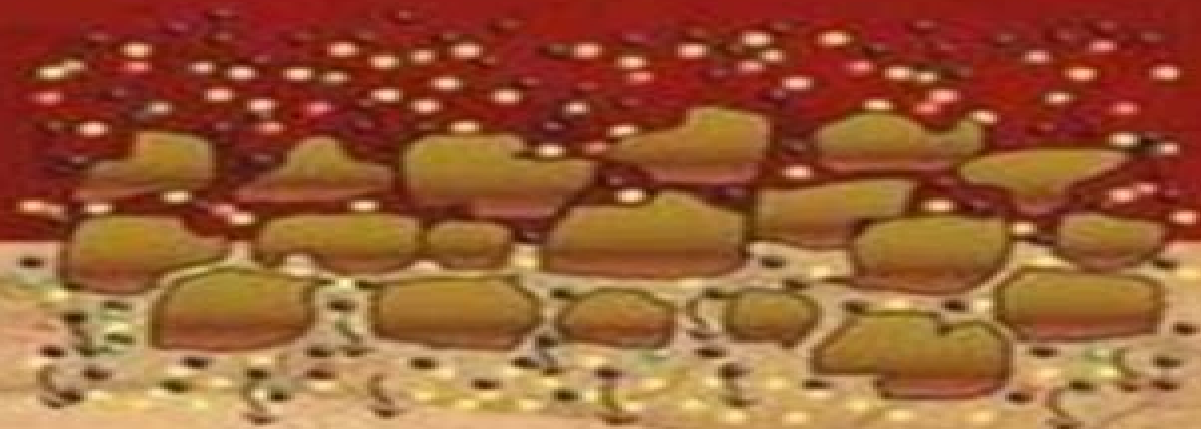


Competitive
Sorption and Transport
of Heavy Metals in Soils
and Geological Media



Edited By
H. Magdi Selim



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Competitive Sorption And Transport Of Heavy Metals In Soils And Geological Media

Alina Kabata-Pendias, Barbara Szeke



Competitive Sorption And Transport Of Heavy Metals In Soils And Geological Media:

Competitive Sorption and Transport of Heavy Metals in Soils and Geological Media H. Magdi Selim, 2017-03-29
Most reported incidents of soil contamination include an array of heavy metals species rather than a single ion. The various interactions in these multicomponent or multiple ion systems significantly impact the fate and transport of heavy metals and competition for sorption sites on soil matrix surfaces is a common phenomenon. Because of this, considering competitive sorption is an important part of predicting contaminant transport. *Competitive Sorption and Transport of Heavy Metals in Soils and Geological Media* gives you the information needed to understand heavy metals sorption and transport in the vadose zone and aquifers. The book brings together state-of-the-art research on the competitive sorption and mobility of single versus multiple heavy metal species. It also relates the transport mechanisms to the processes that govern sorption mechanisms. The work offers new experimental evidence on the fate of multiple heavy metals in soil columns and new field results on how multiple ions influence the mobility of metals in the soil profile under water unsaturated flow. Emphasizing modeling approaches, the book begins with an overview of the competitive behavior of heavy metals. It then takes a closer look at various heavy metals, discussing their behavior in tropical soils, speciation and fractionation, accumulation, migration, competitive retention, and the contamination of water resources at the watershed scale. The book also presents extensive data on phosphate, a commonly used fertilizer, and its role in facilitating the release of trace elements. The final chapter looks at the effect of waterlogged conditions on arsenic and cadmium solubilization. Edited by an internationally recognized researcher and featuring expert contributors, this comprehensive work addresses the complex physical and chemical phenomena of sorption mechanisms. Presenting the latest research, it helps you to better predict the potential mobility of multiple heavy metals in soils.

Competitive Sorption and Transport of Heavy Metals in Soils and Geological Media H. Magdi Selim, 2016-04-19
Most reported incidents of soil contamination include an array of heavy metals species rather than a single ion. The various interactions in these multicomponent or multiple ion systems significantly impact the fate and transport of heavy metals and competition for sorption sites on soil matrix surfaces is a common phenomenon. Because of this, considering competitive sorption is an important part of predicting contaminant transport.

Transport & Fate of Chemicals in Soils H. Magdi Selim, 2014-09-17
During the last four decades, tremendous advances have been made towards the understanding of transport characteristics of contaminants in soils, solutes, and tracers in geological media. *Transport Fate of Chemicals in Soils: Principles Applications* offers a comprehensive treatment of the subject, complete with supporting examples of metals and organic chemicals.

Trace Elements in Waterlogged Soils and Sediments Jörg Rinklebe, Anna Sophia Knox, Michael Paller, 2016-08-19
Many wetlands around the world act as sinks for pollutants, in particular for trace elements. In comparison to terrestrial environments, wetlands are still far less studied. A collaborative effort among world experts, this book brings the current knowledge concerning trace elements in temporary waterlogged soils and sediments together. It discusses factors controlling the dynamics and release kinetics of trace elements and their

underlying biogeochemical processes It also discusses current technologies for remediating sites contaminated with trace metals and the role of bioavailability in risk assessment and regulatory decision making This book is intended for professionals around the world in disciplines related to contaminant bioavailability in aquatic organisms contaminant fate and transport remediation technologies and risk assessment of aquatic and wetland ecosystems *Vanadium in Soils and Plants* Jörg Rinklebe,2022-08-17 Vanadium is an essential element for humans and animals The toxicity of vanadium at higher concentrations could be a global environmental concern and a significant issue for both environmental protection and economic benefits The relevance of anthropogenic vanadium in the environment has increased significantly in recent years due to an increased demand for vanadium in high temperature industrial activities This book summarizes vanadium s current research and explains its behavior and mobilization in the environment especially in soils sediments water and plants Through case studies from various countries it discusses critical limits set and risk assessment approaches and remediation approaches of vanadium contaminated soils **FEATURES** Provides a comprehensive overview of vanadium in the total environment Covers the role of vanadium in various environments such as soils sediments water and plants Includes bioavailability studies and further case studies from various countries around the world Focuses on a better understanding of biogeochemical processes of vanadium Is written by international experts who present the current stage of the knowledge including innovative remediation and management approaches of vanadium contaminated sites This book will be of use to upper level undergraduate and graduate students taking courses in soil science environmental science soil ecology water science plant science ecotoxicology geology and geography as well as scientists lecturers environmental and technical engineers ecologists applied ecological scientists and managers *Trace Elements in Abiotic and Biotic Environments* Alina Kabata-Pendias,Barbara Szteke,2015-04-07 This book helps readers understand the fundamental principles and phenomena that control the transfer of trace elements It describes the occurrence and behavior of trace elements in rocks soil water air and plants and also discusses the anthropogenic impact to the environment In addition the book covers the presence of trace elements in feeds as either contaminants or as nutritional or zootechnical additives and their transfer across the food chain to humans All trace elements are covered from aluminum to zirconium as well as rare earth elements actinides and lanthanides **Antimony** Montserrat Filella,2021-07-05 Antimony Sb is an exciting chemical element ubiquitously present in our daily lives This book provides a coherent and interdisciplinary picture of our current understanding of this element Subjects ranging from its mineralogy mining and environmental chemistry to its potential impact in ecosystems and human health are discussed in this monograph **Management of Contaminated Site Problems, Second Edition** Kofi Asante-Duah,2019-04-12 This book outlines the strategies used in the investigation characterization management and restoration and remediation for various contaminated sites It draws on real world examples from across the globe to illustrate remediation techniques and discusses their applicability It provides guidance for the successful corrective action

assessment and response programs for any type of contaminated land problem and at any location The systematic protocols presented will aid environmental professionals in managing contaminated land and associated problems more efficiently This new edition adds twelve new chapters and is fully updated and expanded throughout

Methylmercury Accumulation in Rice Xinbin Feng,Jianxu Wang,Jörg Rinklebe,2024-09-04 This book presents state of the art knowledge related to concerns about methylmercury MeHg in the soil rice system It covers increasing concerns about human exposure to methylmercury through the consumption of Hg contaminated rice and shows the global contamination of soil and how Hg can be mobilized immobilized methylated and demethylated in soils The authors present the biogeochemical process through which rice plants accumulate Hg This book comprehensively displays the biogeochemical behavior of Hg in paddy soils and rice plants as well as the current remediation technologies to mitigate Hg risks from paddy soil ecosystems Features Provides cutting edge knowledge on mercury in paddy field ecosystems Discusses the key biogeochemical transformation processes of mercury in soil Explains the accumulation processes of mercury in rice plants Includes case studies on how to inhibit mercury accumulation in rice plants Shows the application of Hg stable isotope traces in paddy soil rice field studies Intended for researchers graduate students and professionals working in fields such as Geochemistry Agronomy and Environmental Science and Engineering this book will be an important resource for anyone interested in Hg contamination in soils and rice and the related risk for human and environmental health

Maritime Accidents and Environmental Pollution - The X-Press Pearl Disaster Meththika Vithanage,Ajith Priyal de Alwis,Deshai Botheju,2023-12-29 This book discusses in detail the facts and findings related to the X Press Pearl container vessel accident that occurred in May 2021 off the coast of Colombo Sri Lanka The ship was carrying a large consignment of chemicals and diverse hazardous materials that caused a disastrous and vast environmental and social catastrophe in the region Through many case studies accumulated knowledge and experiences the authors discuss the accident response risk mitigation investigation and damage assessment activities from the very onset of the accident It helps researchers and regulators understand the facts of this unique marine chemical accident and to formulate necessary future regulations as well as to develop robust safety and sustainability management systems and safety cultures Features Written by authorities who led the team involved in accident response and damage assessment Focuses on identifying plausible root causes pitfalls in accident response and weaknesses in current regulatory and management protocols Delivers in depth understanding of a unique marine chemical accident to help formulate necessary future policies and regulations related to such disasters Includes many case studies related to the accident illustrated with photos and figures that are true evidence of the disaster the response and the mitigation Explains and discusses key research findings in a streamlined manner understandable for a wide audience A valuable resource for readers in environmental management and policy creation as well as for researchers professionals academics and students involved in environmental science chemical engineering technical safety and sustainability management maritime polymer and ocean sciences Countries where

maritime disasters are a concern will also find this book is an important guide for taking a responsible approach when handling similar situations in the future not least to avert such events from occurring *Soil Management and Climate Change* Maria Angeles Munoz, Raúl Zornoza, 2017-10-16 Soil Management and Climate Change Effects on Organic Carbon Nitrogen Dynamics and Greenhouse Gas Emissions provides a state of the art overview of recent findings and future research challenges regarding physical chemical and biological processes controlling soil carbon nitrogen dynamic and greenhouse gas emissions from soils This book is for students and academics in soil science and environmental science land managers public administrators and legislators and will increase understanding of organic matter preservation in soil and mitigation of greenhouse gas emissions Given the central role soil plays on the global carbon C and nitrogen N cycles and its impact on greenhouse gas emissions there is an urgent need to increase our common understanding about sources mechanisms and processes that regulate organic matter mineralization and stabilization and to identify those management practices and processes which mitigate greenhouse gas emissions helping increase organic matter stabilization with suitable supplies of available N Provides the latest findings about soil organic matter stabilization and greenhouse gas emissions Covers the effect of practices and management on soil organic matter stabilization Includes information for readers to select the most suitable management practices to increase soil organic matter stabilization *Selenium in plants* Elizabeth A.H. Pilon-Smits, Lenny H.E. Winkel, Zhi-Qing Lin, 2017-05-10 This book covers many facets of plant selenium Se accumulation molecular genetics biochemistry physiology and ecological and evolutionary aspects Broader impacts and applications of plant Se accumulation also receive attention Plant Se accumulation is very relevant for environmental and human health Selenium is both essential at low levels and toxic at high levels and both Se deficiency and toxicity are problems worldwide Selenium can positively affect crop productivity and nutritional value Plants may also be used to clean up excess environmental Se Selenium in plants has profound ecological impact and likely contributes to Se movement in ecosystems and global Se cycling *Arsenic Contamination in the Environment* Dharmendra Kumar Gupta, Soumya Chatterjee, 2017-05-23 This book provides an overview to researchers graduate and undergraduate students as well as academicians who are interested in arsenic It covers human health risks and established cases of human ailments and sheds light on prospective control measures both biological and physico chemical Arsenic As is a widely distributed element in the environment having no known useful physiological function in plants or animals Historically this metalloid has been known to be used widely as a poison Effects of arsenic have come to light in the past few decades due to its increasing contamination in several parts of world with the worst situation being in Bangladesh and West Bengal India The worrying issue is the ingestion of arsenic through water and food and associated health risks due to its carcinogenic and neurotoxic nature The impact of the problem is widespread and it has led to extensive research on finding both the causes and solutions These attempts have allowed us to understand the various probable causes of arsenic contamination in the environment and at the

same time have provided a number of possible solutions It is reported that more than 200 mineral species contain As Generally As binds with iron and sulfur to form arsenopyrite According to one estimate from the World Health Organization WHO contextual levels of As in soil ranges from 1 to 40 mg kg⁻¹ Arsenic toxicity is related to its oxidation state which is present in the medium As is a protoplasmic toxin due to its consequence on sulphydryl group it interferes in cell enzymes cell respiration and in mitosis Exposure of As may occur to humans via several industries such as refining or smelting of metal ores microelectronics wood preservation battery manufacturing and also to those who work in power plants that burn arsenic rich coal

Phosphate in Soils H. Magdi Selim, 2018-10-08 Edited by One of the Best Specialists in Soil Science Recent studies reveal that Phosphorus P in the form of phosphate a macronutrient essential for plant growth and crop yields can influence the bioavailability retention and mobility of trace elements metalloid s and radionuclides in soils When this occurs phosphates can affect the dynamics of heavy metals and influence soil characteristics impacting soil mobility and toxicity Phosphate in Soils Interaction with Micronutrients Radionuclides and Heavy Metals utilizes the latest research to emphasize the role that phosphate plays in enhancing or reducing the mobility of heavy metals in soil and the soil water plant environment It provides an in depth understanding of each heavy metal species and expands on phosphate interactions in geological material Composed of 12 chapters this text Provides an overview of the reactions of metalloid s and common P compounds that are used as fertilizer in soils Emphasizes the effect of phosphorus on copper and zinc adsorption in acid soils Discusses findings on the influence of phosphate compounds on speciation mobility and bioavailability of heavy metals in soils as well as the role of phosphates on in situ and phytoremediation of heavy metals for contaminated soils Places emphasis on the influence of phosphate on various heavy metals species in soils and their solubility mobility and availability Provides extensive information on testing various high phosphate materials for remediation of heavy metal micronutrients and radionuclides contaminated sites Explores the reactivity of heavy metals micronutrients and radionuclides elements in several soils Presents a case study illustrating various remediation efforts of acidic soils and remediation of Cu Zn and lead Pb contaminated soils around nonferrous industrial plants Emphasizes the significance of common ions cations and anions on phosphate mobility and sorption in soils and more The author includes analytical and numerical solutions along with hands on applications and addresses other topics that include the transport and sorption modeling of heavy metals in the presence of phosphate at different scales in the vadose zone

Advances in Agronomy, 2013-01-08 Advances in Agronomy continues to be recognized as a leading reference and a first rate source for the latest research in agronomy As always the subjects covered are varied and exemplary of the myriad of subject matter dealt with by this long running serial Maintains the highest impact factor among serial publications in agriculture Presents timely reviews on important agronomy issues Enjoys a long standing reputation for excellence in the field

Agrochemicals in Soil and Environment M. Naeem, Juan Francisco Jimenez Bremont, Abid Ali Ansari, Sarvajeet Singh Gill, 2022-06-28 This volume Agrochemicals in Soil and

Environment Impacts and Remediation is a comprehensive collection of important literature on agrochemical contamination. The main focus of this book is to point out undesirable changes in biological, physical and chemical characteristics of agricultural soils and its impacts on global agricultural crop productivity. Soil is one of the important resources of basic needs for our sustenance but due to various anthropogenic activities like urbanization and industrialization the soil is losing its basic quality characteristics. Soil microorganisms, water holding capacity, minerals, salts and nutrients are under the direct threat due to agrochemicals; therefore, the agricultural sector is facing a serious challenge. Lack of proper knowledge and luxurious applications of agrochemicals resulting into degradation and deterioration of soil quality, loss of soil and crop productivity and threatening the food security. Therefore, it is imperative to develop indices, indicators and soil parameters for the monitoring and impact assessment of agricultural contaminants. Further, biotic and abiotic stresses and their tolerance mechanisms in plants in relation to the soil contaminants such as toxic pollutants, heavy metals, inorganic and organic matters, variety of pesticides, insecticides, herbicides, agricultural runoffs and solid wastes and chemical fertilizers are also highlighted in this volume. This book also discusses causes of reduced agriculture productivity and suggests sustainable measures such as plant-based technologies, bioremediation and nanotechnology that can be used to overcome the crop losses. The book is of interest to research students, teachers, agricultural scientists, agronomists, environmentalists as well as policy makers.

Climate and Ocean Dynamics at the Brazilian Margin - Past and Present Jacek Raddatz, Christoph Häggi, André Bahr, Cristiano M. Chiessi, 2022-11-07 **Energy Research Abstracts**, 1988 Water-rock Interaction Richard B. Wanty, Robert R. Seal, 2004 **Groundwater and Water Quality** Ramakar Jha, Vijay P. Singh, Vivekanand Singh, L.B. Roy, Roshni Thendiyath, 2022-10-04. This book deals with topics of current interest such as climate change, floods, drought and hydrological extremes. The impact of climate change on water resources is drawing worldwide attention these days for water resources in many countries are already stressed and climate change along with burgeoning population, rising standard of living and increasing demand are adding to the stress. Further, river basins are becoming less resilient to climatic vagaries. Fundamental to addressing these issues is hydrological modelling which is covered in these books. Further, integrated water resources management is vital to ensure water and food security. Integral to the management is groundwater and solute transport. The books encompass tools that will be useful to mitigate the adverse consequences of natural disasters. This book provides many new and innovative methods to assess groundwater and estimate water pollution. Groundwater recharge, solute transport, groundwater modelling are some of the important variables used to estimate the groundwater movement, hydraulic gradient and pollution movement. The water quality is another important variable of river Ganga and its tributaries in India and other rivers over the globe.

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