



Environmental Isotopes in Biodegradation and Bioremediation

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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.

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Editorial Review

About the Author

C. Marjorie Aelion is dean of the School of Public Health and Health Sciences at the University of Massachusetts, Amherst. She worked for the U.S. Geological Survey, Water Resources Division, as a hydrologist for three years before beginning her academic career at the University of South Carolina in Columbia as an assistant professor, associate professor, professor, and associate dean for research. Her research interests lie in the assessment of biodegradation and bioremediation of organic contaminants, and associations between soil metals and negative childhood health outcomes.

Ramon Aravena is a research professor in the Department of Earth and Environmental Sciences at the University of Waterloo, Ontario, Canada. Dr. Aravena's research has focused on the application of environmental isotopes in hydrology, geochemistry, and quaternary geology. He has been involved in numerous groundwater studies in Latin America, Canada, the United States, and Europe related to evaluation of groundwater resources and groundwater contamination.

Patrick Höhener is a professor in hydrogeochemistry at the University of Provence, Marseille. He obtained a Ph.D in environmental sciences in 1990 from the Swiss Federal Institute of Technology, where he later had a position as lecturer at Zurich and Lausanne. His research interests lie in the management and remediation of soils and aquifers contaminated with organic chemicals.

Daniel Hunkeler is professor for groundwater quality at the Centre for Hydrogeology of the University of Neuchâtel, Switzerland and adjunct professor at the University of Waterloo, Canada. He obtained a Ph.D from the Swiss Federal Institute for Technology, Zürich. His research focuses on the development of stable isotope methods and their application to gain insight into the contaminant behavior at the field scale.

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