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# Microbial Degradation of Organic Compounds

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David T. Gibson

Microbial Degradation  
of Organic Compounds

Gibson



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# Microbial Degradation Of Organic Compounds

**Jim C. Spain**



## **Microbial Degradation Of Organic Compounds:**

*Microbial Degradation of Organic Compounds* David T. Gibson, 1984      **Perspectives in Bioremediation** J. R. Wild, Sergei Dmitrievich Varfolomeev, Andrea Scozzafava, 1997 Bioremediation the use of microorganisms for environmental clean up is a technology that is experiencing a rapid phase of development The authors of this text an understanding of the current progress and limitations of technologies that are designed to help nature herself      *Microbial Degradation of Xenobiotics* Shree Nath Singh, 2011-10-07 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      *Microbial Degradation of Organic Compounds (Volume 13)*. Gibson DT., 1984      Biodegradation and Bioremediation Ajay Singh, Owen P. Ward, 2013-03-09 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      Aquatic Humic Substances Dag O. Hessen, 1998-07-16 Humic substances occur in all kinds of aquatic systems but are particularly important in northern coniferous areas They strongly modify the aquatic ecosystems and also constitute a major problem in the drinking water supply This volume covers all aspects of aquatic humic substances from

their origin and chemical properties their effects on light and nutrient regimes and biogeochemical cycling to their role regarding organisms productivity and food web organization from bacteria to fish Special emphasis is paid to carbon cycling and food web organization in humic lakes but aspects of marine carbon cycling related to humus are treated as well

**Microbial Degradation of Natural Products** Günther Winkelmann,1992      **Biodegradation of Hazardous and Special Products** Rolando Chamy,2013-06-14 This book contains a collection of different research activities that include the biodegradation compounds with contaminant characteristics and special products of different interests as an added value product or that allows following up various biological processes The chapters consider the degradation of contaminant compounds generated by industrial activities i e oil industry by product compounds and halogen compounds or compound generated by natural phenomena such as tsunamis which require interventions to recover damaged soils In addition the book contains chapters that involve special product degradation processes such as chlorophyll which corresponds to a biological process indicator as photosynthesis      Microbial Biodegradation and Bioremediation Surajit Das,2014-06-23 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

**Dehalogenation** Max M. Häggblom,Ingeborg D. Bossert,2007-05-08 Halogenated organic compounds constitute one of the largest groups of environmental chemicals The industrial production of new halogenated organic compounds has increased throughout the last century peaking in the 1960s and continuing in widespread use today Organohalides are integral to a variety of industrial applications including use as solvents degreasing agents biocides pharmaceuticals plasticizers hydraulic and heat transfer fluids and intermediates for chemical synthesis to name a few It is important to recognize the beneficial aspects of halogenated organic compounds as well as their potentially deleterious impact on the environment and health Recognition of the adverse environmental effects of many types of organohalide compounds has led to efforts to reduce or eliminate the most problematic ones Although organohalide compounds are typically considered to be anthropogenic industrial compounds they have their counterpart in several thousands of natural biogenic and geogenic organohalides representing most classes of organic chemicals Natural sources account for a significant portion of the global organohalogen budget This volume authored by recognized experts in the field provides a current perspective on how both natural and synthetic organohalides are formed and degraded and how these processes are incorporated into a global

halogen cycle The focus is on microbial processes since these play a major role both in the production and degradation i e cycling of halogenated organic compounds in the environment This book is organized into five parts Part I Introduction provides a global perspective on the issues of organohalides and their fate in the environment **Bioremediation for Environmental Sustainability** Gaurav Saxena,Vineet Kumar,Maulin P. Shah,2020-10-13 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

**Advances in Petroleum Technology** Subrata Borgohain Gogoi,2020-11-25 An impending energy crisis is looming globally which has led to the use of effluents from paper mills for enhanced oil recovery EOR CO2 flooding and wastewater treatment by biosurfactants and the current market demand for cost competitive and environment friendly alternatives to synthetic chemicals This up to date book on petroleum technology provides a comprehensive review of the background and recent advances in the field of petroleum technology and highlights various facets of the fascinating world of upstream midstream and downstream petroleum technologies It comprises 25 chapters each representing the progress prospects and challenges in petroleum research and focuses on the tremendous progress made by the scientific community in this research

field The book covers in detail EOR processes reservoir engineering production operation and optimisation pipeline transportation and storage CO<sub>2</sub> capture and sequestration wastewater management and innovative treatment refining technologies environmental chemistry and biochemistry and biotechnology for the petroleum industry      **Microbial Utilization and Transformation of Dissolved Organic Matter in Aquatic Environments - from Streams to the Deep Ocean** Johanna Sjöstedt, Jean-Francois Lapierre, Youhei Yamashita, Federico Baltar, 2021-07-28      **Microbes and Enzymes in Soil Health and Bioremediation** Ashok Kumar, Swati Sharma, 2019-11-23

Microbial enzymes play a vital role in maintaining soil health and removing pollutants from contaminated land Soil microflora is closely associated with maintaining soil fertility and the use of chemical pesticides fertilizers and other volatile sprays in agriculture threatens the health of the microbial population in the soil Every single particle of healthy soil contains millions of bacteria which interact with the nutrients available sustaining the nutrient cycle and making this microflora an essential component of life on earth How do microbes help in the nutrient cycle Either by intracellular digestion of macromolecules and converting these into smaller units in their metabolic pathways or by secreting enzymes into the extracellular environment to facilitate the conversion of complex macromolecules into micro molecules that can be easily absorbed by other living species To meet demands for energy and food for the growing global population it is important to protect agricultural land from contamination and maintain its productivity Heavy metal ions from contaminated land can enter crops fish or aquatic organisms via contaminated water and these are then taken up by the human body where they can accumulate and alter the normal microflora The microbiological component of the soil is a highly complex system and is still not fully understood How do microbes survive in the changing physicochemical environment of soil This book helps readers understand the mechanism various routes of microbial soil remediation the interactions of different genera and how microbial enzymes support the sustainable restoration of healthy soil      **Advances in Biodegradation and Bioremediation of Industrial Waste** Ram Chandra, 2015-03-24

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

Water Pollution and Remediation: Organic Pollutants Inamuddin, Mohd Imran Ahamed, Eric Lichtfouse, 2021-03-08 Wastewater pollution is a major issue in the context of the future circular economy because all matter should be ultimately reused calling for efficient depollution techniques This book presents timely reviews on the treatment of wastewater contaminated by organic pollutants with focus on aerobic granulation and degradation Organic pollutants include microplastics phthalates humic acids polycyclic aromatic hydrocarbons pharmaceutical drugs and metabolites plastics oil spills petroleum hydrocarbons personal care products tannery waste dyes and pigments

**Biodegradation of Nitroaromatic Compounds** Jim C. Spain, 2013-05-05 During the past five years increased awareness of environmental contamination by nitroaromatic compounds has led to a dramatic increase in research on their biodegradation The resulting discoveries have markedly extended our understanding of degradation mechanisms and pathways in bacteria and fungi Furthermore this new basic knowledge promises the development of field applications of biodegradation systems for nitroaromatic compounds In May of 1994 an International Symposium on the Biodegradation of Nitroaromatic Compounds was held in Las Vegas Nevada This symposium brought together the scientists at the frontiers of research into the biodegradation of nitroaromatic compounds The invited speakers were asked to review their area of expertise and write a critical comprehensive synthesis of their work and related work by others This book is the result of their efforts The emphasis of the reviews is on basic research in biodegradation and biotransformation Therefore the reactions of nitroaromatic compounds in plants animals bacteria fungi soil and even nonbiological systems are considered The goal of the work is to provide the reader with an appreciation of the tremendous range of possibilities for metabolism of aromatic nitro compounds and the experimental approaches used to understand them This volume should be of interest to biochemists microbiologists engineers toxicologists and anyone interested in the behavior of synthetic chemicals in the environment or in living systems Furthermore a variety of commercial applications can be envisioned for some of the reactions described here

Microbial

and Enzymatic Degradation of Wood and Wood Components Karl-Erik L. Eriksson, Robert A. Blanchette, Paul Ander, 2012-12-06 The oil crisis during the 1970s turned interest towards the utilization of renewable resources and towards lignocellulosics in particular The 1970s were also the cradle period of biotechnology and the years when biotechnical utilization of lignocellulosic waste from agriculture and forestry gained priority This was a logical conclusion since one of nature's most important biological reactions is the conversion of wood and other lignocellulosic materials to carbon dioxide water and humic substances However while biotechnology in other areas like medicine and pharmacology concerned production of expensive products on a small scale biotechnical utilization and conversion of lignocellulosics meant production of inexpensive products on a large scale Biotechnical utilization of lignocellulosic materials is therefore a very difficult task and the commercial utilization of this technology has not progressed as rapidly as one would have desired One reason for this was the lack of basic knowledge of enzyme mechanisms involved in the degradation and conversion of wood other lignocellulosics and their individual components There are also risks associated with initiating a technical development before a stable platform of knowledge is available Several of the projects started with enthusiasm have therefore suffered some loss of interest Also contributing to this failing interest is the fact that the oil crisis at the time was not a real one At present nobody predicts a rapid exhaustion of the oil resources and fuel production from lignocellulosics is no longer a high priority

**Microbiota and Biofertilizers**, 2021 The dependence of present farming on artificial input of chemical fertilizers has caused numerous ecological tribulations associated with global warming and soil contamination Moreover there is an essential requirement for realistic agricultural practices on a comprehensive level Accordingly biofertilizers including microbes have been recommended as feasible environmentally sound solutions for agricultural practices which not only are natural and cost effective but also preserve soil environs and important biota of agricultural land In addition it enhances the nutrient quantity of soils organically Microbial biofertilizers promote plant growth by escalating proficient absorption of nutrients for the plants and by providing an excellent disease fighting mechanism Agriculture the backbone of human sustenance has been put under tremendous pressure by the ever increasing human population Although various modern agro techniques boosted agricultural production the excessive use of synthetic fertilizers pesticides and herbicides have proven extremely detrimental to agriculture as well as to the environment in which it is carried out Besides this some faulty agricultural practices like monoculture and defective irrigation further complicate the scenario by eliminating biodiversity increasing the efflux of nutrients into the water bodies the formation of algal blooms eutrophication damaging the water quality and lowering fish stocks Biofertilizers are the organic compounds applied to crops for their sustainable growth and the sustainability of the environment as the microbiota associated with biofertilizers interact with the soil roots and seeds to enhance soil fertility Application of biofertilizers results in the increased mineral and water uptake root development vegetative growth and nitrogen fixation besides liberating growth promoting substances and minerals that help



the maintenance of soil fertility They further act as antagonists and play a pivotal role in neutralising soil borne plant pathogens and thus help in the bio control of diseases Application of biofertilizers instead of synthetic fertilizers could be a promising technique to raise agricultural productivity without degrading environmental quality The present book focuses on the latest research approaches and updates from the microbiota and their applications in the agriculture industry We believe this book addresses various challenges and shed lights on the possible future of the sustainable agricultural system

## Unveiling the Magic of Words: A Overview of "**Microbial Degradation Of Organic Compounds**"

In some sort of defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their power to kindle emotions, provoke contemplation, and ignite transformative change is really awe-inspiring. Enter the realm of "**Microbial Degradation Of Organic Compounds**," a mesmerizing literary masterpiece penned by way of a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve in to the book is central themes, examine its distinctive writing style, and assess its profound effect on the souls of its readers.

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## Microbial Degradation Of Organic Compounds Introduction

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