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KEY=BIOFILM - PALOMA LILLIANNA

Biofilms in Wastewater Treatment

IWA Publishing *The central theme of the book is the flow of information from experimental approaches in biofilm research to simulation and modeling of complex wastewater systems. Probably the greatest challenge in wastewater research lies in using the methods and the results obtained in one scientific discipline to design intelligent experiments in other disciplines, and eventually to improve the knowledge base the practitioner needs to run wastewater treatment plants. The purpose of Biofilms in Wastewater Treatment is to provide engineers with the knowledge needed to apply the new insights gained by researchers. The authors provide an authoritative insight into the function of biofilms on a technical and on a lab-scale, cover some of the exciting new basic microbiological and wastewater engineering research involving molecular biology techniques and microscopy, and discuss recent attempts to predict the development of biofilms. This book is divided into 3 sections: Modeling and Simulation; Architecture, Population Structure and Function; and From Fundamentals to Practical Application, which all start with a scientific question. Individual chapters attempt to answer the question and present different angles of looking at problems. In addition there is an extensive glossary to familiarize the non-expert with unfamiliar terminology used by microbiologists and computational scientists. The colour plate section of this book can be downloaded by clicking here. (PDF Format 1 MB)*

Advances in Wastewater Treatment

IWA Publishing *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.*

Spreadsheets for MBBR Process Design Calculations

Background description of MBBR (moving bed biofilm reactor) wastewater treatment process as an attached growth process using plastic carriers on which the biofilm grows. Flow diagrams are shown for BOD removal and for nitrification, including single stage and two stage processes. Discussion of process design calculations, including the surface area loading rate (SALR) and its use to calculate the carrier surface area needed and the MBBR tank volume needed. Example process design calculations are included for a single stage BOD removal MBBR process, a two stage BOD removal MBBR process, a two stage MBBR process for BOD removal and nitrification and for a single stage nitrification MBBR process. Each of the example calculations includes a screenshot of a spreadsheet for carrying out the MBBR process design calculation for that example.

Bacterial Biofilms

BoD – Books on Demand *This book examines biofilms in nature. Organized into four parts, this book addresses biofilms in wastewater treatment, inhibition of biofilm formation, biofilms and infection, and ecology of biofilms. It is designed for clinicians, researchers, and industry professionals in the fields of microbiology, biotechnology, ecology, and medicine as well as graduate and postgraduate students.*

Mathematical Modeling of Biofilms

IWA Publishing *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

Advanced Biological Processes for Wastewater Treatment

Emerging, Consolidated Technologies and Introduction to Molecular Techniques

Springer *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.

Microbial Biofilms

Importance and Applications

BoD – Books on Demand *In the book Microbial Biofilms: Importance and applications, eminent scientists provide an up-to-date review of the present and future trends on biofilm-related research. This book is divided with four subdivisions as biofilm fundamentals, applications, health aspects, and their control. Moreover, this book also provides a comprehensive account on microbial interactions in biofilms, pyocyanin, and extracellular DNA in facilitating Pseudomonas aeruginosa biofilm formation, atomic force microscopic studies of biofilms, and biofilms in beverage industry. The book comprises a total of 21 chapters from valued contributions from world leading experts in Australia, Bulgaria, Canada, China, Serbia, Germany, Italy, Japan, the United Kingdom, the Kingdom of Saudi Arabia, Republic of Korea, Mexico, Poland, Portugal, and Turkey. This book may be used as a text or reference for everyone interested in biofilms and their applications. It is also highly recommended for environmental microbiologists, soil scientists, medical microbiologists, bioremediation experts, and microbiologists working in biocorrosion, biofouling, biodegradation, water microbiology, quorum sensing, and many other related areas. Scientists in academia, research laboratories, and industry will also find it of interest.*

Sequencing Batch Reactor Technology

IWA Publishing *The report highlights various types of SBRs, design considerations and procedures, equipment required, and experiences gained from practical applications. This report will help both designers and operators of SBRs understand how to use this technology successfully. The focus is on the application of fill-and-draw, variable volume, periodically operated, unsteady-state principles to activated sludge systems. Research findings are presented, from both the laboratory and pilot and full scale SBRs. Also included is a description of trends for technological developments and a discussion of open questions regarding research, development, application, and operation. Contents Introduction Fundamentals of Periodic Processes General Overview of SBR Applications Design of Activated Sludge SBR Plants Equipment and Instrumentation Practical Experiences Evaluation of SBR Facilities in Australia Evaluation of SBR Facilities in the USA and Canada Evaluation*

of SBR Facilities in Germany Evaluation of SBR Facilities in France Evaluation of SBR facilities in Japan Scientific and Technical Report No. 10

Biological Wastewater Treatment: Principles, Modeling and Design

IWA Publishing *The first edition of this book was published in 2008 and it went on to become IWA Publishing's bestseller. Clearly there was a need for it because over the twenty years prior to 2008, the knowledge and understanding of wastewater treatment had advanced extensively and moved away from empirically-based approaches to a fundamental first-principles approach based on chemistry, microbiology, physical and bioprocess engineering, mathematics and modelling. However the quantity, complexity and diversity of these new developments was overwhelming for young water professionals, particularly in developing countries without readily available access to advanced-level tertiary education courses in wastewater treatment. For a whole new generation of young scientists and engineers entering the wastewater treatment profession, this book assembled and integrated the postgraduate course material of a dozen or so professors from research groups around the world who have made significant contributions to the advances in wastewater treatment. This material had matured to the degree that it had been codified into mathematical models for simulation with computers. The first edition of the book offered, that upon completion of an in-depth study of its contents, the modern approach of modelling and simulation in wastewater treatment plant design and operation could be embraced with deeper insight, advanced knowledge and greater confidence, be it activated sludge, biological nitrogen and phosphorus removal, secondary settling tanks, or biofilm systems. However, the advances and developments in wastewater treatment have accelerated over the past 12 years since publication of the first edition. While all the chapters of the first edition have been updated to accommodate these advances and developments, some, such as granular sludge, membrane bioreactors, sulphur conversion-based bioprocesses and biofilm reactors which were new in 2008, have matured into new industry approaches and are also now included in this second edition. The target readership of this second edition remains the young water professionals, who will still be active in the field of protecting our precious water resources long after the aging professors who are leading some of these advances have retired. The authors, all still active in the field, are aware that cleaning dirty water has become more complex but that it is even more urgent now than 12 years ago, and offer this second edition to help the young water professionals engage with the scientific and bioprocess engineering principles of wastewater treatment science and technology with deeper insight, advanced knowledge and greater confidence built on stronger competence.*

A-B processes: Towards Energy Self-sufficient Municipal Wastewater Treatment

IWA Publishing *The principle of the conventional activated sludge (CAS) for municipal wastewater treatment is primarily based on biological oxidation by which organic matters are converted to biomass and carbon dioxide. After more than 100 years' successful application, the CAS process is receiving increasing critiques on its high energy consumption and excessive sludge generation. Currently, almost all municipal wastewater treatment plants with the CAS as a core process are being operated in an energy-negative fashion. To tackle such challenging situations, there is a need to re-examine the present wastewater treatment philosophy by developing and adopting novel process configurations and emerging technologies. The solutions going forward should rely on the ways to improve direct energy recovery from wastewater, while minimizing in-plant energy consumption. This book begins with a critical overview of the energy situation and challenges in current municipal wastewater treatment plants, showing the necessity of the paradigm shift from removal to recovery in terms of energy and resource. As such, the concept of A-B process is discussed in detail in the book. It appears that various A-B process configurations are able to provide possible engineering solutions in which A-stage is primarily designed for COD capture with the aim for direct anaerobic treatment without producing excessive biosludge, while B-stage is designated for nitrogen removal. Making the wastewater treatment energy self-sustainable is obviously of global significance and eventually may become a game changer for the global market of the municipal wastewater reclamation technology. The principal audiences include practitioners, professionals, university researchers, undergraduate and postgraduate students who are interested and specialized in municipal wastewater treatment and process design, environmental engineering, and environmental biotechnology.*

Post Treatments of Anaerobically Treated Effluents

IWA Publishing *The anaerobic process is considered to be a sustainable technology for organic waste treatment mainly due to its lower energy consumption and production of residual solids coupled with the prospect of energy recovery from the biogas generated. However, the anaerobic process cannot be seen as providing the 'complete' solution as its treated effluents would typically not meet the desired discharge limits in terms of residual carbon, nutrients and pathogens. This has given impetus to subsequent post treatment in order to meet the environmental legislations and protect the receiving water bodies and environment. This book*

discusses anaerobic treatment from the perspective of organic wastes and wastewaters (municipal and industrial) followed by various post-treatment options for anaerobic effluent polishing and resource recovery. Coverage will also be from the perspective of future trends and thoughts on anaerobic technologies being able to support meeting the increasingly stringent disposal standards. The resource recovery angle is particularly interesting as this can arguably help achieve the circular economy. It is intended the information can be used to identify appropriate solutions for anaerobic effluent treatment and possible alternative approaches to the commonly applied post-treatment techniques. The succeeding discussion is intended to lead on to identification of opportunities for further research and development. This book can be used as a standard reference book and textbook in universities for Master and Doctoral students. The academic community relevant to the subject, namely faculty, researchers, scientists, and practicing engineers, will find the book both informative and as a useful source of successful case studies.

Aerobic Granular Sludge

IWA Publishing *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 Wastewater Treatment Process Design Calculations

Description of three biological wastewater treatment processes, activated sludge, MBBR (moving bed biofilm reactor), and MBR (membrane bioreactor). Each of these processes is described and discussed in turn. For each of them there is background information about the process, a general description of the process, and description of the process design calculations for that process along with examples illustrating those calculations. Use of spreadsheets for the calculations is covered also, including numerous screenshots of spreadsheets set up to make the various calculations discussed in the book.

Microplastics in Water and Wastewater

IWA Publishing *This book covers the topic of microplastics in water and wastewater. The chapters start with introductory issues related to the growing interest in the scientific community on microplastics and the human water cycle and point out where the microplastics could interact with water. The subsequent chapters examine evidence of the microplastic presence in freshwater, such as in both rivers and lakes, in freshwater biota, and hazardous chemicals associated with microplastics in such systems. Another set of chapters discuss the presence of microplastics in wastewater: their sources; their transfer through a wastewater treatment plant; the concentration of microplastics in effluents throughout the world; the plastic biomedia used in wastewater treatment plants and the effect on the surrounding environment of effluent wastewater pipes. These chapters also discuss the sampling methods, the sample treatment and analysis techniques used so far for microplastics in wastewater. Additionally, the presence of microplastics in sewage sludge and in soils irrigated with wastewater or fertilized with sludge are discussed. The possible impact of plastics and their additives on plants, microalgae, and humans are reviewed and presented in a critical way. Finally, a chapter summarizes all the relevant regulations and initiatives that point to the necessity of a global directive for the protection of the environment from plastic and microplastic pollution. The topic of microplastics in freshwater systems and in wastewater has scarcely been studied and requires more attention. Microplastics in Water and Wastewater aims to bring these initial findings to the attention of a broader audience and especially to operators and managers of freshwater and wastewater systems. It will also be helpful to people already aware of the marine debris problem to understand the sources of microplastics in the oceans, from freshwater systems and wastewater treatment plants.*

Sewage Treatment Plants

Economic Evaluation of Innovative Technologies for Energy Efficiency

IWA Publishing *Sewage Treatment Plants: Economic Evaluation of Innovative Technologies for Energy Efficiency aims to show how cost saving can be achieved in sewage treatment plants through implementation of novel, energy efficient technologies or modification of the conventional, energy demanding treatment facilities towards the concept of energy streamlining. The book brings together knowledge from Engineering, Economics, Utility Management and Practice and helps to provide a better understanding of the real economic value with methodologies and practices about innovative energy technologies and policies in sewage treatment plants.*

Membrane Biological Reactors: Theory, Modeling, Design, Management and Applications to Wastewater Reuse - Second Edition

IWA Publishing *The MBR market continues to experience a massive growth. The best practice in the field is constantly changing and unique quality requirements and management issues are regularly emerging. The second edition of Membrane Biological Reactors: Theory, Modeling, Design, Management and Applications to Wastewater Reuse comprehensively covers the salient features and emerging issues associated with the MBR technology. The book provides thorough coverage starting from biological aspects and fundamentals of membranes, via modeling and design concepts, to practitioners' perspective and good application examples. In the second edition, the chapters have been updated to cover the recently emerged issues. Particularly, the book presents the current status of the technology including market drivers/ restraints and development trend. Process fundamentals (both the biological and membrane components) have received in-depth coverage in the new edition. A new chapter has been added to provide a stronger focus on reuse applications in general and the decisive role of MBR in the entire reuse chain. The second edition also comes with a new chapter containing practical design problems to complement the concepts communicated throughout the book. Other distinguishing features of the new edition are coverage of novel developments and hybrid processes for specialised wastewaters, energy efficiency and sustainability of the process, aspects of MBR process automation and recent material on case studies. The new edition is a valuable reference to the academic and professional community and suitable for undergraduate and postgraduate teaching in Environmental Engineering, Chemical Engineering and Biotechnology.*

Sludge Reduction Technologies in Wastewater Treatment Plants

IWA Publishing *Sludge Reduction Technologies in Wastewater Treatment Plants is a review of the sludge reduction techniques integrated in wastewater treatment plants with detailed chapters on the most promising and most widespread techniques. The aim of the book is to update the international community on the current status of knowledge and techniques in the field of sludge reduction. It will provide a comprehensive understanding of the following issues in sludge reduction: principles of sludge reduction techniques; process configurations; potential performance; advantages and drawbacks; economics and energy consumption. This book will be essential reading for managers and technical staff of wastewater treatment plants as*

well as graduate students and post-graduate specialists.

Mathematical Modelling and Computer Simulation of Activated Sludge Systems

IWA Publishing *Mathematical Modelling and Computer Simulation of Activated Sludge Systems – Second Edition provides, from the process engineering perspective, a comprehensive and up-to-date overview regarding various aspects of the mechanistic ("white box") modelling and simulation of advanced activated sludge systems performing biological nutrient removal. In the new edition of the book, a special focus is given to nitrogen removal and the latest developments in modelling the innovative nitrogen removal processes. Furthermore, a new section on micropollutant removal has been added. The focus of modelling has been shifting in the last years to models that can describe the performance of a whole plant (plant-wide modelling). The expanded part of this new edition introduces models describing the most important processes interrelated with the mainstream activated sludge systems as well as models describing the energy balance, operating costs and environmental impact. The complex process evaluation, including minimization of energy consumption and carbon footprint, is in line with the present and future wastewater treatment goals. By combining a general introduction and a textbook, this book serves both intermediate and more experienced model users, both researchers and practitioners, as a comprehensive guide to modelling and simulation studies. The book can be used as a supplemental material at graduate and post-graduate levels of wastewater engineering/modelling courses.*

Biofilm Reactors WEF MOP 35

McGraw Hill Professional *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 Trickling filter and combined trickling 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 trickling filters*

Handbook of Biological Wastewater Treatment

Design and Optimisation of Activated Sludge Systems

IWA Publishing *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.*

Frontiers in Wastewater Treatment and Modelling

FICWTM 2017

Springer *This book describes the latest research advances, innovations, and applications in the field of water management and environmental engineering as presented by leading researchers, engineers, life scientists and practitioners from around the world at the Frontiers International Conference on Wastewater Treatment (FICWTM), held in Palermo, Italy in May 2017. The topics covered are highly diverse and include the physical processes of mixing and dispersion, biological developments and mathematical modeling, such as computational fluid dynamics in wastewater, MBBR and hybrid systems, membrane bioreactors, anaerobic digestion, reduction of greenhouse gases from wastewater treatment plants, and energy optimization. The contributions amply demonstrate that the application of cost-effective technologies for waste treatment and control is urgently needed so as to implement appropriate regulatory measures that ensure pollution prevention and remediation, safeguard public health, and preserve the environment. The contributions were selected by means of a rigorous peer-review process and highlight many exciting ideas that will spur novel research directions and foster multidisciplinary collaboration among different water specialists.*

Dye Biodegradation, Mechanisms and Techniques

Recent Advances

Springer Nature *An enormous amount of synthetic dyes is used annually in the textile, leather, plastics, paper, and dye industries due to their coloring properties. Although dyes give color to materials, they are prone to increase the level of pollution in the environment. The colored wastewater produced in industrial sectors is released into water bodies, posing threats to the ecosystem. To reduce the adverse effects of dyes in the environment, it is necessary to implement feasible and cost-effective strategies. '"Dye Biodegradation Mechanisms and Techniques - Recent Advances'' provides fundamental principles and pathways of bio-based mechanisms in dye removal. This edition firstly discusses dye classification and pollution, then concentrates on the application of fungi, mesophilic bacteria, microflora, and enzymes in dye degradation. This book also highlights the performance of sequential batch reactor systems, moving bed biofilm reactors, and hybrid bioreactors for dye biodegradation*

Assessment of Treatment Plant Performance and Water Quality Data: A Guide for Students, Researchers and Practitioners

IWA Publishing *This book presents the basic principles for evaluating water quality and treatment plant performance in a clear, innovative and didactic way, using a combined approach that involves the interpretation of monitoring data associated with (i) the basic processes that take place in water bodies and in water and wastewater treatment plants and (ii) data management and statistical calculations to allow a deep interpretation of the data. This book is problem-oriented and works from practice to theory, covering most of the information you will need, such as (a) obtaining flow data and working with the concept of loading, (b) organizing sampling programmes and measurements, (c) connecting laboratory analysis to data management, (e) using numerical and graphical methods for describing monitoring data (descriptive statistics), (f) understanding and reporting removal efficiencies, (g) recognizing symmetry and asymmetry in monitoring data (normal and log-normal distributions), (h) evaluating compliance with targets and regulatory standards for effluents and water bodies, (i) making comparisons with the monitoring data (tests of hypothesis), (j) understanding the relationship between monitoring variables (correlation and regression analysis), (k) making water and mass balances, (l) understanding the different loading rates applied to treatment units, (m) learning the principles of reaction kinetics and reactor hydraulics and (n) performing calibration and verification of models. The major concepts are illustrated by 92 fully worked-out examples, which are supported by 75 freely-downloadable Excel spreadsheets. Each*

chapter concludes with a checklist for your report. If you are a student, researcher or practitioner planning to use or already using treatment plant and water quality monitoring data, then this book is for you! 75 Excel spreadsheets are available to download.

Sludge Thermal Hydrolysis: Application and Potential

IWA Publishing *Thermal hydrolysis is revolutionizing wastewater treatment. Current treatment methods have evolved little since pioneering work in the late 19th and early 20th centuries. Subsequently, most wastewater treatment plants are not designed to meet modern drivers such as energy conservation and nutrient recovery. Additionally, sludge management is expensive and often not viewed in high regard by external stakeholders. By changing the properties of sewage sludge, thermal hydrolysis allows wastewater treatment works to become more efficient, enabling the treatment of greater flowrates to higher standards. Production of renewable energy from sludge is increased, whilst quantity of treated material reduced, which further decreases processing requirements and costs regardless of what they may be. This book, aimed at students and practitioners alike, describes the development of the technology, and highlights the design and economics by means of examples. Benefits and challenges related to thermal hydrolysis are also characterized alongside selected case-studies and ideas for future applications. Dr William (Bill) Barber has had a keen interest in thermal hydrolysis for numerous years and was instrumental in the development of Europe's largest facility as well as advising water utilities, consultants, researchers and government organizations on its potential to modernize wastewater treatment.*

ICSBE 2018

Proceedings of the 9th International Conference on Sustainable Built Environment

Springer *This book highlights current research and development in the area of sustainable built environments, currently one of the most important disciplines in civil engineering. It covers a range of topics, including sustainable construction and infrastructures, waste and wastewater management, enhanced sustainability, renewable and clean energy, sustainable materials and industrial ecology, building automation and virtual reality, and impact of climate change. As such it provides vital insights into responsible urbanization practices, and new tools and technologies in civil engineering that can mitigate the negative effects of the built environment.*

Membrane Bioreactor Processes Principles and Applications

CRC Press *Grasp the Essential Principles of Membrane Bioreactor Processes Evolved from the conventional activated sludge (CAS) process, membrane bioreactor (MBR) processes have become the next-generation solution for municipal and industrial wastewater treatment and recycle. Membrane Bioreactor Processes: Principles and Applications explores nearly all the theoretical and practical aspects of membrane bioreactor technologies. Using the author's expertise obtained from academia and industry, this book provides the crucial details on MBR technology that that you need to know. The book details the theoretical and practical backgrounds of current practices involved with membrane module design, biological and membrane system design, system optimization, and system operation. Outlines the State of the Art of the Membrane Bioreactor Technology The text discusses the fundamentals of membrane filtration, emphasizing the principles of submerged membrane filtration. It also explores the complex interaction among key design and operating parameters, offers comprehensive explanations on the interconnectivity between biological and membrane systems, and covers new findings discovered in recent years. This book clearly explains how small-scale systems perform differently from larger-scale systems and its implications in data interpretation. Using this book as a platform, the technology can be developed further and quickly applied in future processes.*

Biological Wastewater Treatment

IWA Publishing *For information on the online course in Biological Wastewater Treatment from UNESCO-IHE, visit: http://www.iwapublishing.co.uk/books/biological-wastewater-treatment-online-course-principles-modeling-and-design Over the past twenty years, the knowledge and understanding of wastewater treatment have advanced extensively and moved away from empirically-based approaches to a first principles approach embracing chemistry, microbiology, physical and bioprocess engineering, and mathematics. Many of these advances have matured to the degree that they have been codified into mathematical models for simulation with computers. For a new generation of young scientists and engineers entering the wastewater treatment profession, the quantity, complexity and diversity of these new developments can be overwhelming, particularly in developing countries where access is not readily available to advanced level tertiary education courses in wastewater treatment. Biological Wastewater Treatment addresses this deficiency. It assembles and integrates the postgraduate course material of a dozen or so professors from research groups around the world that have made significant contributions to the advances in wastewater treatment. The book forms part of an internet-based curriculum in biological wastewater treatment which also includes: Summarized lecture handouts*

of the topics covered in book Filmed lectures by the author professors Tutorial exercises for students self-learning Upon completion of this curriculum the modern approach of modelling and simulation to wastewater treatment plant design and operation, be it activated sludge, biological nitrogen and phosphorus removal, secondary settling tanks or biofilm systems, can be embraced with deeper insight, advanced knowledge and greater confidence.

Upgrading Existing Wastewater Treatment Plants

Case Histories

Activated Sludge and Aerobic Biofilm Reactors

IWA Publishing *Activated Sludge and Aerobic Biofilm Reactors is the fifth volume in the series Biological Wastewater Treatment. 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. About the series: The series is based on a highly acclaimed set of best selling textbooks. This international version is comprised by six textbooks giving a state-of-the-art presentation of the science and technology of biological wastewater treatment. Other titles in the series are: Volume 1: Waste Stabilisation Ponds; Volume 2: Basic Principles of Wastewater Treatment; Volume 3: Waste Stabilization Ponds; Volume 4: Anaerobic Reactors; Volume 6: Sludge Treatment and Disposal*

Activated Sludge - 100 Years and Counting

IWA Publishing *Activated Sludge - 100 Years and Counting covers the current status of all aspects of the activated sludge process and looks forward to its further development in the future. It celebrates 100 years of the Activated Sludge process, from the time that the early developers presented the seminal works that led to its eventual worldwide adoption. The book assembles contributions from renowned world leaders in activated sludge research, development, technology and*

application. The objective of the book is to summarise the knowledge of all aspects of the activated sludge process and to present and discuss anticipated future developments. The book comprises invited papers that were delivered at the conference "Activated Sludge...100 Years and Counting!", held in Essen, Germany, June 12th to 14th, 2014. Activated Sludge - 100 Years and Counting is of interest to researchers, engineers, designers, operations specialists, and governmental agencies from a wide range of disciplines associated with all aspects of the activated sludge process. Authors: David Jenkins, University of California at Berkeley, USA, Jiri Wanner, Institute of Chemical Technology, Prague, Czech Republic.

Chinese Water Systems

Volume 4: Applied Water Management in China

Springer Nature *This open-access book addresses latest Sino-German results of the joint research efforts within Major Water Program of the Chinese Government supported by German research funding. The Major Water Program aims at the restoration of polluted water environments and sustainable management of water resources in China. The joint BMBF-CLIENT project SINOWATER deals with three most significant and strongest polluted Chinese waters, the river Liao and the Dian-lake as well as Tai-lake in the area of the metropolises Shenyang, Kunming and Suzhou, respectively. The project was conducted by the Research Institute for Water and Waste Management at RWTH Aachen (FiW) e.V., Bavarian State Ministry of the Environment and Consumer Protection, Technical University of Munich, RWTH Aachen University, German and Chinese companies (Martin Membrane Systems AG, Steinhardt GmbH Wassertechnik, GuHong, JT-elektronik, bluemetric, Huawang Water, EVU Group, Atemis GmbH, i+f process GmbH) in close cooperation with Chinese Academy of Environmental Sciences, Tongji University, and the Dianchi Lake Management Authorities. Overall, the joint Sino-German research project SINOWATER provided solutions for the improvement of the water quality in the mentioned water bodies as well as development and optimization of Good Water Governance. These objectives could be achieved through the implementation of innovative German water technologies and the optimization of water management elements in the fields of industrial and municipal wastewater treatment as well as river and shallow lake management.*

Fundamentals of Wastewater Treatment and Engineering

CRC Press *As the worlds population has increased, sources of clean water have decreased, shifting the focus toward pollution reduction and control. Disposal of wastes and wastewater without treatment is no longer an option. Fundamentals of*

Wastewater Treatment and Engineering introduces readers to the essential concepts of wastewater treatment, as well as t

Petroleum Chemicals

Recent Insight

BoD – Books on Demand *A vast amount has been written about petroleum fuels, including books and guidelines; hence, we thought it timely to produce a book Petroleum Fuels: Recent Updates, which covers the most important areas in the topic. In its pages, we tried to include advances toward green and sustainable viable products in terms of biodiesel production and chemical transformation. The book contains rich extracts from experts in the fuel field, including technical/environmental and econometric aspects.*

Biological Wastewater Treatment

CRC Press *Following in the footsteps of previous highly successful and useful editions, Biological Wastewater Treatment, Third Edition presents the theoretical principles and design procedures for biochemical operations used in wastewater treatment processes. It reflects important changes and advancements in the field, such as a revised treatment of the micr*

Handbook of Environmental Materials Management

Springer *This reference work analyzes and assesses global environmental management techniques for environmental materials with a focus on their performance and economic benefits, proposing eco-friendly solutions and designating policies that will sustain the environment for future generations. It addresses management of environmental materials as not only a complex anthropogenic problem, but also as an expensive problem that needs to be managed sustainably. Simultaneously, it considers the environmental and economic benefits involved in the high levels of investment and operation costs required to develop effective materials collection and management systems in modern society.*

Industrial Dyes

Chemistry, Properties, Applications

John Wiley & Sons *What would life be like without color? Ever since one can think back, color has always accompanied mankind. Dyes - originally obtained exclusively from natural sources - are today also produced synthetically on a large scale and represent one of the very mature and traditional sectors of the chemical industry.*

The present reference work on Industrial Dyes provides a comprehensive review of the chemistry, properties and applications of the most important groups of industrial dyes, including optical brighteners. It also outlines the latest developments in the area of functional dyes. Renowned experts in their respective fields have contributed to the chapters on chemical chromophores, synthesis and application of the various dye classes, textile dyeing and non-textile dyeing. The book is aimed at all professionals who are involved in the synthesis, production, manufacture or application of dyes and will prove to be an indispensable guide to all chemists, engineers and technicians in dye science and industry.

The Combined Sharon/Anammox Process

IWA Publishing *Wastewater treatment management, alongside many other industries, is seeking to attain a higher degree of sustainability for its processes by focusing on new technologies which minimise the consumption of resources or even recover them from the wastewater. Conventional removal of ammonium requires usually large amounts of energy for aeration and organic carbon for denitrification. This report focuses on making the nitrogen-removal process more sustainable. This can be achieved by a partial oxidation of ammonium to nitrite, after which the nitrate produced can be converted into nitrogen gas with the rest of ammonium under anoxic conditions. The treatment of nitrogen-rich water can be carried out beneficially by a combination of the Sharon process with the Anammox process. In this combined process less than 50% of the aeration energy is needed, no COD is required and an insignificant amount of sludge is produced. In this Report the potential of using this technology for the treatment of water arising from sludge treatment at a municipal wastewater treatment plant (WWTP) is evaluated and the results of the operation of the system are described in detail. This reject water contains a significant fraction of the N-load towards the wastewater treatment plant. The results are used in an economic evaluation of a potential full scale installation. The Combined Sharon/Anammox Process Report will provide an invaluable source of information for all those concerned with the efficient and sustainable treatment of wastewater including plant managers, process designers, consultants and researchers.*

Activated Carbon for Water and Wastewater Treatment

Integration of Adsorption and

Biological Treatment

John Wiley & Sons *This monograph provides comprehensive coverage of technologies which integrate adsorption and biological processes in water and wastewater treatment. The authors provide both an introduction to the topic as well as a detailed discussion of theoretical and practical considerations. After a review of the basics involved in the chemistry, biology and technology of integrated adsorption and biological removal, they discuss the setup of pilot- and full-scale treatment facilities, covering powdered as well as granular activated carbon. They elucidate the factors that influence the successful operation of integrated systems. Their discussion on integrated systems expands from the effects of environmental to the removal of various pollutants, to regeneration of activated carbon, and to the analysis of such systems in mathematical terms. The authors conclude with a look at future needs for research and develoment. A truly valuable resource for environmental engineers, environmental and water chemists, as well as professionals working in water and wastewater treatment.*

Green Chemistry and Technology

Walter de Gruyter GmbH & Co KG *The 6th volume of Green Chemical Processing considers sustainable chemistry in the context of innovative and emerging technologies, explaining how they can support the “greening” of industry processes. The American Chemical Society’s 12 Principles of Green Chemistry are woven throughout this text as well as the series to which this book belongs.*

Emerging Contaminants from Industrial and Municipal Waste

Removal technologies

Springer Science & Business Media *This book focuses on innovative treatment technologies for the elimination of emerging contaminants in wastewater and drinking water treatment processes. The book also discusses sources and occurrence of emerging contaminants in municipal and industrial waste, giving an overview of state-of-the-art analytical methods for their identification. Further important aspects covered include the acute and chronic effects and overall impact of emerging contaminants on the environment.*