Bioremediation of Mercury

Current Research and Industrial Applications

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Mercury is a heavy metal with extreme toxicity, the ability to biomagnify, and long range atmospheric transport of its gaseous form. Past and present industrial uses of mercury have resulted in the pollution of soils, groundwater, rivers and marine ecosystems worldwide, the clean-up of which, using standard technology, is either not feasible or is prohibitively costly. A low cost and environmentally friendly alternative is bioremediation: the use of microbes or plants (phytoremediation) to remediate contaminated sites.

In this timely book, established mercury experts review the latest research in this area, including the genetic engineering of bacteria and plants. The gap between laboratory research and field application is bridged using case studies: An abandoned chlor-alkali electrolysis factory in Kazhakhstan, a former PVC plant in Albania, and the Madeira River Basin in the Amazon region. The remaining chapters cover: the mercury-cell process of the chlor-alkali electrolysis industry; a pilot plant for wastewater bioremediation; and a comparison of the efficiency of microbial bioremediation to clean-up three types of industrial wastewater. The book covers the complete range from laboratory scale research to full scale industrial operation and shows a multitude of options for future mercury bioremediation technologies.

Essential reading for research scientists, graduate students, and other specialists interested in mercury bioremediation, the book is also recommended reading for environmental microbiologists, chemists and engineers.

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Mercury bioremediation processes as mercury occur naturally in the environment and are found in both elemental inorganic and organic forms. It generally occurs in two oxidation states, Hg+1 and Hg+2, they are commonly found asÂ The extent of mercury concentration determines the proportion of mercury resistant bacteria in contaminated environments (9). In addition, marine bacteria typically eliminate mercury from their surroundings by facilitating the binding of the mercury with thiols to reduce toxicity. Mercury is the smallest and innermost planet in the Solar System. Its orbit around the Sun takes 87.97 days, the shortest of all the planets in the Solar System. It is named after the Greek god Hermes (Î•ÏÎ¼Î®Ï‚), translated into Latin Mercurius Mercury, god of commerce, messenger of the gods, mediator between gods and mortals. Like Venus, Mercury orbits the Sun within Earth's orbit as an inferior planet, and its apparent distance from the Sun as viewed from Earth never exceeds 28Â°. This proximity to the Bioremediation technology uses microorganisms to reduce, eliminate, contain, or transform to benign products contaminants present in soils, sediments, water, and air.Â Mercury, arsenic, lead, and chromium are often prevalent at highly contaminated sites. This fact holds significant challenges for industries because these metals are difficult to remove. Therefore researchers and industries are researching metals that undergo methylation, complexation, or changes in valence state. In book: Microbial Biodegradation and Bioremediation (pp.137-166). Chapter: Mercury Pollution and Bioremediationâ€”A Case Study on Biosorption by a Mercury-Resistant Bacterium. Publisher: Elsevier. Editors: S. Das. Reviews of the latest research in mercury bioremediation. Covers the complete range from laboratory scale research to full scale industrial operation and shows a multitude of options for future mercury bioremediation technologies.Â Mercury is a heavy metal with extreme toxicity, the ability to biomagnify, and long range atmospheric transport of its gaseous form.

Efficient bioremediation was observed at a level of 250 Î¼g/ml with the removal of 60% of mercury ions. The interesting outcome of this study was that the strain V. fluvialis had a high bioremediation efficiency but had a low antibiotic resistance. Hence, V. fluvialis could be successfully used as a strain for the ecofriendly removal of mercury. 1. Introduction. Mercury is one of the most hazardous heavy metals, which is considered as a significant contaminant of the environment. In book: Microbial Biodegradation and Bioremediation (pp.137-166). Chapter: Mercury Pollution and Bioremediationâ€"A Case Study on Biosorption by a Mercury-Resistant Bacterium. Publisher: Elsevier. Editors: S. Das. Authors: Jaysankar De. 35.53. University of Florida. Anthony E (2014) Bioremediation of mercury by biofilm forming mercury resistant marine bacteria. National Institute of Technology Rourkela. Ariya PA, Amyot M, Dastoor A, Deeds D, Feinberg A, Kos G, Poulain A, Ryjkov A, Semenjuk K, Subir M (2015) Mercury physicochemical and biogeochemical transformation in the atmosphere and at atmospheric interfaces: a review and future directions. Chem Rev 115:3760â€"3802. CAS PubMed Article Google Scholar.