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Volume 51

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Methods for Bioremediation of Water and Wastewater Pollution

 Springer

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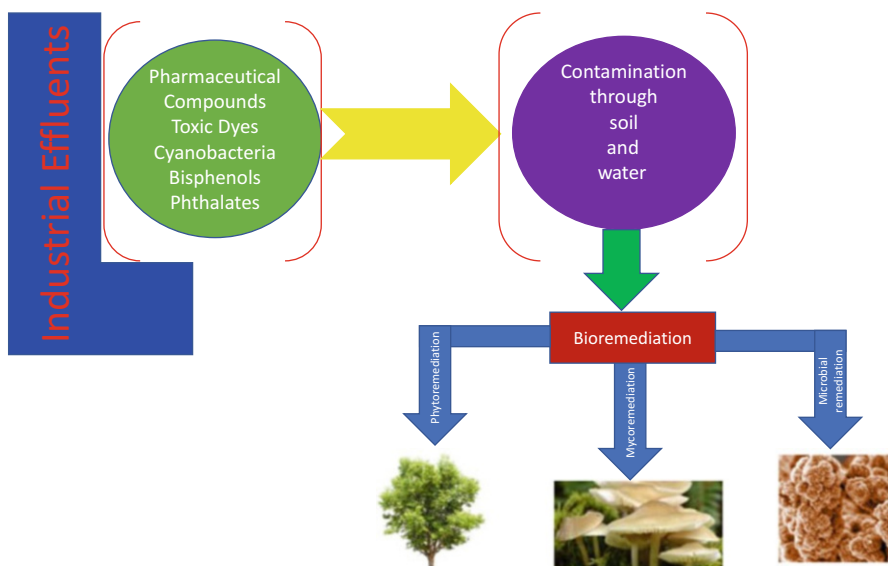
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Preface

The rapid growth of population and industrialization has resulted in the disposal of harmful chemicals into the environment, thus inducing health issues for life. The major sources of contamination include industries, agrochemistry, mining activities and waste disposal. Remediation of environmental media using biological methods is actually a fast-developing research field because bioremediation is considered as a cheap, sustainable, green and socially acceptable way of cleaning. Scientists have designed many remediation mechanisms such as detoxification, immobilization, degradation, concentration, disposal and recycling by the action of microorganisms or enzymes. Bioremediation strategies include natural attenuation, biostimulation by encouraging natural processes of biodegradation and bioaugmentation by adding beneficial microorganisms. This book presents strategies, concepts and methods for bioremediation of metals, dyes and organic pollutants. The structure, classification, properties, ecotoxicology and bioremediation of various pollutants are discussed. This book is a good reference guide for faculty, postgraduates, researchers and industrial professionals who are linked to environmental science, analytical chemistry, biotechnology, nutrition, photochemistry and toxicology.



Chapter 1 discusses the bioremediation of samples contaminated by lead, cadmium or chromium using *Pseudomonas*-based biosorbents. Additionally, the modelling of the biosorption process of heavy metals, the efficiency of new biosorbents and toxicological limits are highlighted. Chapter 2 discusses world scientific paradigms on water pollution remediation, as the author believes that environmental catastrophes are a consequence of how the scientific society looks at nature. Chapter 3 introduces anaerobic processes for the removal of pollutants. Chapter 4 presents an alternative approach for remediating dyes and metals by sorption using bacterial strains and metabolites. Chapter 5 focuses on bacterial biofilm-based strategies for metal sequestration, with emphasis on biofilms, quorum sensing and functional bacterial items. Chapter 6 reviews laccase for immobilization of dyes. Chapter 7 describes economical, eco-friendly and efficient biochemical water purification methods, with focus on removal efficiencies of various microorganisms, and on the effect of temperature, pH and initial dye concentration. Wastewater bioremediation of metals, dyes and pigments by plants, bacteria, fungi and algae are presented in Chap. 8.

Chapter 9 details the application of microorganisms to remove metals from wastewater, with focus on biosorption and mechanisms. Sorption of metals on exopolymeric substances from bacteria is then discussed in Chap. 10. Chapter 11 presents the bioremediation of bisphenols and phthalates by chelation with nanoparticles from soil microbiota, plants and fungi (Figure). Metal phytoextraction is discussed in Chaps. 12 and 16. Chapter 13 reviews the use of bark and extracts to decrease metal contamination. Chapter 14 discusses dye history, classification,

properties, remediation and environmental impact. Natural remediation techniques such as vegetative filter strips, phytoremediation and constructed wetlands are presented in Chap. 15. Chapter 17 focuses on nickel and cadmium removal from aqueous solutions using microorganisms. Biological strategies for the removal of metals using microorganisms and plants are presented in Chap. 18.

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