

Biological Degradation And Bioremediation Of Toxic Chemicals

Emerging Technologies in Environmental Bioremediation introduces emerging bioremediation technologies for the treatment and management of industrial wastes and other environmental pollutants for the sake of environmental sustainability. Emerging bioremediation approaches such as nano-bioremediation technology, electro-bioremediation technology, microbial fuel cell technology, Modified Ludzack-Ettinger Process, Modified Activated Sludge Process, and phytotechnologies for the remediation of industrial wastes/pollutants are discussed in a comprehensive manner not found in other books. Furthermore, the book includes updated information as well as future directions for research in the field of bioremediation of industrial wastes. This book will be extremely useful to students, researchers, scientists and professionals in the field of microbiology and biotechnology, Bio (chemical) engineers, environmental researchers, ecotoxicology, and many more. Includes the recovery of resources from wastewater Describes the importance of microorganisms in environmental bioremediation technologies Points out the reuse of treated wastewater through emerging technologies Pays attention to the occurrence of novel micro-pollutants Emphasizes the role of nanotechnology in pollutant bioremediation

Enhanced analytical capabilities and separation techniques, improved detection limits, and accessibility of instrumentation have led to massive strides in the use of isotopes to assess microbial processes in surface and subsurface sediments. Considering the rapid growth of research and commercial interest in stable isotope and radioisotope applications for contaminant hydrology and microbial ecology, an up-to-date overview of the field is long overdue. Environmental Isotopes in Biodegradation and Bioremediation comprehensively covers established and emerging isotope methods for environmental applications, focusing on biodegradation and bioremediation. This book is an invaluable tool for researchers, practitioners, and regulators who require an extensive understanding of the application of isotope methods to natural compounds and environmental contaminants. It addresses questions including: What amount of a compound comes from anthropogenic release? Do the chemicals involved undergo degradation in the environment? Do they persist and accumulate? This book is divided into four sections: Isotope Fundamentals covers important background and theoretical information needed to understand later chapters Isotopes and Microbial Processes discusses the application of isotopes to different environmental redox conditions that dictate the predominant microbial processes that will occur Isotopes in Field Applications describes the transformation of anthropogenic pollutants and the application of isotope tools to field sites Isotope Emerging Areas addresses the use of compounds labeled with stable isotopes, including stable isotope probing and the use of radiocarbon at natural abundance and novel stable isotopes This reference details how isotope tools can be used to gain insight into the origin and fate of natural compounds and contaminants in the environment. Integrating theoretical and practical knowledge, the authors examine the principles of isotope tools and then present an extensive overview of key environmental processes that can be investigated with isotope methods. They also discuss analytical and data evaluation procedures, addressing established and emerging applications. To illustrate concepts and methodology, the authors use a wide range of case studies and recent field and laboratory research from various disciplines currently employing these methods. This book is a valuable tool for expanding the application of both stable isotopes and radioisotopes into untapped areas.

Microbial Biodegradation and Bioremediation: Techniques and Case Studies for Environmental Pollution, Second Edition describes the successful application of microbes and their derivatives for bioremediation of potentially toxic and relatively novel compounds in the environment. Our natural biodiversity and environment is in danger due to the release of continuously emerging potential pollutants by anthropogenic activities. Though many attempts have been made to eradicate and remediate these noxious elements, thousands of xenobiotics of relatively new entities emerge every day, thus worsening the situation. Primitive microorganisms are highly adaptable to toxic environments, and can reduce the load of toxic elements by their successful transformation and remediation. This completely updated new edition presents many new technologies and techniques and includes theoretical context and case studies in every chapter. Microbial Biodegradation and Bioremediation: Techniques and Case Studies for Environmental Pollution, Second Edition serves as a single-source reference and encompasses all categories of pollutants and their applications in a convenient, comprehensive format for researchers in environmental science and engineering, pollution, environmental microbiology, and

biotechnology. Describes many novel approaches of microbial bioremediation including genetic engineering, metagenomics, microbial fuel cell technology, biosurfactants and biofilm-based bioremediation Introduces relatively new hazardous elements and their bioremediation practices including oil spills, military waste water, greenhouse gases, polythene wastes, and more Provides the most advanced techniques in the field of bioremediation, including insilico approach, microbes as pollution indicators, use of bioreactors, techniques of pollution monitoring, and more Completely updated and expanded to include topics and techniques such as genetically engineered bacteria, environmental health, nanoremediation, heavy metals, contaminant transport, and in situ and ex situ methods Includes theoretical context and case studies within each chapter

Plastics in the Environment is a collection of reviewed and relevant research chapters, offering a comprehensive overview of recent developments in the field of plastic pollution and how it is affecting the environment. The book comprises single chapters authored by various researchers and edited by an expert active in the research area. All chapters are complete in themselves but united under a common research study topic. This publication aims at providing a thorough overview of the latest research efforts by international authors on the trending topic of plastics in the environment and opens new possible research paths for further novel developments.

Active and Passive Approaches

An Approach Towards Sustainable Technology

Genetics of Biodegradation and Bioremediation

Microbial Biodegradation of Xenobiotic Compounds

In Situ Bioremediation

Bioremediation of Pollutants: From Genetic Engineering to Genome Engineering provides insights into genetic and genome engineering strategies in bioremediation, covering a wide range of microorganisms that are key to the removal of pollutants. The book includes discussions on root engineering, transgenic plants, metagenomics, bioreactors, molecular biology tools, genome editing, synthetic biology, microbial indicators, biosurfactants, biofilms, genetically modified organisms, and engineered fungi and bacteria. Presented by top experts in the field, this resource captures the essence and diversity of bioremediation methodologies in a single source. Students and beginners in environmental science, researchers, soil scientists, genetic and genome engineers, stakeholders and policymakers interested in improving this rapidly growing area of research will find this resource extremely useful. Draws together research from eminent scientists from across the globe in the areas of phytoremediation and microbial remediation Includes case studies of engineered bacterial remediation Covers the genome editing CRISPR-Cas9 system that has been less explored in plants and microorganisms

Bioremediation for Environmental Sustainability: Toxicity, Mechanisms of Contaminants Degradation, Detoxification and Challenges introduces pollution and toxicity profiles of various organic and inorganic contaminants, including mechanisms of toxicity, degradation, and detoxification by microbes and plants, and their bioremediation approaches for environmental sustainability. The book also covers many advanced technologies in the field of bioremediation and phytoremediation, including electro-bioremediation, microbial fuel cells, nano-bioremediation, constructed wetlands, phytotechnologies, and many more, which are lacking in other competitive titles existing in the market. The book includes updated information, as well as future directions for research, in the field of bioremediation of industrial wastes. This book is a reference for students, researchers, scientists, and professionals in the fields of microbiology, biotechnology, environmental sciences, eco-toxicology, environmental remediation, and waste management, especially those who aspire to work on the biodegradation and bioremediation of industrial wastes and environmental pollutants for environmental sustainability. Environmental safety and sustainability with rapid industrialization is one of the major challenges worldwide. Industries are the key drivers in the world economy, but these are also the major polluters due to discharge of potentially toxic and hazardous wastes containing various organic and inorganic pollutants, which cause environmental pollution and severe toxic effects in living beings. Introduces pollution and toxicity profiles of environmental contaminants and industrial wastes, including oil refinery wastewater, distillery wastewater, tannery wastewater, textile wastewater, mine tailing wastes, plastic wastes, and more Describes underlying mechanisms of degradation and detoxification of emerging organic and inorganic contaminants with enzymatic roles Focuses on recent advances and challenges in bioremediation and phytoremediation, including microbial enzymes, biosurfactants, microalgae, biofilm, archaea, genetically engineered organisms, and more Describes how microbes and plants can be successfully applied for the remediation of potentially toxic industrial wastes and chemical pollutants to protect the environment and public health

The rapid progression of technology has significantly impacted population growth, urbanization, and industrialization in modern society. These developments, while positive on the surface, have created critical environmental problems in recent years. The Handbook of Research on Inventive Bioremediation Techniques is a comprehensive reference source for the latest scholarly information on optimizing

bioremediation technologies and methods to control pollution and enhance sustainability and conservation initiatives for the environment. Highlighting pivotal research perspectives on topics such as biodegradation, microbial tools, and green technology, this publication is ideally designed for academics, professionals, graduate students, and practitioners interested in emerging techniques for environmental decontamination.

Addresses a Global Challenge to Sustainable Development Advances in Biodegradation and Bioremediation of Industrial Waste examines and compiles the latest information on the industrial waste biodegradation process and provides a comprehensive review. Dedicated to reducing pollutants generated by agriculturally contaminated soil, and plastic waste from various industries, this text is a book that begs the question: Is a pollution-free environment possible? The book combines with current available data with the expert knowledge of specialists from around the world to evaluate various aspects of environmental microbiology and biotechnology. It emphasizes the role of different bioreactors for the treatment of complex industrial waste and provides specific chapters on bioreactors and membrane process integrated with biodegradation process. It also places special emphasis on phytoremediation and the role of wetland plant rhizosphere bacterial ecology and the bioremediation of complex industrial wastewater. The authors address the microbiological, biochemical, and molecular aspects of biodegradation and bioremediation which cover numerous topics, including microbial genomics and proteomics for the bioremediation of industrial waste. This text contains 14 chapters and covers: Bioprocess engineering and mathematical modelling with a focus on environmental engineering The roles of siderophores and the rhizosphere bacterial community for phytoremediation of heavy metals Current advances in phytoremediation, especially as it relates to the mechanism of phytoremediation of soil polluted with heavy metals Microbial degradation of aromatic compounds and pesticides: Challenges and solution Bioremediation of hydrocarbon contaminated wastewater of refinery plants The role of biosurfactants for bioremediation and biodegradation of various pollutants discharged from industrial waste as they are tools of biotechnology The role of potential microbial enzymatic processes for bioremediation of industrial waste The latest knowledge regarding the biodegradation of tannery and textile waste A resource for students interested in the field of environment, microbiology, industrial engineering, biotechnology, botany, and agricultural sciences, Advances in Biodegradation and Bioremediation of Industrial Waste provides recent knowledge and approaches on the bioremediation of complex industrial waste.

Recent Trends in Pesticide Residue Assay

Trace Metals in the Environment

Biodegradation, Bioremediation, and Bioconversion of Xenobiotics for Sustainable Development

New Approaches and Recent Advances

Environmental Isotopes in Biodegradation and Bioremediation

Microbial Biodegradation and Bioremediation brings together experts in relevant fields to describe the successful application of microbes and their derivatives for bioremediation of potentially toxic and relatively novel compounds. This single-source reference encompasses all categories of pollutants and their applications in a convenient, comprehensive package. Our natural biodiversity and environment is in danger due to the release of continuously emerging potential pollutants by anthropogenic activities. Though many attempts have been made to eradicate and remediate these noxious elements, every day thousands of xenobiotics of relatively new entities emerge, thus worsening the situation. Primitive microorganisms are highly adaptable to toxic environments, and can reduce the load of toxic elements by their successful transformation and remediation. Describes many novel approaches of microbial bioremediation including genetic engineering, metagenomics, microbial fuel cell technology, biosurfactants and biofilm-based bioremediation Introduces relatively new hazardous elements and their bioremediation practices including oil spills, military waste water, greenhouse gases, polythene wastes, and more Provides the most advanced techniques in the field of bioremediation, including insilico approach, microbes as pollution indicators, use of bioreactors, techniques of pollution monitoring, and more

Bioremediation technologies are gaining immense credibility in the field of waste management because of their eco-compatibility nature. Biomass can interact and confront with water and soil pollutants in both active (live) as well as passive (dead) way, thereby offering numerous opportunities of exploring them for environmental clean-up. In 21st century, wastes are no longer a waste but are recognized as a valuable Resource. Employing novel and integrated strategies for the development of modern bioremediation processes is desperate need of the hour. This edited book on Applied Bioremediation - Active and Passive Approaches contains mix of interesting chapters that will certainly add to the advancement of knowledge and will provide the required valuable resource and stimulus to the researchers worldwide.

In this volume, experts from universities, government labs and industry share their findings on the microbiological, biochemical and molecular aspects of biodegradation and bioremediation. The text covers numerous topics, including: bioavailability, biodegradation of various pollutants, microbial community dynamics, properties and engineering of important biocatalysts, and methods for monitoring bioremediation processes. Microbial processes are environmentally

compatible and can be integrated with non-biological processes to detoxify, degrade and immobilize environmental contaminants.

Smart Bioremediation Technologies: Microbial Enzymes provides insights into the complex behavior of enzymes and identifies metabolites and their degradation pathways. It will help readers work towards solutions for sustainable medicine and environmental pollution. The book highlights the microbial enzymes that have replaced many plant and animal enzymes, also presenting their applications in varying industries, including pharmaceuticals, genetic engineering, biofuels, diagnostics and therapy. In addition, new methods, including genomics and metagenomics, are being employed for the discovery of new enzymes from microbes. This book brings all of these topics together, representing the first resource on how to solve problems in bioremediation. Provides the most novel approaches in enzyme studies Gives insights in real-time enzymology that are correlated with bioremediation Serves as a valuable resource on the use of genomes, transcriptomes and proteomes with bioremediation Refers to enzymes as diagnostic tools

Principles and Practice

Bioremediation of Pollutants

Techniques and Case Studies for Environmental Pollution

Biodegradation and Bioremediation of Polluted Systems

From Genetic Engineering to Genome Engineering

Microbial Biodegradation of Xenobiotic Compounds examines and collects the recent information on the bioremediation technologies around the world. This book focuses on methods to decrease pollutants created by anthropogenic activities, industrial activities, and agricultural activities. This book answers some of the questions about – how to reduce contaminants? And whether there is a possibility of converting these pollutants in to useful energy by advanced biotechnological methods? The book combines present obtainable data with the expert knowledge of researchers from all over the world covering different aspects of environmental biotechnology and microbiology. It covers basic concepts of bioremediation and various methods involved in the bioremediation process, and provides specific chapters on the role of different genes and enzymes involved in microbial bioremediation process. It also gives special attention to heavy metal bioremediation by microalgae and the mechanisms involved during the degradation process. Recent innovative technologies about converting toxic pollutants in to useful energy like bioplastics and electricity are also discussed by specialist authors. Various chapters address the bioremediation of pesticides in soil using microbial metabolites, and molecular aspects of biodegradation which cover topics including identification of novel genes through the metagenomic approach and bioremediation using fungal laccase enzymes. Alexander presents the basic principles of biodegradation and how these principles relate to bioremediation. All the subject's microbiological, chemical, toxicological, environmental, engineering and technological aspects are covered. **Bioremediation for Environmental Sustainability: Approaches to Tackle Pollution for Cleaner and Greener Society** discusses many recently developed and successfully applied bio/phytoremediation technologies for pollution control and minimization, which are lacking more comprehensive coverage in previous books. This book describes the scope and applications of bio/phytoremediation technologies and especially focuses on the associated eco-environmental concerns, field studies, sustainability issues, and future prospects. The book also examines the feasibility of environmentally friendly and sustainable bio/phytoremediation technologies to remediate contaminated sites, as well as future directions in the field of bioremediation for environmental sustainability. Illustrates the importance of microbes and plants in bio/phytoremediation and wastewater treatment Includes chapters on original research outcomes pertaining to pollution, pollution abatement, and associated bioremediation technologies Covers emerging bioremediation technologies, including electro-bioremediation, microbial fuel cell, nano-bioremediation, constructed wetlands, and more Highlights key developments and challenges in bioremediation and phytoremediation technologies Describes the roles of relatively new approaches in bio/phytoremediation, including molecular engineering and omics technologies, microbial enzymes, biosurfactants, plant-microbe interactions, genetically engineered organisms, and more

This book presents a broad compendium of biodegradation research and discussions on the most up-to-date bioremediation strategies. The most relevant microbiological, biochemical and genetic concepts are presented alongside the fundamentals of bioremediation. The topics include: a wide variety of contaminant impacts evaluation, key methodologies required to measure biodegradation and propose new bioremediation protocols, as well as the handling of microbial communities related to such processes. The selected collaborating authors are renowned for their microbiology expertise and will provide an in-depth reference for students and specialists. The contents provide a valuable source of information for researchers, professionals, and policy makers alike.

Applied Bioremediation and Phytoremediation

Opportunities for Environmental Applications of Marine Biotechnology

Toxicity and Waste Management Using Bioremediation

Advances in Biodegradation and Bioremediation of Industrial Waste

Proceedings of the October 5-6, 1999, Workshop

FROM THE INTRODUCTION This three-volume series, *Bioremediation: Principles and Practice*, provides state of the art description of advances in pollution treatment and reduction using biological means; identify and address, at a fundamental level, broad scientific and technological areas that are unique to the subject or theme and that must be understood if advances are to be made; and provide a comprehensive overview of new developments at the regulatory, desk-top, bench-scale, pilot scale, and full-scale levels. The series covers all media-air, water, and soil/sediment-and blends the talents, knowledge, and know-how of academic, industrial, governmental, and international contributors. The series addresses the removal of both hazardous and nonhazardous contaminants from

the liquid, solid, and gas phase using biological processes. This includes the biological treatment of wastes of municipal and industrial origin; bioremediation of leachates, soils, and sediments; and biofiltration for contaminated gases.

This book will discuss the effective and sustainable technological approaches for remediation of contaminants via eco-friendly usage of microbes. The primary focus will be on the role of microbes, particularly bacteria and fungi, for the degradation and removal of various xenobiotic substances in the environment. The book will also emphasize molecular approaches and biosynthetic pathways of microbes, and present gene and protein expression studies for bio-deterioration techniques. New innovative and sophisticated green technologies for waste minimization and waste control will be presented, as well as the potential of microbes for various techniques of bioremediation, including bio-sorption, bio-augmentation, bio-stimulation, to clean contaminated environments.

This book contains a collection of different biodegradation research activities where biological processes take place. The book has two main sections: A) Polymers and Surfactants Biodegradation and B) Biodegradation: Microbial Behaviour.

Our interest in the microbial biodegradation of xenobiotics has increased many folds in recent years to find out sustainable ways for environmental cleanup. Bioremediation and biotransformation processes harness the naturally occurring ability of microbes to degrade, transform or accumulate a wide range of organic pollutants. Major methodological breakthroughs in recent years through detailed genomic, metagenomic, proteomic, bioinformatic and other high-throughput analyses of environmentally relevant microorganisms have provided us unprecedented insights into key biodegradative pathways and the ability of organisms to adapt to changing environmental conditions. The degradation of a wide spectrum of organic pollutants and wastes discharged into the environment by anthropogenic activities is an emerging need today to promote sustainable development of our society with low environmental impact. Microbial processes play a major role in the removal of recalcitrant compounds taking advantage of the astonishing catabolic versatility of microorganisms to degrade or transform such compounds. New breakthroughs in sequencing, genomics, proteomics, bioinformatics and imaging are generating vital information which opens a new era providing new insights of metabolic and regulatory networks, as well as clues to the evolution of degradation pathways and to the molecular adaptation strategies to changing environmental conditions. Functional genomic and metagenomic approaches are increasing our understanding of the relative importance of different pathways and regulatory networks to carbon flux in particular environments and for particular compounds. New approaches will certainly accelerate the development of bioremediation technologies and biotransformation processes in coming years for natural attenuation of contaminated environments

New Advances and Technologies

Microbial Degradation of Plastics

Handbook of Research on Inventive Bioremediation Techniques

Microbial Bioremediation & Biodegradation

Life of Science

The remediation of environmental pollutants has become a relevant topic within the field of waste management. Advances in biological approaches are a potential tool for contamination and pollution control. The Handbook of Research on Microbial Tools for Environmental Waste Management is a critical scholarly resource that explores the advanced biological approaches that are used as remediation for pollution cleanup processes. Featuring coverage on a broad range of topics such as biodegradation, microbial dehalogenation, and pollution controlling treatments, this book is geared towards environmental scientists, biologists, policy makers, graduate students, and scholars seeking current research on environmental engineering and green technologies.

Growing population in the world demands increase in the food production and intense health care systems. Use of chemical pesticides is imperative for the management insects in agricultural and disease transmission, weeds and harmful microbes. Monitoring and estimating pesticide residue in crop plants, food, soil, water and other ecosystem has become significant in the recent concern on environment and ecosystem. The book comprises of new innovative trends to detect pesticide residue in crop plants, animal origin food and fishes. Different advanced extraction techniques of sample preparation for residue analysis are elaborately described. Apart from residue assays, metabolism and degradation of pesticide compounds fenamophos, chlorpyrifos, pirimiphos, heptachlor and organic pesticides are also documented. This book volume is of twelve chapters contributed by eminent scientists from eleven countries.

Filled with practical applications and research, Biodegradation of Nitroaromatic Compounds and Explosives presents an international perspective on environmental contamination from explosives. It covers biodegradation strategies for DNT and a wide variety of other nitroaromatic compounds of environmental significance and makes the information accessible to practicing environmental and chemical engineers.

Biodegradation of Nitroaromatic Compounds and Explosives gives you a synthesis of ongoing research and an appreciation of the remarkable range of biochemical strategies available for the transformation of nitroaromatic compounds. It provides a realistic assessment of the current and potential field applications of the various strategies.

This 2-day workshop is the culmination of a study of the status and future of marine biotechnology. The overall goal of this workshop is to examine what was initially called "Opportunities for Marine Biotechnology in the United States," to consider where we are now in this field of "Environmental Marine Biotechnology," to envision the field in the future, and to discuss any impediments that might be encountered along the way. Opportunities for Environmental Applications of Marine Biotechnology: Proceedings of the October 5-6, 1999, Workshop addresses the question of where the federal government should invest its limited funds and what future initiatives should be planned.

Biodegradation

Emerging Technologies in Environmental Bioremediation

Biodegradation, Pollutants and Bioremediation Principles

When Does it Work?

Bioremediation for Environmental Sustainability

Microbial or biological degradation has long been the subject of active concern, and the rapid expansion and growing sophistication of various industries in the last century has significantly increased the volume and complexity of toxic residues of wastes. These can be remediated by plants and microbes, either natural origin or adapted for a specific purpose, in a process known as bioremediation. The interest in microbial biodegradation of pollutants has intensified in recent years in an attempt to find sustainable ways to clean contaminated environments. These bioremediation and biotransformation methods take advantage of the tremendous microbial catabolic diversity to degrade, transform or accumulate a variety of compounds, such as hydrocarbons, polychlorinated biphenyls, polaromatic hydrocarbons pharmaceutical substances, radionuclides and metals. Unlike conventional methods, bioremediation does not physically disturb the site. This book describes the basic principles of biodegradation and shows how these principles are related to bioremediation. Authored by leading, international environmental microbiologists, it discusses topics such as aerobic biodegradation, microbial degradation of pollutants, and microbial community dynamics. It provides valuable insights into how biodegradation processes work and can be utilised for pollution abatement, and as such appeals to

researchers and postgraduate students as well as experts in the field of bioremediation. With focus on the practical use of modern biotechnology for environmental sustainability, this book provides a thoughtful overview of molecular aspects of environmental studies to create a new awareness of fundamental biological processes and sustainable ecological concerns. It covers the latest research by prominent scientists in modern biology and delineates recent and prospective applications in the sub-areas of environmental biotechnology with special focus on the biodegradation of toxic pollutants, bioremediation of contaminated environments, and bioconversion of organic wastes toward a green economy and sustainable future.

In situ bioremediation--the use of microorganisms for on-site removal of contaminants--is potentially cheaper, faster, and safer than conventional cleanup methods. But in situ bioremediation is also clouded in uncertainty, controversy, and mistrust. This volume from the National Research Council provides direction for decisionmakers and offers detailed and readable explanations of the processes involved in in situ bioremediation, circumstances in which it is best used, and methods of measurement, field testing, and modeling to evaluate the results of bioremediation projects. Bioremediation experts representing academic research, field practice, regulation, and industry provide accessible information and case examples; they explore how in situ bioremediation works, how it has developed since its first commercial use in 1972, and what research and education efforts are recommended for the future. The volume includes a series of perspective papers. The book will be immediately useful to policymakers, regulators, bioremediation practitioners and purchasers, environmental groups, concerned citizens, faculty, and students.

Many biodegradation pathways, both aerobic and anaerobic, have already been characterised, and the phylogenetic relationships among catabolic genes within them have been studied. However, new biodegradation activities and their coding genes are continuously being reported, including those involved in the catabolism of emerging contaminants and those generally regarded as non-biodegradable. Gene regulation is also an important issue for the efficient biodegradation of contaminants. Specific induction by the substrate and over-imposed global regulatory networks adjust the expression of the biodegradation genes to meet bacterial physiological needs. New biodegradation pathways can be assembled in a particular strain or in a bacterial consortium by recruiting biodegradation genes from different origins through horizontal gene transfer. The abundance and diversity of biodegradation genes, analysed by either genomic or metagenomic approaches, constitute valuable indicators of the biodegradation potential of a particular environmental niche. This knowledge paves the way to systems metabolic engineering approaches to valorise biowaste for the production of value-added products.

Biodegradation and Bioremediation

Microbial Biodegradation and Bioremediation

Environmental Biotechnology

Biodegradation of Nitroaromatic Compounds and Explosives

Engineering and Technology

This book contains a collection of different research activities where several technologies have been applied to the optimization of biodegradation processes. The book has three main sections: A) Hydrocarbons biodegradation, B) Biodegradation and anaerobic digestion, and C) Biodegradation and sustainability.

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.

The huge expansion of the chemical and petroleum industries in the twentieth century has resulted in the production of a vast array of chemical compounds and materials that have transformed our lives. The associated large-scale manufacturing, processing and handling activities have caused a serious deterioration in environmental quality and created threats to human health. These negative impacts have led to responses and regulations requiring remedial action in support of environmental sustainability. of biotechnological methods through bioremediation, Application has gained prominence as an option for soil remediation methods. Bioremediation is a multidisciplinary approach where biologists, chemists, soil scientists and engineers work as team to develop and implement remediation processes.

Bioremediation has now been used successfully to remediate many petroleum-contaminated sites. However, there are as yet no commercial technologies commonly used to remediate the most recalcitrant contaminants. Nevertheless, bioremediation is a rapidly advancing field and new bio-based remedial technologies are continuing to emerge.

In chapters written by authors on the cutting edge of investigative research, Biological Degradation and Bioremediation of Toxic Chemicals thoroughly covers the range of such organisms and the use of such pathways. Also described are genetic and molecular biological techniques to improve the ability of microorganisms to degrade harmful compounds, including the conversion of wastes into useful products. The book provides a comprehensive basis for further research, indicating future directions for biotechnological applications.

Consequences of Microbial Interactions with Hydrocarbons, Oils, and Lipids: Biodegradation and Bioremediation

Biological Degradation and Bioremediation of Toxic Chemicals

Advances in Bioremediation of Wastewater and Polluted Soil

Smart Bioremediation Technologies

Biodegradation Technology Developments

The pollution of soil and groundwater by heavy metals and other chemicals is becoming a serious issue in many countries. However, the current bioremediation processes do not often achieve sufficient remediation, and more effective processes are desired. This book deals with advances in the bioremediation of polluted soil and groundwater. In the former chapters of this book, respected researchers in this field describe how the optimization of microorganisms, enzymes, absorbents, additives and injection procedures can help to realize excellent bioremediation. In the latter chapters, other researchers introduce bioremediation processes that have been performed in the field and novel bioremediation processes. Thus, the readers will be able to obtain new ideas about effective bioremediation as well as important information about recent advances in bioremediation.

Bioremediation is an emerging field of environmental research. The objective of a bioremediation process is to immobilize contaminants (reactants) or to transform them into chemical products that do not pose a risk to human health and the environment. Toxicity and Waste Management Using Bioremediation provides relevant theoretical and practical frameworks and the latest empirical research findings on the remediation of contaminated soil and groundwater using bioorganisms. Focusing on effective waste treatment methodologies and management strategies that lead to improved human and environmental health, this timely publication is ideal for use by environmental scientists, biologists, policy makers, graduate students, and scholars in the fields of environmental science, chemistry, and biology.

This book presents new insights into the development of different aspects of petroleum science and engineering. The book contains 19 chapters divided into two main sections: (i) Exploration and Production and (ii) Environmental Solutions. There are 11 chapters in the first section, and the focus is on the topics related to exploration and production of oil and gas, such as characterization of petroleum source rocks, drilling technology, characterization of reservoir fluids, and enhanced oil recovery. In the second section, the special emphasis is on waste technologies and environmental cleanup in the downstream sector. The book written by numerous prominent scholars clearly shows the necessity of the multidisciplinary approach to sustainable development in the petroleum industry and stresses the most updated topics such as EOR and environmental cleanup of fossil fuel wastes.

In this book international experts discuss the state-of-the-art in the biological degradation of hydrocarbons to meet remedial or disposal goals. The work focuses on practical applications, often on globally important scales including the remediation of some of the world's largest crude oil spills. Other related chapters discuss important implications of microbial transformation of hydrocarbons, including treatment of high fat processing wastes, impacts of microbial biodegradation activity on industrial processes, and the implications of microbial oil degradation in relation to modern oil extraction processes like hydraulic fracturing of shales and extraction of oil sands.

Soil Bioremediation

Recent Insights in Petroleum Science and Engineering

Pesticides

Handbook of Research on Microbial Tools for Environmental Waste Management

Plastics in the Environment

Biodegradation is the break down of organic matter by microbes. Bioremediation is an engineered technique applied by people to clean up organic matter by helping microbes with the biodegradation process. One way of doing that is to introduce oxygen into the subsurface to help more aerobic microbes grow in order to clean up oil in the soil. The potential toxicity (harmful action) inherent in a substance is manifest only when that substance comes in contact with that susceptible living biological system. A chemical normally thought of as "e;harmless"e; will evoke a toxic response if added to a biological system in sufficient amount. The toxic potency of a chemicals is defined by the relationship between dose (the amount) of the chemical and the response that is produced in a biological system. The toxicity of industrial wastes is not often managed and it has caused serious damage to earth and water. The most important aspect of environmental biotechnology is the effective management of hazardous and toxic pollutants (xenobiotics) by bioremediation. The environmental clean-up process through bioremediation can be achieved in two ways-in situ and ex situ bioremediation. The book aims to provide relevant theoretical and practical frameworks and the latest empirical research findings in this area, along with case studies. It is written for students, academicians and industry professionals who want to improve their understanding of the strategic role of biodegradation and bioremediation at different levels of the biodegradation and bioremediation research and knowledge, that is, heavy metal pollution, toxicity, remediation methods and strategies to manage the waste in industries, which are a global concern.

Microbial Degradation of Xenobiotics

Toxicity, Mechanisms of Contaminants Degradation, Detoxification and Challenges

Approaches to Tackle Pollution for Cleaner and Greener Society

Applied Bioremediation

Microbial Enzymes