

# Anaerobic Reactors Biological Wastewater Treatment Volume 4 By Carlos Augusto De Lemos Chernicharo 2007 01 05

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## **Aerobic Granular Sludge** - S. Bathe

2005-03-31

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 questions 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 in Warm Climate Regions* - Marcos Von Sperling

2005-09-30

*Biological Wastewater Treatment in Warm Climate Regions* gives a state-of-the-art presentation of the science and technology of biological wastewater treatment, particularly domestic sewage. The book covers the main treatment processes used worldwide with wastewater treatment in warm climate regions given a particular emphasis where simple, affordable and sustainable solutions are required. This comprehensive book presents in a clear and informative way the basic principles of biological wastewater treatment, including theory and practice, and covering conception, design and operation. In order to ensure the practical and didactic view of the book, 371 illustrations, 322 summary tables and 117

examples are included. All major wastewater treatment processes are covered by full and interlinked design examples which are built up throughout the book, from the determination of wastewater characteristics, the impact of discharge into rivers and lakes, the design of several wastewater treatment processes and the design of sludge treatment and disposal units. The 55 chapters are divided into 7 parts over two volumes: Volume One: (1) Introduction to wastewater characteristics, treatment and disposal; (2) Basic principles of wastewater treatment; (3) Stabilisation ponds; (4) Anaerobic reactors; Volume Two: (5) Activated sludge; (6) Aerobic biofilm reactors; (7) Sludge treatment and disposal. As well as being an ideal textbook, *Biological Wastewater Treatment in Warm Climate Regions* is an important reference for practising professionals such as engineers, biologists, chemists and environmental scientists, acting in consulting companies, water authorities and environmental agencies.

## **Environmental Anaerobic Technology -**

Herbert H. P. Fang 2010

Anaerobic technology has become widely accepted by the environmental industry as a cost-effective alternative to the conventional aerobic process. This makes anaerobic process the favored green treatment technology for sustainable environment in years to come. Written by world-renowned authors, this compendium summarizes the successful full-scale application experiences of anaerobic technology worldwide, including not just food, beverage, and distillery wastewaters but also municipal, agricultural, chemical and petrochemical wastewaters. The book also introduces new developments of anaerobic technology, including pretreatment and granulation technologies, membrane bioreactor, two-stage treatment, bio-hydrogen production, molecular techniques, and modeling .  
[Biological Wastewater Treatment](#) - C. P. Leslie Grady Jr. 2011-05-09

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

Treatment Wetlands - Gabriela Dotro 2017-11-15

Contents: Overview of Treatment Wetlands; Fundamentals of Treatment Wetlands; Horizontal Flow Wetlands; Vertical Flow Wetlands; French Vertical Flow Wetlands; Intensified and Modified Wetlands; Free Water Surface Wetlands; Other Applications; Additional Aspects.

Anaerobic Technology in Pulp and Paper Industry - Pratima Bajpai 2017-03-14

This book presents a state-of-the-art report on the treatment of pulp and paper industry effluents using anaerobic technology. It covers a comprehensive range of topics, including the

basic reasons for anaerobic treatment, comparison between anaerobic and aerobic treatment, effluent types suitable for anaerobic treatment, design considerations for anaerobic treatment, anaerobic reactor configurations applied for treatment of pulp and paper industry effluents, present status of anaerobic treatment in pulp and paper industry, economic aspects, examples of full scale installations and future trends.

Handbook of Biological Wastewater Treatment - Adrianus van Haandel 2012-02-20

The scope of this comprehensive new edition of Handbook of Biological Wastewater Treatment ranges from the design of the activated sludge system, final settlers, auxiliary units (sludge thickeners and digesters) to pre-treatment units such as primary settlers and UASB reactors. The core of the book deals with the optimized design of biological and chemical nutrient removal. The book 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. It offers a truly integrated cost-based design method that can be easily implemented in spreadsheets and adapted to the particular needs of the user. Handbook of Biological Wastewater Treatment: Second Edition incorporates valuable new material that improves the instructive qualities of the first edition. The book has a new structure that makes the material more readily understandable and the numerous additional examples clarify the text. On the website [www.wastewaterhandbook.com](http://www.wastewaterhandbook.com) three free excel design spreadsheets for different configurations (secondary treatment with and without primary settling and nitrogen removal) can be downloaded to get the reader started with their own design projects. New sections have been added throughout: to explain the difference between true and apparent yield while the section on the F/M ratio, and especially the

reasons not to use it, has been expanded; to demonstrate the effect of the oxygen recycle to the anoxic zones on both the denitrification capacity and the concept of available nitrate is explained in more detail. the latest developments on the causes and solution to sludge bulking and scum formation to show the rapid developments of innovative nitrogen removal and sludge separation problems the anaerobic pre-treatment section is completely rewritten based on the experiences obtained from an extensive review of large full-scale UASB based sewage treatment plants a new section on industrial anaerobic wastewater treatment three new appendices have been added. These deal with the calibration of the denitrification model, empirical design guidelines for final settler design (STORA/STOWA and ATV) and with the potential for development of denitrification in the final settler. A new chapter on moving bed biofilm reactors Handbook of Biological Wastewater

Treatment: Second Edition is written for post graduate students and engineers in consulting firms and environmental protection agencies. It is an invaluable resource for everybody working in the field of wastewater treatment. Lecturer support material is available when adopted for university courses. This includes course material for the first 7 modules in the form of PDF printouts and an exercise file with questions and answers and a symbol list. Authors: Prof. dr. ir. A.C. van Haandel, Federal University of Campina Grande - Brazil and Ir. J.G.M. van der Lubbe, Biothane Systems International - Veolia, The Netherlands

*Aquaponics Food Production Systems* - Simon Goddek 2019-06-21

This open access book, written by world experts in aquaponics and related technologies, provides the authoritative and comprehensive overview of the key aquaculture and hydroponic and other integrated systems, socio-economic and environmental aspects. Aquaponic systems,

which combine aquaculture and vegetable food production offer alternative technology solutions for a world that is increasingly under stress through population growth, urbanisation, water shortages, land and soil degradation, environmental pollution, world hunger and climate change.

Activated Sludge and Aerobic Biofilm Reactors - Marcos Von Sperling 2007-03-30

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

**Wastewater Treatment Reactors** - Maulin P. Shah 2021-05-12

Wastewater Treatment Reactors: Microbial Community Structure analyzes microbial community structure in relation to changes in physico-chemical parameters, the gene content (metagenome) or gene expression (metatranscriptome) of microbial communities in relation to changes in physico-chemical

parameters, physiological aspects of microbial communities, enrichment cultures or pure cultures of key species in relation to changes in physico-chemical parameters, and modeling of potential consequences of changes in microbial community structure or function for higher trophic levels in a given habitat. As several studies have been carried out to understand bulking phenomena and the importance of environmental factors on sludge settling characteristics, which are thought to be strongly influenced by flocculation, sludge bulking, foaming and rising, this book is an ideal resource on the topics covered. Presents the state-of-the-art techniques and applications of omics tools in wastewater treatment reactors (WWTRs) Describes both theoretical and practical knowledge surrounding the fundamental roles of microorganisms in WWTRs Points out the reuse of treated wastewater through emerging technologies Covers the economics of wastewater treatment and the

development of suitable alternatives in terms of performance and cost effectiveness Discusses cutting-edge molecular biological tools Gives in-depth knowledge to study microbial community structure and function in wastewater treatment reactors

### **Biological Wastewater Treatment** - Mogens

Henze 2008-09-01

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.

### **Biological Wastewater Treatment Processes**

- Davide Dionisi 2017-02-03

The focus of the book is on how to use mass and heat balances to simulate and design biological wastewater treatment processes. All the main processes for biological wastewater treatment are covered viz. activated sludge processes for carbon and nitrogen removal, anaerobic digestion, sequencing batch reactors, and attached growth processes.

### **Current Developments in Biotechnology and Bioengineering**

- Giorgio Mannina 2022-09-26  
Smart Solutions for Wastewater: Road-mapping the Transition to Circular Economy, the latest release in the Current Developments in Biotechnology and Bioengineering presents up-

to-date information on research and technological developments of resource recovery in wastewater treatment in terms of carbon, nutrients and energy. The book fulfils the gaps and current challenges that hinder the application of resource recovery facilities in wastewater treatment plants, discusses knowledge gaps, provides future research perspectives, and discusses strategies to solve problems from a circular economy perspective. It is an excellent, interdisciplinary and updated overview of technologies in terms of potential yields, pollutants removal, nutrients recovery and energy production. Covers different aspects of resource recovery technologies and research gaps in wastewater treatment Focuses on different MBR configurations and systems/hybrid systems in treating a large variety of wastewaters Provides state-of-the-art technology developments, including technology, advantages and challenges as well as strategies to overcome limitations Includes technologies

for managing sewage sludge in order to foster solutions for recovering in a circular economy context

*Sludge Treatment and Disposal* - Cleverson Vitorio Andreoli 2007-03-30

Sludge Treatment and Disposal is the sixth volume in the series Biological Wastewater Treatment. The book covers in a clear and informative way the sludge characteristics, production, treatment (thickening, dewatering, stabilisation, pathogens removal) and disposal (land application for agricultural purposes, sanitary landfills, landfarming and other methods). Environmental and public health issues are also fully described. 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 5: Activated Sludge and Aerobic Biofilm Reactors

*Assessment of Treatment Plant Performance and Water Quality Data: A Guide for Students, Researchers and Practitioners* - Marcos von Sperling 2020-01-15

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.

### **Selected Water Resources Abstracts - 1991**

**Anaerobic Sewage Treatment** - Jeroen van der Lubbe 2019-08-15

Anaerobic Sewage Treatment: Optimization of Process and Physical Design of Anaerobic and Complementary Processes focuses on process design and deals with start-up procedures and steady state performance of UASB reactors, as well as the influence of operation on reactor performance.

*Biological Wastewater Treatment in Warm Climate Regions* - Marcos von Sperling 2005  
*Biological Wastewater Treatment in Warm Climate Regions* gives a state-of-the-art presentation of the science and technology of

biological wastewater treatment, particularly domestic sewage. The book covers the main treatment processes used worldwide with wastewater treatment in warm climate regions given a particular emphasis where simple, affordable and sustainable solutions are required. This comprehensive book presents in a clear and informative way the basic principles of biological wastewater treatment, including theory and practice, and covering conception, design and operation. In order to ensure the practical and didactic view of the book, 371 illustrations, 322 summary tables and 117 examples are included. All major wastewater treatment processes are covered by full and interlinked design examples which are built up throughout the book, from the determination of wastewater characteristics, the impact of discharge into rivers and lakes, the design of several wastewater treatment processes and the design of sludge treatment and disposal units. The 55 chapters are divided into 7 parts over

two volumes: Volume One: (1) Introduction to wastewater characteristics, treatment and disposal; (2) Basic principles of wastewater treatment; (3) Stabilisation ponds; (4) Anaerobic reactors; Volume Two: (5) Activated sludge; (6) Aerobic biofilm reactors; (7) Sludge treatment and disposal. As well as being an ideal textbook, Biological Wastewater Treatment in Warm Climate Regions is an important reference for practising professionals such as engineers, biologists, chemists and environmental scientists, acting in consulting companies, water authorities and environmental agencies

### **Biomethanization of the Organic Fraction of Municipal Solid Wastes** - J. Mata-Alvarez

2002-08-31

Biomethanization of the Organic Fraction of Municipal Solid Wastes is a comprehensive introduction to both the fundamentals and the more practical aspects of the anaerobic digestion of organic solid wastes, particularly those derived from households, that is, the

organic fraction of municipal solid wastes (OFMSW). It can be used as a textbook for specialized courses and also as a guide for practitioners. In the first part, the book covers the relevant aspects of anaerobic digestion (AD) of organic wastes. The fundamentals and kinetic aspects of AD are reviewed with particular emphasis on the aspects related to solid wastes. This introduction is necessary to have a comprehensive view of the AD process and to understand the practical principles as well as the origin of possible problems arising from the management of the process. Chapter 2 emphasizes the role of kinetics in designing the reactor, paying special attention to existing models, particularly the dynamic ones. Through this introduction, it is intended to facilitate the technology transfer from laboratory or pilot plant experiences to full-scale process, in order to implement improvements in current digesters. Laboratory methods are described for the analysis and optimization of reactor

performance, such as methanogenic activity tests or experimental evaluation of the biodegradation kinetics of solid organic waste. The different reaction patterns applied to industrial reactors are outlined. Industrial reactors are classified in accordance with the system they use, pointing out advantages and limitations. Co-digestion, enabling the co-treatment of organic wastes of different origin in a more economically feasible way, is described in detail. Examples of co-digestion are given, with OFMSW as a base-substrate. Finally, full-scale co-digestion plants are discussed. Various types (mechanical, biological, physico-chemical) of pre-treatment to increase the biodegradability, and thus the yields of the process, are reviewed in detail. The use of the fermentation products of anaerobic digesters for biological nutrient removal processes in wastewater treatment plants is described. This constitutes an example of integrated waste management, a field in which both economic and

technical advances can be achieved. Balances are given to justify the approach, and a full-scale case study is presented. The important topic of economics and the ecological advantages of the process are emphasized. The use of compost, the integration with composting technology, and advantages over other technologies are detailed in the framework of an environmental impact assessment of biowaste treatment. Finally, the anaerobic digestion of MSW in landfills is reviewed in detail, with emphasis on landfill process enhancement and strategies for its application.

*Anaerobic Reactors* - Carlos Augusto de Lemos Chernicharo 2007

Biorefinery - Juan-Rodrigo Bastidas-Oyanedel 2019-04-15

This book discusses the biorefinery of biomass feedstocks. In-depth chapters highlight the scientific and technical aspects and present a techno-economic analysis of such systems. By

using a TEA approach, the authors present feasible pathways for conversion of biomass (both residual biomass, energy crops and algae biomass), showing the different possibilities for the production of biochemical materials, biofuels, and fertilizers. The concepts presented in this book will link companies, investors, and governments by providing a framework that will help reduce pollutants and create a biomass related economy that incorporates the newest developments and technologies in the area.

*Biology of Wastewater Treatment* - N F Gray 2004-04-06

This comprehensive text provides the reader with both a detailed reference and a unified course on wastewater treatment. Aimed at scientists and engineers, it deals with the environmental and biological aspects of wastewater treatment and sludge disposal. The book starts by examining the nature of wastewaters and how they are oxidized in the natural environment. An introductory chapter

deals with wastewater treatment systems and examines how natural principles have been harnessed by man to treat his own waste in specialist reactors. The role of organisms is considered by looking at kinetics, metabolism and the different types of micro-organisms involved. All the major biological process groups are examined in detail, in highly referenced chapters; they include fixed film reactors, activated sludge, stabilization ponds, anaerobic systems and vegetative processes. Sludge treatment and disposal is examined with particular reference to the environmental problems associated with the various disposal routes. A comprehensive chapter on public health looks at the important waterborne organisms associated with disease, as well as removal processes within treatment systems. Biotechnology has had an enormous impact on wastewater treatment at every level, and this is explored in terms of resource reuse, biological conversion processes and environmental

protection. Finally, there is a short concluding chapter that looks at the sustainability of waste water treatment. The text is fully illustrated and supported by over 3000 references.

Contents: How Nature Deals with Waste  
How Man Deals with Waste  
The Role of Organisms  
Fixed-Film Reactors  
Activated Sludge  
Natural Treatment Systems  
Anaerobic Unit Processes  
Sludge Treatment and Disposal  
Public Health  
Biotechnology and Wastewater Treatment  
Readership: Graduate students in wastewater technology.

Reviews: "Anyone interested in the biology of wastewater treatment will find this book useful." *Biotechnology Advances* "... is both well written and informative and it should appeal to anyone with an interest in wastewater treatment. It covers the ground in sufficient depth to stay useful throughout one's entire career, serving as an essential reference, allowing one to dive in and out at will as one's needs dictate ... manages to fulfil what I believe

to be its aim of bridging the gap between wastewater engineering and its underlying biology.”Journal of the Chartered Institution of Water and Environmental Management

### **Optimization of the Electron Donor Supply to Sulphate Reducing Bioreactors Treating Inorganic Wastewater** - Luis Carlos Reyes-

Alvarado 2018-09-03

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.

### Basic Principles of Wastewater Treatment -

Marcos Von Sperling 2007-03-30

Basic Principles of Wastewater Treatment is the second volume in the series Biological Wastewater Treatment, and focusses on the unit operations and processes associated with biological wastewater treatment. The major topics covered are: microbiology and ecology of wastewater treatment reaction kinetics and reactor hydraulics conversion of organic and inorganic matter sedimentation aeration The theory presented in this volume forms the basis



upon which the other books of the series are built. 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: Wastewater Characteristics, Treatment and Disposal; Volume 3: Waste Stabilisation Ponds; Volume 4: Anaerobic Reactors; Volume 5: Activated Sludge and Aerobic Biofilm Reactors; Volume 6: Sludge Treatment and Disposal

**Sludge Reduction Technologies in Wastewater Treatment Plants** - Paola Foladori  
2010-07-31

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.

**Anaerobic Digestion Processes in Industrial Wastewater Treatment** - Sandra M. Stronach  
2011-11-17

There have been many significant microbiological, biochemical and technological advances made in the understanding and implementation of anaerobic digestion processes with respect to industrial and domestic wastewater treatment. Elucidation of the mechanisms of anaerobic degradation has

permitted a greater control over the biological parameters of waste conversion and the technical advances achieved have reduced the time and land area requirements and increased the cost-effectiveness and efficiency of the various processes presently in use. By product recovery in the form of utilisable methane gas has become increasingly feasible, while the development of new and superior anaerobic reactor designs with increased tolerance to toxic and shock loadings of concentrated effluents has established a potential for treating many extremely recalcitrant industrial wastestreams. The major anaerobic bioreactor systems and their applications and limitations are examined here, together with microbiological and biochemical aspects of anaerobic wastewater treatment processes. London, June 1986 S. M. Stronach T. Rudd J. N. Lester v Table of Contents 1 The Biochemistry of Anaerobic Digestion 1 1. 1 Kinetics of Substrate Utilisation and Bacterial Growth 3 1. 1. 1 COD Fluxes and

Mean Carbon Oxidation State 3 1. 1. 2 Bacterial Growth and Biokinetics 4 1. 1. 2. 1 Growth and Single Substrate Kinetics 4 1. 1. 2. 2 Multisubstrate Systems . 8 1. 2 Kinetics and Biochemistry of Hydrolysis 8 1. 3 Kinetics and Biochemistry of Fermentation and J1-Oxidation . 11 1.

*Dynamical Modelling & Estimation in Wastewater Treatment Processes* - D. Dochain  
2001-12-01

Environmental quality is becoming an increasing concern in our society. In that context, waste and wastewater treatment, and more specifically biological wastewater treatment processes play an important role. In this book, we concentrate on the mathematical modelling of these processes. The main purpose is to provide the increasing number of professionals who are using models to design, optimise and control wastewater treatment processes with the necessary background for their activities of model building, selection and calibration. The

book deals specifically with dynamic models because they allow us to describe the behaviour of treatment plants under the highly dynamic conditions that we want them to operate (e.g. Sequencing Batch Reactors) or we have to operate them (e.g. storm conditions, spills). Further extension is provided to new reactor systems for which partial differential equation descriptions are necessary to account for their distributed parameter nature (e.g. settlers, fixed bed reactors). The model building exercise is introduced as a step-wise activity that, in this book, starts from mass balancing principles. In many cases, different hypotheses and their corresponding models can be proposed for a particular process. It is therefore essential to be able to select from these candidate models in an objective manner. To this end, structure characterisation methods are introduced. Important sections of the book deal with the collection of high quality data using optimal experimental design, parameter estimation

techniques for calibration and the on-line use of models in state and parameter estimators. Contents Dynamical Modelling Dynamical Mass Balance Model Building and Analysis Structure Characterisation (SC) Structural Identifiability Practical Identifiability and Optimal Experiment Design for Parameter Estimation (OED/PE) Estimation of Model Parameters Recursive State and Parameter Estimation Glossary Nomenclature

**Advances in Wastewater Treatment** - Giorgio Mannina 2018-10-15

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.

**Waste Stabilisation Ponds** - Marcos Von Sperling 2007-03-30

Waste Stabilisation Ponds is the third volume in the series Biological Wastewater Treatment. The major variants of pond systems are fully covered, namely: facultative ponds anaerobic ponds aerated lagoons maturation ponds The book presents in a clear and informative way the main

concepts, working principles, expected removal efficiencies, design criteria, design examples, construction aspects, operational guidelines and sludge management for pond systems. 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 4: Anaerobic Reactors; Volume 5: Activated Sludge and Aerobic Biofilm Reactors; Volume 6: Sludge Treatment and Disposal

*Anaerobic Digestion Processes in Industrial Wastewater Treatment* - Sandra M. Stronach 2012-12-06

There have been many significant microbiological, biochemical and technological advances made in the understanding and implementation of anaerobic digestion processes

with respect to industrial and domestic wastewater treatment. Elucidation of the mechanisms of anaerobic degradation has permitted a greater control over the biological parameters of waste conversion and the technical advances achieved have reduced the time and land area requirements and increased the cost-effectiveness and efficiency of the various processes presently in use. By product recovery in the form of utilisable methane gas has become increasingly feasible, while the development of new and superior anaerobic reactor designs with increased tolerance to toxic and shock loadings of concentrated effluents has established a potential for treating many extremely recalcitrant industrial wastestreams. The major anaerobic bioreactor systems and their applications and limitations are examined here, together with microbiological and biochemical aspects of anaerobic wastewater treatment processes. London, June 1986 S. M. Stronach T. Rudd J. N. Lester v Table of

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Anaerobic Reactors - Carlos Augustos de Lemos Chernicharo 2007-03-30

Anaerobic Reactors is the forth volume in the series Biological Wastewater Treatment. The fundamentals of anaerobic treatment are presented in detail, including its applicability, microbiology, biochemistry and main reactor configurations. Two reactor types are analysed in more detail, namely anaerobic filters and especially UASB (upflow anaerobic sludge blanket) reactors. Particular attention is also devoted to the post-treatment of the effluents

from the anaerobic reactors. 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 for anaerobic reactors. 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 5: Activated Sludge and Aerobic Biofilm Reactors; Volume 6: Sludge Treatment and Disposal

*Biological Wastewater Treatment and Resource Recovery* - Robina Farooq 2017-03-29

Biological treatment of wastewater is a low-cost solution for remediation of wastewater. This book focuses on the bioremediation of

wastewater, its management, monitoring, role of biofilms on wastewater treatment and energy recovery. It emphasizes on organic, inorganic and micropollutants entering into the environment after conventional wastewater treatment facilities of industrial, agricultural and domestic wastewaters. The occurrence of persistent pollutants poses deleterious effects on human and environmental health. Simple solution for recovery of energy as well as water during biological treatment of wastewater is a viable option. This book provides necessary knowledge and experimental studies on emerging bioremediation processes for reducing water, air and soil pollution.

**Biology of Wastewater Treatment** - N. F. Gray 2004

This comprehensive text provides the reader with both a detailed reference and a unified course on wastewater treatment. Aimed at scientists and engineers, it deals with the environmental and biological aspects of

wastewater treatment and sludge disposal. The book starts by examining the nature of wastewaters and how they are oxidized in the natural environment. An introductory chapter deals with wastewater treatment systems and examines how natural principles have been harnessed by man to treat his own waste in specialist reactors. The role of organisms is considered by looking at kinetics, metabolism and the different types of micro-organisms involved. All the major biological process groups are examined in detail, in highly referenced chapters; they include fixed film reactors, activated sludge, stabilization ponds, anaerobic systems and vegetative processes. Sludge treatment and disposal is examined with particular reference to the environmental problems associated with the various disposal routes. A comprehensive chapter on public health looks at the important waterborne organisms associated with disease, as well as removal processes within treatment systems.

Biotechnology has had an enormous impact on wastewater treatment at every level, and this is explored in terms of resource reuse, biological conversion processes and environmental protection. Finally, there is a short concluding chapter that looks at the sustainability of waste water treatment. The text is fully illustrated and supported by over 3000 references.

### **Current Advances in Anaerobic Digestion Technology** - Marcell Nikolausz 2021-03-17

Anaerobic digestion (AD) is one of the oldest biotechnological processes and originally referred to biomass degradation under anoxic conditions in both natural and engineered systems. It has been used for decades to treat various waste streams and to produce methane-rich biogas as an important energy carrier, and it has become a major player in electrical power production. AD is a popular, mature technology, and our knowledge about the influencing process parameters as well as about the diverse microbial communities involved in the process

has increased dramatically over the last few decades. To avoid competition with food and feed production, the AD feedstock spectrum has constantly been extended to waste products either rich in recalcitrant lignocellulose or containing inhibitory substances such as ammonia, which requires application of various pre-treatments or specific management of the microbial resources. Extending the definition of AD, it can also convert gases rich in hydrogen and carbon dioxide into methane that can substitute natural gas, which opens new opportunities by a direct link to traditional petrochemistry. Furthermore, AD can be coupled with emerging biotechnological applications, such as microbial electrochemical technologies or the production of medium-chain fatty acids by anaerobic fermentation. Ultimately, because of the wide range of applications, AD is still a very vital field in science. This Special Issue highlights some key topics of this research field.

*Biological Treatment of Industrial Wastewater* - Maulin P. Shah 2021-12-03

*Biological Treatment of Industrial Wastewater* presents a comprehensive overview of the latest advances and trends in the use of bioreactors for treating industrial wastewater.

### **Fundamentals of Biological Wastewater**

**Treatment** - Udo Wiesmann 2007-02-27

This concise introduction to the fundamentals of biological treatment of wastewater describes how to model and integrate biological steps into industrial processes. The book first covers the chemical, physical and biological basics, including wastewater characteristics, microbial metabolism, determining stoichiometric equations for catabolism and anabolism, measurements of mass transfer and respiration rates and the aerobic treatment of wastewater loaded with dissolved organics. It then moves on to deal with such applications and technologies as nitrogen and phosphorus removal, membrane technology, the assessment and selection of



aeration systems, simple models for biofilm reactors and the modeling of activated sludge processes. A final section looks at the processing of water and the treatment of wastewater integrated into the production process. Essential reading for chemists, engineers, microbiologists, environmental officers, agencies and consultants, in both academia and industry.

### **Wastewater Characteristics, Treatment and Disposal**

- Marcos Von Sperling 2007-03-30

Wastewater Characteristics, Treatment and Disposal is the first volume in the series Biological Wastewater Treatment, presenting an integrated view of water quality and wastewater treatment. The book covers the following topics: wastewater characteristics (flow and major constituents) impact of wastewater discharges to rivers and lakes overview of wastewater treatment systems complementary items in planning studies. This book, with its clear and practical approach, lays the foundations for the topics that are analysed in more detail in the

other books of the series. 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 2: Basic Principles of Wastewater Treatment; Volume 3: Waste Stabilisation Ponds; Volume 4: Anaerobic Reactors; Volume 5: Activated Sludge and Aerobic Biofilm Reactors; Volume 6: Sludge Treatment and Disposal

*The Biogas Handbook* - Arthur Wellinger

2013-02-19

With pressure increasing to utilise wastes and residues effectively and sustainably, the production of biogas represents one of the most important routes towards reaching national and international renewable energy targets. The biogas handbook: Science, production and applications provides a comprehensive and systematic guide to the development and

deployment of biogas supply chains and technology. Following a concise overview of biogas as an energy option, part one explores biomass resources and fundamental science and engineering of biogas production, including feedstock characterisation, storage and pre-treatment, and yield optimisation. Plant design, engineering, process optimisation and digestate utilisation are the focus of part two. Topics considered include the engineering and process control of biogas plants, methane emissions in biogas production, and biogas digestate quality, utilisation and land application. Finally, part three discusses international experience and best practice in biogas utilisation. Biogas cleaning and upgrading to biomethane, biomethane use as transport fuel and the generation of heat and power from biogas for stationary applications are all discussed. The book concludes with a review of market development and biomethane certification schemes. With its distinguished editors and

international team of expert contributors, The biogas handbook: Science, production and applications is a practical reference to biogas technology for process engineers, manufacturers, industrial chemists and biochemists, scientists, researchers and academics working in this field. Provides a concise overview of biogas as an energy option  
Explores biomass resources for production  
Examines plant design and engineering and process optimisation

**Hygienic Design of Food Factories** - John Holah 2011-10-26

Food safety is vital for consumer confidence, and the hygienic design of food processing facilities is central to the manufacture of safe products. Hygienic design of food factories provides an authoritative overview of hygiene control in the design, construction and renovation of food factories. The business case for a new or refurbished food factory, its equipment needs and the impacts on factory design and

construction are considered in two introductory chapters. Part one then reviews the implications of hygiene and construction regulation in various countries on food factory design. Retailer requirements are also discussed. Part two describes site selection, factory layout and the associated issue of airflow. Parts three, four and five then address the hygienic design of essential parts of a food factory. These include walls, ceilings, floors, selected utility and process support systems, entry and exit points, storage areas and changing rooms. Lastly part six covers the management of building work and factory inspection when commissioning the plant. With its distinguished editors and international team of contributors, Hygienic design of food factories is an essential reference for managers of food factories, food plant engineers and all those with an academic research interest in the field. An authoritative overview of hygiene control in the design, construction and renovation of food factories Examines the implications of hygiene

and construction regulation in various countries on food factory design Describes site selection, factory layout and the associated issue of airflow  
**Anaerobic Reactors for Sewage Treatment: Design, construction and operation** - Carlos Augusto de Lemos Chernicharo 2019-07-15  
Anaerobic sewage treatment using UASB reactors has significantly expanded in the last few decades and is now a consolidated technology in some warm climate regions. Several advantages of the anaerobic process make it a more sustainable option for sewage treatment. However, there are still important constraints related to design, construction, and operation of UASB reactors. Conversely, there is enough knowledge, experience, and proven technology that can be used to effectively tackle all the related drawbacks. This book delivers the most relevant techno-scientific developments from academia and water authorities, comprehensively addressing the main aspects of interest in design, construction, and operation of

UASB reactors for sewage treatment. Special attention is given to the proper and integrated management of sludge, scum, gaseous emissions, energy recovery, and effluent quality. The main purpose is to provide information and share experiences not yet compiled in the specialized literature on anaerobic sewage treatment. Therefore, a sequence of 12 well-interconnected chapters consolidates the practical knowledge and experiences that important research groups and recognized

professionals worldwide have acquired over the past 20 years in demo- and full-scale anaerobic-based sewage treatment plants. Anaerobic Reactors for Sewage Treatment: Design, Construction and Operation can significantly contribute towards a responsible expansion of the anaerobic technology in the world. The book is a valuable tool for engineers, constructors, operators, wastewater utility managers, as well as for students interested in anaerobic processes for sewage treatment.