



Wastewater treatment applications for nitrogen and phosphorous removal

# Phosphorus And Nitrogen Removal From Municipal Wastewater

**Markku Juhani Mäkelä, Finland**



## **Phosphorus And Nitrogen Removal From Municipal Wastewater:**

Phosphorus and Nitrogen Removal from Municipal Wastewater Richard I. Sedlak, 2018-04-27 This valuable new book offers practical guidance regarding the design and operation of systems for reducing effluent nitrogen and phosphorus. The principles of nitrogen and phosphorus removal are discussed including sources of nitrogen and phosphorus in wastewater, removal options, nitrogen and phosphorus transformations in treatment process, selection and treatment. The book also covers the design and operation of nitrogen and phosphorus removal systems including system options, system design, facility design, facility costs, and operation. Practical case studies are provided as examples of successful system implementations that may be able to help you decide what will work best in your plant. *Phosphorus and Nitrogen Removal from Municipal*

*Wastewater*, 1991. **Phosphorus and Nitrogen Removal from Municipal Wastewater** Richard I. Sedlak, 1991-10-07 This valuable new book offers practical guidance regarding the design and operation of systems for reducing effluent nitrogen and phosphorus. The principles of nitrogen and phosphorus removal are discussed including sources of nitrogen and phosphorus in wastewater, removal options, nitrogen and phosphorus transformations in treatment process, selection and treatment. The book also covers the design and operation of nitrogen and phosphorus removal systems including system options, system design, facility design, facility costs, and operation. Practical case studies are provided as examples of successful system implementations that may be able to help you decide what will work best in your plant. **Principles and Practice of Phosphorus and Nitrogen Removal from Municipal Wastewater** Soap and Detergent Association, 1989

*Nitrogen Removal from Municipal Wastewater* Matti Valve, 1995. National Policies and Technologies for Phosphorus and Nitrogen Removal from Municipal Wastewater in Finland Markku Juhani Mäkelä, Finland, 1990. **Technical and**

**Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities** Tetra Tech, Inc, 2011. Biological Nutrient (nitrogen and Phosphorus) Removal from Municipal Wastewater Using Different

Variations of the Activated Sludge Process Karunanidhi Munirathinam, 1986. **Simultaneous Biological Nitrogen**

**Removal and Electrochemical Phosphorus Recovery from Municipal Wastewater** Damian Jakub Kruk, 2017 The main objective of the study was to develop a partial nitrification anammox electrically assisted struvite yield membrane bioreactor PN A EASY MBR with simultaneous phosphorus recovery for treatment of municipal wastewater. The research was conducted in four separate experiments evaluating the feasibility of electrochemical phosphorus recovery, impact of electric current on nitrifying and anammox bacteria, and long term anammox performance at low temperature. The EASY method based on the magnesium dissolution from a sacrificial anode was found to be very effective in recovery of high quality struvite even from fermented waste activated sludge from a wastewater treatment plant that does not practice enhanced biological phosphorus removal. Effects of short and long term exposure of nitrifying biomass to direct current were investigated using inert graphite electrodes. Both short and long term exposure kinetic tests indicated that the activity of ammonia oxidizing bacteria was

slightly inhibited with almost linear decline whereas the activity of nitrite oxidizing bacteria was stimulated. The trends of relative activity changes exhibit a high correlation to the electric current applied per mass of volatile suspended solids. Low temperatures are one of the main obstacles to implementation in the main stream. In this study the impact of long term exposure to a temperature of 10 °C on the anammox process was investigated. Quantitative PCR was used to follow the population dynamics of different strains of anammox bacteria. Results of the investigation of the electric current impact on anammox activity provided evidence that simultaneous anammox and electrochemical processes is not a feasible approach. However the study provided a novel method of phosphorus recovery available also for non EBPR plants which can be applied in the mainstream process simultaneously with conventional nitrification. The study of anammox at low temperature generated valuable insights for development of mainstream anammox treatment.

*Removal of Nitrogen and Phosphorus from Municipal Wastewater using Microalgae immobilized on Twin-Layer System* Jing Shi, 2010-12-09 Excessive nitrogen and phosphorus loading from municipal wastewater treatment plants is an ongoing threat to water quality which leads to more stringent environmental regulations in different countries. Microalgal mediated twin layer system offers an interesting alternative for nitrogen and phosphorus removal since it provides a treatment to remove both nutrients efficiently coupled with the production of potentially valuable biomass. In the twin layer system microalgae are immobilized by self adhesion on a wet microporous ultrathin substrate the substrate layer. Subtending the substrate layer a second layer consisting of a macroporous fibrous material the source layer provides the growth medium. Twin layer effectively separate microalgae from the bulk of their growth medium yet allow diffusion of nutrients. Nylon filter cloth and glass grid reinforced lamina were selected as the suitable substrate and source layer for twin layer system respectively. Immobilized green algae *Scenedesmus rubescens* and *Chlamydomonas terricola* showed highest biomass productivities among 23 algae supplied by synthetic secondary wastewater and were recommended for wastewater treatment in general. Removal of nitrogen and phosphorus from the real municipal wastewater by *S. rubescens* was investigated. During 54 days *S. rubescens* grew well. 1.05 g dry weight m<sup>-2</sup> day<sup>-1</sup> remained immobilized and removed phosphorus nitrate and ammonium efficiently from four types of wastewater within short retention time. 1.2 days e.g. the residual phosphate P was

*Advanced Composite Materials for Wastewater Treatment* Norzita Ngadi, R.A. Ilyas, Nur Hafizah Ab Hamid, S.M. Sapuan, 2025-05-08 Advanced Composite Materials for Wastewater Treatment presents the latest technological advancements in this important research field. This book explores recent advances in manufacturing fabrication and the introduction of functional groups such as tailored layered double hydroxide LDH based nanocomposites and three dimensional hierarchical nanostructures. Among several discussed composites those that show maximum efficiency including graphene composites bio based composites alginate natural fiber rubber etc biochar metal organic frameworks geopolymers nanocomposites and LDH are all discussed. This book is an essential reference resource for researchers scientists and industrial professionals as well as postgraduate students providing

them with an in depth understanding of cutting edge developments in this field It provides readers with an overview of the evolution of composites in water and wastewater treatment applications Covers wastewater treatment processes using composite materials Introduces different types of composite materials with an emphasis on performance related to wastewater treatment Showcases valuable techniques in producing composite materials for wastewater treatment

**Nutrient Removal from Wastewaters** Nigel J. Horan, 1994-10-06 Topics in the book include novel processes removal of ammonia and nitrogen retrofitting upgrading treatment plants for nutrient removal and operating experiences at full scale plants Nutrient removal from wastewaters is a critical topic in every region Problems can arise from domestic sewage industrial wastewater or rainwater runoff *Select Nitrogen and Phosphorus Regulations and Removal Methods in Municipal Wastewater Treatment Plants* Mary F. Long, 1999

**Biological Removal of Nitrogen and Phosphorus from Municipal Wastewater** Pat McCourt, 1991 Biological Wastewater Treatment, Revised and Expanded Carlos D.M. Filipe, C.P. Leslie Grady, Jr., 1998-10-15 Written by noted experts in the field sharing extensive academic and industrial experience this thoroughly updated Second Edition covers commonly used and new suspended and attached growth reactors The authors discuss combined carbon and ammonia oxidation activated sludge biological nutrient removal aerobic digestion anaerobic processes lagoons trickling filters rotating biological contactors fluidized beds and biologically aerated filters They integrate the principles of biochemical processes with applications in the real world communicating approaches to the conception design operation and optimization of biochemical unit operations in a comprehensive yet lucid manner

**Environmental Biotechnology Volume 4** K. M. Gothandam, Ramachandran Srinivasan, Shivendu Ranjan, Nandita Dasgupta, Eric Lichtfouse, 2021-09-24 This book reviews the production of bioplastic from various raw materials and recycling wastewater into useful bioproducts by bacteria In addition it also addresses the recent advancement in pest control in rice plants different methods to analyse genotoxicity on soil samples and the effect of phytocompounds on acrylamide induced toxicity in Drosophilla Interestingly this book also discusses mesoporous silica nanoparticles role as nanocarrier material for inhibiting the cancer cell especially breast cancer and various biotechnological applications of marine fungal exopolysaccharides

**Optimization of Biological Nitrogen and Phosphorus Removal in A2/O Wastewater Treatment Processes** Changyong Wu, 2021 Anaerobic anoxic oxic A2 O is one of the most widely used processes in municipal wastewater treatment plants for simultaneous biological nitrogen and phosphorus removal The A2 O process has many advantages such as simple configuration and short hydraulic retention time HRT etc In addition it is easy to operate Therefore A2 O will be continuously chosen as the main option in all kinds of newly designed and built wastewater treatment plants Though the A2 O process has been used widely it has some inherent contradictions which are difficult to overcome For example the contradiction between substrate competition and SRT makes the high nitrogen and phosphorus removal unable to be achieved simultaneously As a result the removal efficiency of the system cannot be further improved In the past 10

years in China the wastewater quality very obviously changed with the improvement of living conditions At present municipal wastewater with a low C N ratio is rather common in most countries in the world The lack of a carbon source will make the inherent contradictions of the A2 O process becomes serious Therefore the conventional design parameters of the A2 O process are needed to adjust or the configuration of the A2 O process should change to fit the change of the wastewater quality According to this this book systematically describes how to improve the nitrogen and phosphorus removal efficiency of municipal wastewater with low C N ratio and effectively utilize the carbon resource in the influent of wastewater This publication is useful for students researchers and engineers whose major focus is municipal and the environment

**Handbook of Biological Wastewater Treatment** Adrianus van Haandel, Jeroen van der Lubbe, 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

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Municipal Wastewater Treatment Works Construction Grants Program United States. Environmental Protection  
Agency,1975

## Embracing the Track of Expression: An Psychological Symphony within **Phosphorus And Nitrogen Removal From Municipal Wastewater**

In a world used by monitors and the ceaseless chatter of fast communication, the melodic beauty and emotional symphony created by the written word often diminish into the backdrop, eclipsed by the persistent noise and distractions that permeate our lives. Nevertheless, set within the pages of **Phosphorus And Nitrogen Removal From Municipal Wastewater** a charming fictional value full of natural emotions, lies an immersive symphony waiting to be embraced. Crafted by a masterful musician of language, this charming masterpiece conducts readers on a mental journey, skillfully unraveling the hidden melodies and profound impact resonating within each carefully crafted phrase. Within the depths with this touching analysis, we can investigate the book is central harmonies, analyze its enthralling writing design, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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