

Biofiltration For Air Pollution Control

From Biofiltration to Promising Options in Gaseous Fluxes Biotreatment: Recent Developments, New Trends, Advances, and Opportunities provides an overview on the biological tools used for the fluxes, with emphasis on traditional and perspective options, opening new horizons for research and implementation in practice. It is known that air pollution is an emergent global issue and a priority for international environmental programs. Moreover, technologies based on biological methods are significantly contributing to the sustainable development concept. Thus this book provides tools for addressing these issues in a sustainable manner. These issues can be solved at different levels (e.g., "end-of-pipe" gaseous streams, indoor/outdoor air, closed environments), which can be approached by the different techniques presented in the book, from classical biofiltration techniques (part 1) to phytotreatment and microalgae-based techniques (part 2). Although all options have their particularities that make them suitable for different applications, a special attention is drawn to the potential of the last one, which offers multiple possibilities for biomass valorization. Scientists from worldwide with relevant experience in their field contributed to the development of this book. Presents the main biotechnological aspects applied for gas purification, focusing on process understanding, limitations, and capability in different applications Promotes the biofiltration process by enhancing their performance together with the simultaneously economic and environmental impacts Implements new aspects of scientific research and development in the field of air pollution control Master's Thesis from the year 2012 in the subject Chemistry - Bio-chemistry, , course: Master Degree, language: English, abstract: Modern air pollution control technologies have emerged over the years to solve emission problems in industrial facilities and thereby comply with environmental regulations. A variety of technologies have been developed to meet the needs of both the industries and the regulatory agencies. From the view the techno economics. Some air pollutants like H₂S, NH₃ and VOC's are emitted in the industry causes odour and this not only causes occupational health but also damages public image of the industry. Biofiltration is a sustainable technology for VOC and odor control. Bio-filtration is a method of pollution control in which pollutants are biologically degraded using microorganisms. Generally, the emission from biofiltration are one-fourth to one-tenth that of physico-chemical destructive technologies. Biofilters are being developed and effectively used for a wide variety of industries, including wood processing, pharmaceuticals, petroleum remediation etc. Biofilters are cost-effective and straightforward options for pollutants capable of biodegrading reasonably easily. Triethylamine(TEA) is a Volatile organic compound widely used in polymerization reactions and a solvent and corrosion inhibitor in industry and it is also used as an intermediate in the production of various chemicals, including pesticides. It is necessary to remove TEA from the environment. TEA gas-phase bio treatment has emerged as an effective and inexpensive alternative to conventional physicochemical treatment systems. The technology is still under development. From the economics, equipment, process kinetics, and operational skills and different layouts and flow trains are being proposed including biofiltration, biotrickling filter, and bioscrubber. In the present work, studies have been carried out on biofilter contaminated with TEA. The contaminated gas is passed through a packed bed where TEA compound is absorbed into the biofilm in which diffusion and aerobic biodegradation occur. This is a complex set of physical, chemical and biological interactions. Therefore, selection of suitable microbial consortia and biofilter configuration is very important from commercial perspective.

Proceedings of the 2006 USC-TRG Conference on Biofiltration for Air Pollution Control

Biotechnology for Odor and Air Pollution Control

2000 USC-TRG Conference on Biofiltration

An Innovative Role of Biofiltration in Wastewater Treatment Plants (WWTPs)

Proceedings, 1995 Conference on Biofiltration (an Air Pollution Control Technology)

Recent Developments, New Trends, Advances, and Opportunities

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.

The number-one environmental threat to public health, air pollution remains a pressing problem-made even more complicated by the massive quantity and diversity of air pollution sources. Biofiltration technology (using micro-organisms growing on porous media) is being recognized as one of the most advantageous means to convert pollutants to harmless products. Done properly, biofiltration works at a reasonable cost-utilizing inexpensive components, without requiring fuel or generating hazardous by-products. Firmly established in Europe, biofiltration techniques are being increasingly applied in North America: Biofiltration for Air Pollution Control offers the necessary knowledge to "do it right."

Integrated Air Quality Management

Bioreactors and Bioenergy

A Fundamental Study of Biofiltration Processes for VOC Removal from Waste Gas Streams

(an air pollution control technology)

Modeling and Evaluation of Pollutant Emissions from Industrial Biofilters by Dispersion Models

October 22 and 23, 1998, University of Southern California, Los Angeles, California, USA

A panel of respected air pollution control educators and practicing professionals critically survey the both principles and practices underlying control processes, and illustrate these with a host of detailed design examples for practicing engineers. The authors discuss the performance, potential, and limitations of the major control processes-including fabric filtration, cyclones, electrostatic precipitation, wet and dry scrubbing, and condensation-as a basis for intelligent planning of abatement systems,. Additional chapters critically examine flare processes, thermal oxidation, catalytic oxidation, gas-phase activated carbon adsorption, and gas-phase biofiltration. The contributors detail the Best Available Technologies (BAT) for air pollution control and provide cost data, examples, theoretical explanations, and engineering methods for the design, installation, and operation of air pollution process equipment. Methods of practical design calculation are illustrated by numerous numerical calculations.

Whether considered a threat to the health of humans in particular or of the ecosystem in general, the problem of air pollution affects us all. In addition to the 189 chemicals listed in the air toxins category of the 1990 Clean Air Act Amendments, smog, acid rain, ozone depletion, and global warming all arise from air pollution. You can debate the prime causes of acid rain, excessive lumbering or

changes in the weather ó but the diminishing rainforest and the spreading desert speak for themselves. Air Pollution addresses the sources and results of these problems, and how they influence the environment. It surveys all aspects of management, including dispersion modeling, emission measurements, air quality and continuous emission monitoring, remote sensing, and stack sampling. In addition, the book explores methods of reduction and control, with particular attention to gaseous emission controls and odor control. This stellar resource addresses the prevention of pollution created by existing technology, and the design of future zero-emissions technology. A useful guide for engineers, students or anyone working for environmental protection, Air Pollution provides a solid foundation and presents a sound environmental philosophy. Béla G. Lipták speaks on Post-Oil Energy Technology on the AT&T Tech Channel.

Waste Minimization in Industrial Processes and Remediation of Hazardous Waste

Special Topical Issue on Biofiltration Technologies for Air Pollution Treatment and Control

1996 Conference on Biofiltration

Proceedings of the 3rd International Congress on Biotechniques for Air Pollution Control. Delft, The Netherlands, September 28-30, 2009

Biofiltration as a Viable Alternative for Air Pollution Control at Department of Defense Surface Coating Facilities

Proceedings, 1996 Conference on Biofiltration (an Air Pollution Control Technology)

In the debate over pollution control, the price of pollution is a key issue. But which is more costly: clean up or prevention? From regulations to technology selection to equipment design, Air Pollution Control Technology Handbook serves as a single source of information on commonly used air pollution control technology. It covers environmental regulations and their history, process design, the cost of air pollution control equipment, and methods of designing equipment for control of gaseous pollutants and particulate matter. This book covers how to: Review alternative design methods Select methods for control Evaluate the costs of control equipment Examine equipment proposals from vendors With its comprehensive coverage of air pollution control processes, the Air Pollution Control Technology Handbook is a detailed reference for the practicing engineer who prepares the basic process engineering and cost estimation required for the design of an air pollution control system. It discusses the topics in depth so that you can apply the methods and equations presented and proceed with equipment design.

Slow sand filtration is typically cited as being the first "engineered" process in drinking-water treatment. Proven modifications to the conventional slow sand filtration process, the awareness of induced biological activity in riverbank filtration systems, and the growth of oxidant-induced biological removals in more rapid-rate filters (e.g. biological activated carbon) demonstrate the renaissance of biofiltration as a treatment process that remains viable for both small, rural communities and major cities. Biofiltration is expected to become even more common in the future as efforts intensify to decrease the presence of disease-causing microorganisms and disinfection by-products in drinking water, to minimize microbial regrowth potential in distribution systems, and where operator skill levels are emphasized. Recent Progress in Slow Sand and Alternative Biofiltration Processes provides a state-of-the-art assessment on a variety of biofiltration systems from studies conducted around the world. The authors collectively represent a perspective from 23 countries and include academics, biofiltration system users, designers, and manufacturers. It provides an up-to-date perspective on the physical, chemical, biological, and operational factors affecting the performance of slow sand filtration (SSF), riverbank filtration (RBF), soil-aquifer treatment (SAT), and biological activated carbon (BAC) processes. The main themes are: comparable overviews of biofiltration systems; slow sand filtration process behavior, treatment performance and process developments; and alternative biofiltration process behaviors, treatment performances, and process developments.

Air Pollution Prevention and Control

Asian Case Studies

A Focus on Key Biodegradation Parameters

USC-UAM 2008 Conference on Biofiltration for Air Pollution Control : October 22-24, 2008, Long Beach, California

October 5-6, 1995, University of Southern California, Los Angeles : Sponsored by University of Southern California, Environmental Engineering Program, Department of Civil Engineering & The Reynolds Group

1998 USC-TRG Conference on Biofiltration

Biofiltration for Air Pollution ControlCRC Press

Energy and feedstock materials for the chemical industry show an increasing demand. With constraints related to availability and use of oil, the energy and chemical industry is subject to considerable changes. The need for the use of cheaper and widely available feedstocks, and the development of sustainable and environmentally friendly c

Air, Gas, and Water Pollution Control Using Industrial and Agricultural Solid Wastes Adsorbents

October 18-20, 2006, Long Beach, California, USA.

an air pollution control technology

Handbook of Environment and Waste Management

Recent Progress in Slow Sand and Alternative Biofiltration Processes

Air Pollution Control Engineering

Here is the first book on biotechnological processes for controlling odor and air pollution emanating from industrial and municipal airstreams. Authors from academia and industry describe biotechnological methods ranging from those in laboratory stages to pilot

evaluation to full-scale process implementation. In addition to the basic microbiology and engineering, the design, modeling, and control of bioreactors are discussed in detail.

In these pages is all the information that you-manager, engineer, or other technical professional-would need to select, size, and estimate "budget/study" level capital and annual costs for a variety of air pollution control equipment. This equipment includes wet scrubbers, carbon adsorbers, and other "add-on" devices. This book also deals with such nonstack controls as wet dust suppression systems and flue gas desulfurization systems. The costs are current (1988 or 1989 dollars) and are mainly presented in equational form for ease of computerization and updating. Clear, comprehensive equipment sizing procedures are also detailed. Finally, several detailed example problems are included to illustrate the sizing and costing procedures. This book is not just for technical personnel, however. The material is easy to grasp and use. Anyone with an air pollution control background can follow and apply the procedures and data herein. Using this book, air pollution control professionals can now develop sound, defensible (within $\pm 30\%$) cost estimates with a minimum of time and effort.

October 24 & 25, 1996, University of Southern California, Los Angeles

Proceedings

Indoor Environmental Quality

Air Pollution Control Technology Handbook

2002 USC-TRG Conference on Biofiltration

Biofilter for the purification of air contaminated with triethylamine (TEA)

With gradually increasing strict environmental regulations that control emissions of volatile organic compounds (VOCs), reduced sulphur compounds and nuisance odors from industries, there is a growing need for air pollution control systems. Biofiltration systems have been widely used in the treatment of odorous and toxic volatile organic compounds. As compared to traditional physical and chemical systems, biofiltration is cost-effective, environmentally friendly, and highly efficient for many biodegradable pollutants. The biofilter concept is about using microorganisms to metabolize the variety of contaminants such as volatile organic compounds, reduced sulphur compounds and hydrocarbons. Although the biofilters are designed to eliminate pollutants with greater than 90% efficiency, accidental releases do occur due to biofilter failures; hence, this poses serious threats to health, especially to those who live in the vicinity of biofilter locations. This research investigates the dispersion of air pollutants that are accidentally released from industrial biofilters. Two commercial biofilters that were installed in different industrial sites, located in (Hickson) and (Toronto), Ontario, Canada, were used as test cases. A mathematical (Gaussian) dispersion model, a screening model (SCREEN3), and a non-steady state Lagrangian California Puff Model (CALPUFF), were used at different biofilter removal efficiencies to predict pollutant concentrations, dispersion and health effects, and to examine the impacts of topographical and meteorological conditions on concentration of pollutant emissions at receptor locations. The study shows that geographical variations (i.e., flat versus elevated surfaces) of the location of a biofilter have an effect on the wind, and hence on pollutant dispersion. The results confirmed that the wind direction has a direct impact on the pollutant plume path, whereas the wind speed and atmospheric stability class influence the pollutant concentration. The results elucidated that the high concentration of pollutants due to low removal efficiency of a biofilter can cause serious health problems. The results of this work can be used as a basis to evaluate biofilter performance under various atmospheric and geographical conditions and to improve biofilter design.

Many physico-chemical and operational factors influence the performance, treatment costs, and longterm stability of biofilters for the treatment of wastewater. An innovative role of biofiltration in wastewater treatment plants (WWTPs) focuses on identifying the factors that affect biofiltration, such as the hydraulic retention time of the biofiltration system, the type and characteristics of the filter, and the attached biomass, explains their influence and provides guidelines on how to control these factors to optimize better operation with respect to pollutant control present in (WWTPs). The fundamental basis of the treatment in biofilters is the action of pollutant-degrading microorganisms and consequently the book also discusses in depth about the microbial ecology of biofiltration. In addition, it explores the applications of biofiltration including the removal of emerging pollutants. Describes the microbial ecology of biofiltration Includes modeling of biofiltration Describes the designing of biofilters, start-up, and monitoring Discusses the mechanism of biofiltration Describes the controlling and operational factors of biofiltration

1995 Conference on Biofiltration

Modeling the Biofiltration of NO_x in an Integrated Air Pollution Control Technology

Air and Water Pollution Control

Biofiltration

Biofiltration as an Air Pollution Control Technology for VOC Emissions

Bioreactors for Waste Gas Treatment

This monograph consists of manuscripts submitted by invited speakers who participated in the symposium "Industrial Environmental Chemistry: Waste Minimization in Industrial Processes and Remediation of Hazardous Waste," held March 24-26, 1992, at Texas A&M University. This meeting was the tenth annual international symposium sponsored by the Texas A&M Industry-University Cooperative Chemistry Program (IUCCP). The program was developed by an academic-industrial steering committee consisting of the co-chairmen, Professors Donald T. Sawyer and Arthur E. Martell of the Texas A&M University Chemistry Department, and members appointed by the sponsoring companies: Bernie A. Allen, Jr., Dow Chemical USA; Kirk W. Brown, Texas A&M University; Abraham Clearfield, Texas A&M University; Greg Leyes, Monsanto Company; Jay Warner, Hoechst-Celanese Corporation; Paul M. Zakriski, BF Goodrich Company; and Emile A. Schweikert, Texas A&M University (IUCCP Coordinator). The subject of this conference reflects the interest that has developed in academic institutions and industry for technological solutions to environmental contamination by industrial wastes. Progress is most likely with strategies that minimize waste production from industrial processes. Clearly the key to the protection and preservation of the environment will be through R&D that optimizes chemical processes to minimize or eliminate waste streams. Eleven of the papers are directed to waste minimization. An additional ten papers discuss chemical and biological remediation strategies for hazardous wastes that contaminate soils, sludges, and water.

*The steady growth in the number of vehicles on the road, heavy reliance on coal, use of dirty fuels for residential combustion, and extensive open burning are some of the major factors leading to the progressive deterioration of air quality in developing countries in Asia. And despite efforts to establish and implement air quality measurement systems, the development of infrastructure, environmental technology, and management practices continues to lag behind the rate of emission increase. Based on ten years of coordinated research, *Integrated Air Quality Management: Asian Case Studies* discusses technical and policy tools for the integrated air quality management of developing countries in Asia. The book begins with an overview of major issues of air quality management practices in developing Asia and potential approaches to reduce pollution, including opportunities for integration of air quality improvement and climate migration strategies. It covers the methodology and results of fine particulate matter monitoring using traditional filter-based and satellite monitoring techniques. It examines the applications of a 3D dispersion modeling tool for urban and regional air quality management focusing on surface ozone, fine particulate matter, and acid deposition. The final chapters discuss innovative control technologies for gaseous air pollutants and illustrate the integrated air quality management in developing Asia through case studies for target source categories including agricultural residue field burning, vehicle emissions, brick kilns, and industrial VOC emission. Illustrated with case studies, this book presents an integrated air quality management methodology that employs technical and policy tools to achieve air quality goals. It includes technical information and policy recommendations based on the outcomes of several multi-year air quality research programs coordinated by the Asian Institute of Technology. The text combines fundamental information and advanced knowledge useful to large audiences dealing with subjects of integrated air quality management.*

An Air Pollution Control Technology, October 19 and 20, 2000, University of Southern California, Los Angeles, California, USA

Biofiltration for Air Pollution Control

White Paper : Biofiltration for Air Pollution Control

An Air Pollution Control Technology

Air Pollution

When we think of indoor pollution, we usually think of conditions originating from faulty ventilation systems, second hand smoke, and other air borne pollutants. Taking an in-depth, hard science look at the problems of indoor environmental pollution, *Indoor Environmental Quality* covers all the major indoor contaminants - inorganic, organic, and bio

Air pollution, a major concern at the end of the 20th century, still remains a significant problem to be solved today. Traditionally, industrial waste gases have primarily been treated through physical or chemical methods. The search for new, efficient, and cost-effective alternative technologies has led to the development and, more recently, the improvement of gas phase bioreactors. This book is the first single text to provide a complete, comprehensive picture of all major biological reactors suitable for solving air pollution problems. The text describes the main features and covers the major aspects, from microbiological to engineering, as well as economic aspects, of the different types of bioreactors. The book also presents an in-depth review of the subject, from fundamental bench-scale research to industrial field applications related to the operation of full-scale systems successfully treating polluted air in Europe and the United States. Material dedicated to more conventional non-biological technologies has also been included, to provide a complete overview of the different alternative treatment processes. Audience: The different chapters have been written by international experts, as a result of a fruitful collaboration between European and American scientists and engineers. The resulting text is a high quality, valuable reference tool for a variety of readers, including graduate and postgraduate students, researchers, professors, engineers, and those professionals who

are interested in environmental engineering and, more specifically, in innovative air pollution control technologies.

Estimating Costs of Air Pollution Control

Proceedings, 1998 USC-TRG Conference on Biofiltration (an Air Pollution Control Technology)

From Biofiltration to Promising Options in Gaseous Fluxes Biotreatment

Industrial Environmental Chemistry

Biotechniques for Air Pollution Control

Investigation of a Novel Air Pollution Control Technology for the South Coast Air Basin

In recent years, air pollution has become a major worldwide concern. Air pollutants can affect metabolic activity, impede healthy development, and exhibit carcinogenic and toxic properties in humans. Over the past two decades, the use of microbes to remove pollutants from contaminated air streams has become a widely accepted and efficient alternative to the classical physical and chemical treatment technologies. Air Pollution Prevention and Control: Bioreactors and Bioenergy focusses on these biotechnological alternatives looking at both the optimization of bioreactors and the development of cleaner biofuels. Structured in five parts, the book covers: Fundamentals and microbiological aspects Biofilters, bioscrubbers and other end-of-pipe treatment technologies Specific applications of bioreactors Biofuels production from pollutants and renewable resources (including biogas, biohydrogen, biodiesel and bioethanol) and its environmental impacts Case studies of applications including biotrickling filtration of waste gases, industrial bioscrubbers applied in different industries and biogas upgrading Air Pollution Prevention and Control: Bioreactors and Bioenergy is the first reference work to give a broad overview of bioprocesses for the mitigation of air pollution. Primarily intended for researchers and students in environmental engineering, biotechnology and applied microbiology, the book will also be of interest to industrial and governmental researchers.

Air and water pollution occurs when toxic pollutants of varying kinds (organic, inorganic, radioactive and so on) are directly or indirectly discharged into the environment without adequate treatment to remove these potential pollutants. There are a total of 13 book chapters in three sections contributed by significant number of expert authors around the world, aiming to provide scientific knowledge and up-to-date development of various solid wastes based cost-effective adsorbent materials and its sustainable application in the removal of contaminates/pollutants from air, gas and water. This book is useful for the professions, practicing engineers, scientists, researchers, academics and undergraduate and post-graduate students' interest on this specific area. ? Key Features: • Exclusive compilation of information on use of industrial and agricultural waste based adsorbents for air and water pollution abatement. • Explores utilization of industrial solid wastes in adsorptive purification and agricultural and agricultural by-products in separation and purification. • Discusses cost-effective solid wastes based emerging adsorbents. • Alternative adsorbents in the removal of a wide range of contaminants and pollutants from water is proposed. • Includes performance of unit operations in waste effluents treatment.