Biological Treatment Of Landfill Leachate

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Proceedings of the 44th Industrial Waste Conference May 1989, Purdue University
Waste Management: Concepts, Methodologies, Tools, and Applications

ASHLEY IVY

Perspectives on Biological Treatment of Sanitary Landfill Leachate Butterworth-Heinemann
Population growth and industrial development have increased the amount of wastewater generated by urban areas, and one of the major problems facing industrialized nations is the contamination of the environment by hazardous chemicals. Therefore, to meet the standards, suitable treatment alternatives should be established. Advanced Oxidation Processes (AOPs) in Water and Wastewater Treatment is a pivotal reference source that provides vital research on the current, green, and advanced technologies for wastewater treatment. While highlighting topics such as groundwater treatment, environmental legislation, and oxidation processes, this publication explores the contamination of environments by hazardous chemicals as well as the methods of decontamination and the reduction of negative effects on the environment. This book is a vital reference source for environmental engineers, waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, and academicians seeking current research on achieving sustainable management for wastewater treatment.
Pollution Control Technology for Leachate from Municipal Solid Waste Springer
Practical Techniques for Groundwater and Soil Remediation is a compilation of articles by the author that were printed in the National Ground Water Association (NGWA) magazine Groundwater Monitoring Review. The book provides valuable data, emphasizes the practical aspects of remediation, presents results from actual remediation programs, and helps readers prepare remediation strategies. The book also includes detailed technical data on treatment equipment performance and the costs associated with their design and operation. A unique feature of the book is that it also contains data from treatment systems that did not work. Practical Techniques for Groundwater and Soil Remediation is a "must have" source of invaluable data and tips that will be useful for all groundwater and soil remediation professionals.
Generation, Control and Treatment LAP Lambert Academic Publishing
New research-case histories and operating data-on every conceivable facet of today's big problem are detailed in the latest

Purdue Book-with unparalleled appropriate, usable information and data for your current industrial waste problems from the May 1989 Conference.

Practical Techniques for Groundwater & Soil Remediation Routledge

Landfilling, one of the prevailing worldwide waste management strategies, is presented together with its benefits and environmental risks. Aside from biogas, another non-avoidable product of landfilling is landfill leachate, which usually contains a variety of potentially hazardous inorganic and organic compounds. It can be treated by different physico-chemical and biological methods and their combinations. The composition and characteristics of landfill leachate are presented from the aspect of biotreatability. The treatment with activated sludge, mainly consisting of bacterial cultures under aerobic and anaerobic conditions in various reactor systems, is explained, including an extensive literature review. The potential of fungi and their extracellular enzymes for treatment of municipal landfill leachates is also presented, with a detailed review of the landfill leachate treatment studies. The future perspectives of biological treatment are also discussed.

The Aerobic Treatment of Landfill Leachate Using Rotating Biological Contactors CRC Press

Municipal solid waste (MSW) disposal is an ever-increasing problem in many parts of the world, especially in developing countries. To date, landfilling is still the preferred option for the disposal and management of MSW due to its low-cost operation. While this solution is advantageous from a cost perspective, it introduces a high level of potential pollutants which can be detrimental to the local environment. Control and Treatment of Landfill Leachate for Sanitary Waste Disposal presents research-based insights and solutions for the proper management and treatment of landfill leachate. Highlighting relevant topics on emerging technologies and treatment innovations for minimizing the environmental hazards of waste disposal, this innovative publication contributes to filling in many of the gaps that exist in the current literature available on leachate treatment. Waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, graduate students, and researchers will find this publication beneficial to their professional and academic interests in the area of waste treatment and management.

New Advances and Technologies IGI Global

Early biological treatment studies with the raw leachate did not yield high COD and nitrogen removals. In order to improve biological treatability, the landfill leachate was subjected to pretreatment by chemical coagulation-flocculation followed by air stripping of ammonia. The pretreated leachate was subjected to aerobic biological treatment in an aeration tank by fed-batch operation. In order to improve the extent of COD and ammonium nitrogen removals, pretreated leachate was subjected to adsorbent supplemented biological treatment in an aeration tank operated in fed-batch mode by using powdered zeolite (PZ) and powdered activated carbon (PAC) as adsorbents. Chemical oxidation was used to further reduce COD content of landfill leachate after PAC added biological treatment. Three oxidizing agents (H2O2, Fenton's reagent, NaOCl) were used in different concentrations for chemical oxidation.

Routledge

Landfill Leachates will provide an invaluable source of information on the subject for scientists, engineers, practitioners, policy makers, and regulatory officials. Constructed wetlands are proving to be the best natural treatment system for landfill leachates. Most of the contaminants in landfill leachates are degraded in treatment wetlands. Potential for long-term sustainability and significant cost savings are attractive features of this eco-technology. Documentation of the experience in this use of constructed wetlands has been limited. Constructed Wetlands for the Treatment of Landfill Leachates is the first compilation of the results of research from North America and Europe. Originally presented at an international symposium, this collection of papers offers the most recent research findings from the leading researchers in this new and innovative natural treatment system. Specific issues addressed in the text include: leachate characteristics, and the potential for treatability by constructed wetlands wetland treatment, processes and transformation use of constructed wetlands in cold climatic conditions assessment of the tolerance of wetland plants to the toxicity of leachates role of plants in the treatments of leachates integrated wetland systems performance of different wetland treatment systems cost comparisons of wetland technology vs. traditional treatment technologies The potential for environmental contamination due to leachates from landfills is increasing, and there is an urgent need to find ways and means to treat leachates in a sustainable way Constructed Wetlands for the Treatment of

Exploration of Biological Treatment Systems for the Removal of Persistent Landfill Leachate Contaminants and Nanoparticles Routledge

It is necessary to understand the extent of pollution in the environment in terms of the air, water, and soil in order for both humans and animals to live healthier lives. Poor waste treatment or pollution monitoring can lead to massive environmental issues, such as diminishing valuable resources, and cause a significant negative impact on society. Solutions, such as reuse of waste and sustainable waste management, must be explored to prevent these adverse effects. The Handbook of Research on Resource Management for Pollution and Waste Treatment is a collection of innovative research that examines waste and pollution treatment methods that can be adopted at local and international levels and examines appropriate resource management strategies for environmentally related issues. Featuring coverage on a wide range of topics such as soil washing, bioremediation, and runoff handling, this book is ideally designed for environmentalists, engineers, waste management professionals, natural resource regulators, environmental policymakers, scientists, academicians, researchers, and students seeking current research on viable resource management methods for the regeneration of their immediate environment.

Biological Treatment of Hazardous Waste Landfill Leachate Using an Anaerobic/aerobic Process Biological Treatment of Landfill LeachateExploration of Biological Treatment Systems for the Removal of Persistent Landfill Leachate Contaminants and NanoparticlesThe integrity of groundwater sources is constantly threatened by contaminant plumes generated by accidental gasoline leakages and leachates escaping landfills. These plumes are of concern due to their proven toxicity to living organisms. Aromatic and chlorinated hydrocarbons, volatile fatty acids, phenols, and ammonia have been found in these leachates. In addition, benzene, toluene, and xylenes (BTX) are major components of gasoline. The lack of oxygen in groundwater makes anaerobic bioremediation desired for the treatment of groundwater contaminated with BTX and chlorinated solvents. With the objective of finding microorganisms capable of BTX and cis-dichloroethylene (cis-DCE) degradation under anaerobic conditions for their use in permeable reactive barriers, different inocula were tested in batch experiments. Toluene was rapidly degraded by several inocula in the presence of alternative electron acceptors. Benzene and m-xylene were eliminated by few of the inocula tested after incubation periods ranging from

244 to 716 days. cis-DCE was highly recalcitrant as no degradation was observed over 440 days. Biological processes have been successfully applied for the treatment of landfill leachates as well. In an effort to provide an effective and economical alternative, an anaerobic-aerobic system was evaluated using a synthetic media simulating the organic and ammonia content of real leachates. The removal of the organic content reached 98% in an upflow anaerobic sludge blanket reactor, and resulted in the formation of methane. During the aerobic process, in an innovative down-flow sponge reactor, ammonia was highly transformed to nitrite and nitrate. Complete nitrification was eventually achieved. The capacity of current wastewater treatment plants for removing nanoparticles has been questioned during the last years. Nanoparticles have been incorporated into numerous applications and their presence in wastewater seems to be inevitable. A laboratory-scale secondary treatment system was set-in to study the behavior of cerium and aluminum oxide nanoparticles during wastewater treatment. The nanoparticles were highly removed, suggesting that secondary treatment is suitable for their elimination. The removal of these nanoparticles was influenced by the pH and organic content of the wastewater. Aluminum nanoparticles proved to be toxic; however the performance of the system for eliminating the organic content was recovered over time.Adsorptive Biological Treatment Of Landfill Leachate

This book contains a collection of research works focused on the biodegradation of different types of pollutants, both in water and solids. The book is divided in three major sections: A) Biodegradation of organic pollutants in solids and wastewater, B) Biodegradation of complex pollutants, and C) Novel technologies in biodegradation and bioremediation.

Anaerobic Treatment of Landfill Leachate by an Upflow Two-Stage Biological Filter CRC Press

Anaerobic digestion is a biochemical degradation process that converts complex organic material, such as animal manure, into methane and other byproducts. Part of the author's Wastewater Microbiology series, Microbiology of Anareboic Digesters eschews technical jargon to deliver a practical, how-to guide for wastewater plant operators.

Constructed Wetlands for the Treatment of Landfill Leachates IGI Global

In the third part of this dissertation the application of flushing/Fenton's reagent oxidation to produce sustainable solid waste cells was evaluated. A treatment similar to pump and treat process utilizing Fenton’s reagent on-site treated leachate combined with in-situ aeration was proposed. Treated leachate would be recycled to the landfill cell flushes releasable nonbiodegradable carbon from the cell and oxidizes it externally. This technique was demonstrated to have treatment cost and time benefits over other alternatives for producing completely stable solid waste cells such as anaerobic flushing and biological and/or mechanical pretreatment of solid waste (used in the EU).

Landfill leachate treatment - with particular reference to an aerobic biological treatment system World Scientific

The integrity of groundwater sources is constantly threatened by contaminant plumes generated by accidental gasoline leakages and leachates escaping landfills. These plumes are of concern due to their proven toxicity to living organisms. Aromatic and chlorinated hydrocarbons, volatile fatty acids, phenols, and ammonia have been found in these leachates. In addition, benzene, toluene, and xylenes (BTX) are major components of gasoline. The lack of oxygen in groundwater makes anaerobic bioremediation desired for the treatment of groundwater contaminated with BTX and chlorinated solvents. With the objective of finding microorganisms capable of BTX and cis-dichloroethylene (cis-DCE) degradation under anaerobic conditions for their use in permeable reactive barriers, different inocula were tested in batch experiments. Toluene was rapidly degraded by several inocula in the presence of alternative electron acceptors. Benzene and m-xylene were eliminated by few of the inocula tested after incubation periods ranging from 244 to 716 days. cis-DCE was highly recalcitrant as no degradation was observed over 440 days. Biological processes have been successfully applied for the treatment of landfill leachates as well. In an effort to provide an effective and economical alternative, an anaerobic-aerobic system was evaluated using a synthetic media simulating the organic and ammonia content of real leachates. The removal of the organic content reached 98% in an upflow anaerobic sludge blanket reactor, and resulted in the formation of methane. During the aerobic process, in an innovative down-flow sponge reactor, ammonia was highly transformed to nitrite and nitrate. Complete nitrification was eventually achieved. The capacity of current wastewater treatment plants for removing nanoparticles has been questioned during the last years. Nanoparticles have been incorporated into numerous applications and their presence in wastewater seems to be inevitable. A laboratory-scale secondary treatment system was set-in to study the behavior of cerium and aluminum oxide nanoparticles during wastewater treatment. The nanoparticles were highly removed, suggesting that secondary treatment is suitable for their elimination. The removal of these nanoparticles was influenced by the pH and organic content of the wastewater. Aluminum nanoparticles proved to be toxic; however the performance of the system for eliminating the organic content was recovered over time.

Advance Wastewater Treatment Technique LAP Lambert Academic 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.

Applications and Effluent Treatment IGI Global

Biological Treatment of Landfill LeachateExploration of Biological Treatment Systems for the Removal of Persistent Landfill Leachate Contaminants and Nanoparticles

An investigation into biological treatment systems for landfill leachate CRC Press

Leachate percolating through landfills must be collected and properly treated. However, high concentrations of ammonia (NH4+), refractory organic matter [measured as chemical oxygen demand (COD)], water color and heavy metals in leachate interfere biological processes in conventional wastewater treatment plants. Constructed wetlands (CWs) have been used in the past to treat leachate, but their design and performance has not been properly optimized. In particular, low cost adsorbent materials, such as zeolite and biochar, have the potential to adsorb ammonia and organic compounds, respectively. This

increases their retention in the wetland and reduces their toxicity to microorganisms and plants in the ecosystem. In this study, three laboratory-scale recirculating biofilm sequencing batch reactors (RB-SBRs) were set up with the following media materials: 1) lightweight expanded clay aggregate (LECA), 2) LECA + clinoptilolite, a natural zeolite mineral (CZ), 3) LECA + zeolite + biochar (CZB). Reactors were operated in a four-stage sequence to simulate hybrid sub-surface flow wetlands: 1) fill, 2) anoxic react, 3) aerobic react, and 4) decant. The initial hydraulic retention time (HRT) was 14 days and was reduced to 8.75 days after 17 cycles. NH4+, COD, nitrite (NO2-), nitrate (NO3-) and UV456 absorbance were measured to compare the removal performance between RB-SBRs with and without absorbent addition. Substantially higher COD removal was observed in the biochar amended reactor. COD removal of 83% and 61% was observed at HRTs of 14 and 8.75 days, respectively. Higher color removal (95% and 82%) was found in CZB during both HRTs treatment than C and CZ without even without zeolite addition. Higher effluent NO3- concentrations were observed in CZB, possibly due to lower bioavailability of organic carbon due to adsorption by biochar. Thus, the recommendation for the design of hybrid sub-surface wetlands is to consider the appropriate and economic organic carbon source addition to anoxic phase as an extra electron donor, which can contribute to higher denitrification performance to the completely remove nitrogen from landfill leachate.

Biological-chemical Treatment of Landfill Leachate IGI Global

The advantages inherent in anaerobic submerged filter system coupled with the amenability of this process in its application to leachate stabilization suggests that it is worthy of consideration as a basis for full scale leachate treatment facilities. The AnSBF is well suited to handling the large organic loads that often characterize leachates, particularly leachates that are discharged from young landfills. More than 96% COD and BOD can be removed from a high-strength acidic leachate waste-water, according to the present study, if the organic loading is controlled not in excess of 75.2 lb COD/1000 cu ft -day or 56.4. Metal removal efficiency is high when the influent concentrations of Fe(III) and Zn(II) are less than 115.3 mg/1 and 10.4 mg/1, respectively. In addition to the efficient treatment of soluble COD, BOD, and heavy metals, the anaerobic filter requires no effluent recycle or sludge return.

Aerobic Granular Sludge BoD – Books on Demand

This book presents new application processes in the context of anaerobic digestion (AD), such as phosphorus recovery, microbial fuel cells (MFCs), and seaweed digestion. In addition, it introduces a new technique for the modeling and optimization of AD processes. Chapters 1 and 2 review AD as a technique for converting a range of organic wastes into biogas, while Chapter 3 discusses the recovery of phosphorus from anaerobically digested liquor. Chapters 4 and 5 focus on new techniques for modeling and optimizing AD. Chapters 6 and 7 then describe the state of the art in AD effluent treatment. The book’s final three chapters focus on more recent developments, including microbial fuel cells (MFCs) (Chapter 8), seaweed production (Chapter 9), and enzyme technologies (Chapter 10).

Assessment and Remediation of Environmental Hazards IWA Publishing

The Handbook of Environment and Waste Management, Volume 1, Air and Water Pollution Control, is a comprehensive compilation of topics that are at the forefront of many technical advances and practices in air and water pollution control. These include air pollution control, water pollution control, water treatment, wastewater treatment, industrial waste treatment and small scale wastewater treatment. Internationally recognized authorities in the field of environment and waste management contribute chapters in their areas of expertise. This handbook is an essential source of reference for professionals and researchers in the areas of air, water, and waste management, and as a text for advanced undergraduate and graduate courses in these fields.

Biodegradation and Bioremediation of Polluted Systems John Wiley & Sons

The overall objectives of this research are (1) to supply information allowing Facility Engineers (FEs) at Army installations both to recognize potential or actual leachate problems and to gauge the magnitude of the problems, (2) to provide guidance on short- and long-term remedial actions which might control leachate formation and migration, and (3) to provide information to installation, FE, major command, and district personnel regarding legal ramifications of and responsibilities concerning leachate gas/problems. The objective of the phase of the study reported here is to provide FEs (1) an overview of the technologies that can be used to treat leachate, and (2) guidance on choosing and designing leachate treatment systems that will meet the Army's needs. An extensive literature survey identified technologies which have been used to treat leachate, or have shown potential for treating waste with characteristics similar to leachate. Technologies were examined in terms of their operational principles, waste treatment capability, major design and construction parameters, advantages and disadvantages, and estimated costs. Particular emphasis was given to lagoon technology because it has low capital, operation, and maintenance costs, and it is a form of biological treatment which has shown the most potential for treating typical Army leachates.

Biological Treatment of Landfill Leachate

As the world’s population continues to grow and economic conditions continue to improve, more solid and liquid waste is being generated by society. Improper disposal methods can not only lead to harmful environmental impacts but can also negatively affect human health. To prevent further harm to the world’s ecosystems, there is a dire need for sustainable waste management practices that will safeguard the environment for future generations. Waste Management: Concepts, Methodologies, Tools, and Applications is a vital reference source that examines the management of different types of wastes and provides relevant theoretical frameworks about new waste management technologies for the control of air, water, and soil pollution. Highlighting a range of topics such as contaminant removal, landfill treatment, and recycling, this multi-volume book is ideally designed for environmental engineers, waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, policymakers, government officials, academicians, researchers, and students.

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