy, meat, and seafood industry wastes bakery and soft drink wastes palm and olive oil wastes pesticide and livestock wastes pulp and paper wastes phosphate wastes detergent wastes photographic wastes refinery and metal plating wastes power industry wastes This state-of-the-art Second Edition is required reading for pollution control, environmental, chemical, civil, sanitary, and industrial engineers; environmental scientists; regulatory health officials; and upper-level undergraduate and graduate students in these disciplines.

This book contains the proceedings of the 10e of a series of international symposia on process systems engineering (PSE) initiated in 1982. The special focus of PSE09 is how PSE methods can support sustainable resource systems and emerging technologies in the areas of green engineering. \* Contains fully searchable CD of all printed contributions \* Focus on sustainable green engineering \* 9 Plenary papers, 21 Keynote lectures by leading experts in the field Advances in Wastewater Treatment presents a compendium of the key topics surrounding wastewater treatment, assembled by looking at the future technologies, and provides future perspectives in wastewater treatment and modelling. It covers the fundamentals and innovative wastewater treatment processes (such as membrane bioreactors and granular process). Furthermore, it focuses attention on mathematical modelling aspects in the field of wastewater treatments by highlighting the key role of models in process design, operation and control. Other topics include: • Anaerobic digestion • Biological nutrient removal • Instrumentation, control and automation • Computational fluid dynamics in wastewater • IFAS systems • New frontiers in wastewater treatment • Greenhouse gas emissions from wastewater treatment Each topic is addressed by discussing past, present and future trends. Advances in Wastewater Treatment is a valid support for researchers, practitioners and also students to have a frame of the frontiers in wastewater treatment and modelling.

The sustainable management of the Forest Industries challenges many different disciplines. Not only do the different forest industry sectors vary in the approaches needed, but the unique nature of mills and their surrounding environments create a huge variety of conditions and hence of strategies to be employed. Yet again the IAWQ's Forest Industry Wastewaters Symposium provided a forum for the world's leading experts to discuss the scientific and practical issues and report progress. The proceedings are introduced by 4 invited papers that examine the social, economic and ecological relationships of the forest industries and together with the concluding summary of the sessions and related panel discussion make plain the context in which the industries operate and can continue to improve their performance. The 42 selected papers cover: Process water treatment and recirculation Biological treatment Environmental effects Treatment and utilization of solids Studies of specific compounds and management of residuals and toxicity. These proceedings genuinely constitute a briefing on the state of the art and will prove invaluable to anyone involved as a researcher or a practitioner in the management of forest industry wastewaters.

Indexes material from conference proceedings and hard-to-find documents, in addition to journal articles. Over 1,000 journals are indexed and literature published from 1981 to the present is covered. Topics in pollution and its management are extensively covered from the standpoints of atmosphere, emissions, mathematical models, effects on people and animals, and environmental action. Major areas of coverage include: air pollution, marine pollution, freshwater pollution, sewage and wastewater treatment, waste management, land pollution, toxicology and health, noise, and radiation.

Handbook of Biological Wastewater Treatment: Second Edition deals with the optimized design of biological and chemical nutrient removal. It presents the state-of-the-art theory concerning the various aspects of the activated sludge system and develops procedures for optimized cost based design and operation.

"Access to safe water is a fundamental human need and therefore a basic human right" --Kofi Annan, United Nations Secretary General Edited by two world-renowned scientists in the field, The Handbook of Water and Wastewater Microbiology provides a definitive and comprehensive coverage of water and wastewater microbiology. With contributions from experts from around the world, this book gives a global perspective on the important issues faced in the provision of safe drinking water, the problems of dealing with aquatic pollution and the processes involved in wastewater management. Starting with an introductory chapter of basic microbiological principles, The Handbook of Water and Wastewater Microbiology develops these principles further, ensuring that this is the essential text for process engineers with little microbiological experience and specialist microbiologists alike. Comprehensive selection of reviews dealing with drinking water and aquatic pollution Provides an understanding of basic microbiology and how it is applied to engineering process solutions Suitable for all levels of knowledge in microbiology -from those with no background to specialists who require the depth of information

This book presents an integrated discussion on ecotoxicology, containing both general concepts and specific ecotoxicological issues of major biological groups, extending beyond conventional systems. It explores worldwide, regional, and biocompartmentalized topics, bringing forth new points of view on global issues and addressing the increasing diversity and complexity of the ecotoxicological field. It also contains novel information on emerging contaminants, presents bioaccumulation effects on different levels of ecological organization and risk analyses, and discusses novel fields of methodological applications, including key aspects in ecotoxicological and environmental monitoring studies.

This reference details particle characterization, dynamics, manufacturing, handling, and processing for the employment of multiphase reactors, as well as procedures in reactor scale-up and design for applications in the chemical, mineral, petroleum, power, cement and pharmaceuticals industries. The authors discuss flow through fixed beds, elutriati  
Sustainable Technologies for Water and Wastewater TreatmentCRC Press

"In 2009, the third edition of the Encyclopedia of Microbiology and the Desk Encyclopedia of Microbiology published, providing customers with a six-volume compendium and condensed reference, respectively, on the vast subject of microbiology. This derivative will compile thirty-two chapters from the original MRW relating to microbial ecology (the study of how microbes interact with each other and their environments) and present them in a single thematic volume that will appeal to researchers, technicians, and students in the environmental science and microbial ecology fields. Classic and cutting-edge entries on topics including air quality, marine habitats, food webs, and microbial adhesion will be fully updated by their original authors (when possible), providing a up-to-date and affordable option to those with focused research interests"--Provided by publisher.

Sustainable Technologies for Water and Wastewater Treatment discusses relevant sustainable technologies for water and wastewater treatment pertaining to a nanoscale approach to water treatment and desalination, membrane-based technologies for water recovery and reuse, the energy and water nexus,



degradation of organic pollutants, nascent technologies, bio and bio-inspired materials for water reclamation and integrated systems, and an overview of wastewater treatment plants. The book focuses on advanced topics including in situ generation of hydroxyl radicals, which can aid in the indiscriminate oxidation of any contaminant present in wastewater, making advanced oxidation processes commercially viable. Features: A comprehensive review of current and novel water and wastewater treatment technologies from a sustainability perspective All the sustainable technologies, such as desalination, wastewater treatment, advanced oxidation processes, hydrodynamic cavitation, membrane-based technologies, sonosorption, and electrospun fibers Discussion on reference materials for important research accomplishments in the area of water and environmental engineering Theoretical aspects covering principles and instrumentation A summary on sustainability, including life cycle assessment (LCA), energy balance and large-scale implementation of advanced techniques This book is aimed at professionals, graduate students, and researchers in civil, chemical, environmental engineering, and materials science.

**Current Developments in Biotechnology and Bioengineering: Emerging Organic Micropollutants** summarizes the current knowledge of emerging organic micropollutants in wastewater and the possibilities of their removal/elimination. This book attempts a thorough and exhaustive discussion on ongoing research and future perspectives on advanced treatment methods and future directions to maintain and protect the environment through microbiological, nanotechnological, application of membrane technology, molecular biological and by policymaking means. In addition, the book includes the latest developments in biotechnology and bioengineering pertaining to various aspects in the field of emerging organic micropollutants, including their sources, health effects and environmental impacts. Includes testing methods for the analysis and characterization of emerging organic micropollutants in wastewater Discusses the environmental impact and health hazards of emerging organic micropollutants in wastewater Provides a useful guide to identify priority areas of research demand in the remediation/removal of emerging organic micropollutants

This book presents peer-reviewed articles from the 1st International Conference on Dam Safety Management and Engineering (ICDSME 2019), organized by the Malaysian National Committee on Large Dams (MYCOLD), Tenaga Nasional Berhad (TNB), Department of Irrigation and Drainage (DID) and Universiti Tenaga Nasional (UNITEN). With the theme “resilient dams for resilient communities,” the conference highlighted the latest developments in the area and provided a platform for researchers and professionals to exchange ideas and to address dam safety and engineering issues with the environment in mind. The topics covered included, but was not limited to, best practices in dam safety, reservoir management, dam health monitoring, risk assessment, emergency management and sustainable dams.

This book presents recent developments in advanced biological treatment

technologies that are attracting increasing attention or that have a high potential for large-scale application in the near future. It also explores the fundamental principles as well as the applicability of the engineered bioreactors in detail. It describes two of the emerging technologies: membrane bioreactors (MBR) and moving bed biofilm reactors (MBBR), both of which are finding increasing application worldwide thanks to their compactness and high efficiency. It also includes a chapter dedicated to aerobic granular sludge (AGS) technology, and discusses the main features and applications of this promising process, which can simultaneously remove organic matter, nitrogen and phosphorus and is considered a breakthrough in biological wastewater treatment. Given the importance of removing nitrogen compounds from wastewater, the latest advances in this area, including new processes for nitrogen removal (e.g. Anammox), are also reviewed. Developments in molecular biology techniques over the last twenty years provide insights into the complex microbial diversity found in biological treatment systems. The final chapter discusses these techniques in detail and presents the state-of-the-art in this field and the opportunities these techniques offer to improve process performance.

As we know, rapid industrialization is a serious concern in the context of a healthy environment and public health due to the generation of huge volumes of toxic wastewater. Although various physico-chemical and biological approaches are available for the treatment of this wastewater, many of them are not effective. Now, there are a number of emerging ecofriendly, cost-effective approaches utilizing microorganisms (bacterial/fungi/algae), green plants or their enzymes, and constructed wetland treatment systems in the treatment of wastewaters containing pollutants such as endocrine disrupting chemicals, toxic metals, pesticides, dyes, petroleum hydrocarbons and phenolic compounds. This book provides a much-needed, comprehensive overview of the various types of wastewater and their ecotoxicological effects on the environment, humans, animals and plants as well as various emerging and eco-friendly approaches for their treatment. It provides insights into the ecological problems and challenges in the treatment and management of wastewaters generated by various sources. The main objective of this research was to optimize the electron donor supply in sulphate reducing bioreactors treating sulphate rich wastewater. Two types of electron donor were tested: lactate and slow release electron donors such as carbohydrate based polymers and lignocellulosic biowastes. Biological sulphate reduction was evaluated in different bioreactor configurations: the inverse fluidized bed, sequencing batch and batch reactors. The reactors were tested under steady-state, high-rate and transient-state feeding conditions of electron donor and acceptor, respectively. The results showed that the inverse fluidized bed reactor configuration is robust and resilient to transient and high-rate feeding conditions at a hydraulic retention time as low as 0.125 d. The biological sulphate reduction was limited by the COD:sulphate ratio (82% either using carbohydrate based polymers or lignocellulosic bio-wastes, in batch bioreactors. The biological

sulphate reduction was limited by the hydrolysis-fermentation rate and by the complexity of the slow release electron donors.

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