

1. Record Nr.	UNINA9910808332903321
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Titolo	Air pollution prevention and control : bioreactors and bioenergy // edited by Christian Kennes and Maria C. Veiga
Pubbl/distr/stampa	Chichester, West Sussex, : Wiley, c2013
ISBN	9781118523353 1118523350 9781118523360 1118523369 9781299315792 1299315798 9781118523346 1118523342
Edizione	[1st ed.]
Descrizione fisica	1 online resource (571 pages)
Altri autori (Persone)	KennesC VeigaMaria C
Disciplina	628.5/36
Soggetti	Air - Pollution Air - Purification Bioreactors Biomass energy
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover; Title Page; Copyright; Contents; List of Contributors; Preface; Part I Fundamentals and Microbiological Aspects; Chapter 1 Introduction to Air Pollution; 1.1 Introduction; 1.2 Types and sources of air pollutants; 1.2.1 Particulate matter; 1.2.2 Carbon monoxide and carbon dioxide; 1.2.3 Sulphur oxides; 1.2.4 Nitrogen oxides; 1.2.5 Volatile organic compounds (VOCs); 1.2.6 Odours; 1.2.7 Ozone; 1.2.8 Calculating concentrations of gaseous pollutants; 1.3 Air pollution control technologies; 1.3.1 Particulate matter; 1.3.2 Volatile organic and inorganic compounds 1.3.2.1 Nonbiological processes 1.3.2.2 Bioprocesses; 1.3.3

Environmentally friendly bioenergy; 1.4 Conclusions; References; Chapter 2 Biodegradation and Bioconversion of Volatile Pollutants; 2.1 Introduction; 2.2 Biodegradation of volatile compounds; 2.2.1 Inorganic compounds; 2.2.1.1 Hydrogen sulphide (H₂S); 2.2.1.2 Ammonia; 2.2.2 Organic compounds; 2.2.2.1 C_xH_y pollutants; 2.2.2.2 C_xH_yO_z pollutants; 2.2.2.3 Organic sulphur compounds; 2.2.2.4 Halogenated organic compounds; 2.3 Mass balance calculations; 2.4 Bioconversion of volatile compounds; 2.4.1 Carbon monoxide and carbon dioxide 2.4.2 Volatile organic compounds (VOCs) 2.5 Conclusions; References; Chapter 3 Identification and Characterization of Microbial Communities in Bioreactors; 3.1 Introduction; 3.2 Molecular techniques to characterize the microbial communities in bioreactors; 3.2.1 Quantification of the community members; 3.2.1.1 Microscopic direct counts; 3.2.1.2 Quantitative PCR; 3.2.2 Assessment of microbial community diversity and structure; 3.2.2.1 Biochemical methods; 3.2.2.2 Genetic fingerprinting methods; 3.2.2.3 Analysis of fingerprint data by multivariate statistical tools and diversity indices 3.2.3 Determination of the microbial community composition 3.2.3.1 Construction of small sub-unit (SSU) rRNA clone libraries followed by phylogenetic identification by randomly sequencing the clones; 3.2.3.2 Fluorescent in situ hybridization (FISH); 3.2.4 Techniques linking microbial identity to ecological function; 3.2.4.1 Stable isotope probing (SIP); 3.2.4.2 Microautoradiography combined with FISH (FISH-MAR); 3.2.5 Microarray techniques; 3.2.6 Synthesis; 3.3 The link of microbial community structure with ecological function in engineered ecosystems; 3.3.1 Introduction 3.3.2 Temporal and spatial dynamics of the microbial community structure under stationary conditions in bioreactors 3.3.2.1 Temporal stability and dynamics of the total bacterial community structure in the steady state; 3.3.2.2 Microbial and functional stratification along the biofilter height; 3.3.2.3 The microbial community structure-ecosystem function relationship; 3.3.3 Impact of environmental disturbances on the microbial community structure within bioreactors; 3.4 Conclusions; References; Part II Bioreactors for Air Pollution Control; Chapter 4 Biofilters; 4.1 Introduction 4.2 Historical perspective of biofilters

Sommario/riassunto

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 o
