

# Removal Of Lead Ii From Aqueous Solution Using Low Cost

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*Biosorption* - Jan Derco 2018-07-18

Municipal and industrial wastewaters contain a wide spectrum of pollutants. Their effective removal presents a challenge for water treatment technology. Biosorption of nutrients and pollutants has been used in sewage treatment since the discovery of the activated sludge process. It is a passive uptake process by which pollutants are adsorbed on the surface of cell walls and/or dissolved in structures of microorganism cells that are present in sludge. Sorbed pollutants remain in the sludge and can be potentially released back into the environment depending on their condition

and the reversibility of the pollutant-sludge interaction. An overview of typical biosorption applications for the removal of nutrients, organic pollutants, and metals in wastewater treatment is provided in different areas of their use for the protection of aquatic ecosystems and human health. This book will be of interest to operators of wastewater treatment plants and sludge treatment and disposal facilities as well as to researchers and university students in the field of environmental engineering.

Biosorption of Heavy Metals - Bohumil Volesky  
1990-08-15

This state-of-the-art volume represents the first comprehensively written book which focuses on the new field of biosorption. This fascinating work conveys essential fundamental information and outlines the perspectives of biosorption. It summarizes the metal-sorbing properties of nonliving bacterial, fungal, and algal biomass, plus highlights relevant metal-binding mechanisms. This volume also discusses the aspects of obtaining and processing microbial biomass and metal-chelating chemicals into industrially applicable biosorbent products. Microbiologists, chemists, and engineers with an

interest in new technological and scientific horizons will find this reference indispensable. Environment and Toxicology - Arvind Kumar 2005  
In Indian context.

**Enhanced Chitosan Material for Water Treatment**  
- Ephraim Igberase 2021-04-29

This book reviews some of the latest developments in the field of water treatment using multi-functional chitosan-based materials. It covers the production of chitosan beads and membranes from chitosan powder, as well as modification techniques for enhancing the material for commercial and industrial purposes.

The book summarizes the results of experimental adsorption/desorption studies for elucidating the underlying reaction mechanism of heavy-metal removal from wastewater, presenting an advanced overview of an array of characterization techniques such as Fourier-transform infrared spectroscopy, thermogravimetric analysis, x-ray diffraction, and scanning electron microscopy. Additionally, it features a look at the development and application of specialized engineering software and image analysis for modelling the kinetics of adsorption. This book is ideal for scientists and engineers working in the broader

field of environmental materials science. It is all well suited for chemists, as well as industrial and civil engineers, interested in wastewater treatment and mitigation of water pollution

**Novel Approaches to Design Eco-friendly Materials Based on Natural Nanomaterials** - Aiqin Wang 2019-08-12

Naturally available nanomaterials or those synthesized from natural resources become “new favorite” of material world due to their advantages of low cost, safety and environmental friendliness. They are honored as future “green materials” and widely used in fabricating various

functional materials. Naturally available materials have been playing an increasingly important role in many fields such as environmental remediation, separation, catalysis, and polymer composites.

This book collects latest research results on the new composites for environmental application, focusing on the study of fabricating functional composites using natural clay minerals. Naturally available materials or solid waste or minerals are good precursors for producing adsorbents.

Composites based on sub-bituminous coal, lignite, and a blend of coal and *Irvingia gabonensis* seed shells, the Cl-type Mg-Al

hydrotalcite (Cl-LDH), the hydroxyapatite decorated with carbon nanotube and Zirconium (Zr)-containing silica residue purification (ZSR-P) were proved to have good adsorption capability to Cd(II) and Pb(II) ions, antibiotic molecules, Cd(II), and fluoride, respectively. The nano-Mg(OH)<sub>2</sub> loaded carbon cloth showed good separation effect for Eu(III), and the sodium-modified clinoptilolite showed good separation effect for CH<sub>4</sub>/N<sub>2</sub> from coal bed gas. Also, natural nanoclay is an effective precursor for the preparation of inorganic-inorganic or organic-inorganic nano-hybrid materials. Using nano-

kaolinite as a carrier, the inorganic-inorganic hybrid cobalt blue pigment with excellent color and stability can be obtained by surface co-precipitation and in-situ calcination crystallization process. The intercalation of 7-amino-4-methylcoumarin (AMC) molecules into the interlayer space of montmorillonite (MMT) can effectively inhibit fluorescence quenching and improve the detection effectiveness of Cr(VI) in water. The interlayer space of kaolinite can accommodate organic molecules to form an organic-inorganic hybrid composite. Natural clay minerals are also effective carriers for catalysts.

Er<sup>3+</sup>:CeO<sub>2</sub>/palygorskite nanocomposites prepared by a facile precipitation method showed excellent desulfurization rate under visible light irradiation. The zero-valent iron-loaded nanoclays composite catalysts can degrade efficiently Rhodamine 6G (Rh 6G) under microwave irradiation. In addition, the polymer composites have been developed using natural palygorskite, montmorillonite nanosheets or silica nanoparticles as inorganic components, which are potential to be used in many fields such as packing, biomedicine, or rubber. With the increasing attention to clay minerals, research methods for

the microstructure of clay minerals continue to receive attention. It is no doubt that natural materials have got a booming attention from researchers in mineralogy, materials science, chemistry, energy, biomedicine and other fields due to their advantages. However, there is still a long way to go to substitute traditional synthetic nanomaterials with natural ones, and there are still theoretical and technological limitation in the design and synthesis of new materials from natural materials. Related theoretical research and technological development require continuous exploration by researchers. This book has

collected some recent advances in related research, and hopes to play a role in attracting more attention to the construction of functional materials from natural raw materials. It is also believed that through the unremitting efforts of all researchers, the dream of green materials and green preparation processes can be realized.

*Sustainable Heavy Metal Remediation* - Eldon R. Rene 2017-10-13

This book presents an assortment of case-studies pertaining to the use of sustainable technologies for heavy metal removal and recovery from mining and metallurgical wastes, construction and

demolition wastes, spent catalysts and electronic wastes. Wastewaters from diverse industrial and mining activities have caused pollution problems, but these sectors also serve as a hotspot for metal recovery. Several metal removal technologies based on physical, chemical and biological processes have been successfully implemented in full-scale operation, while metal recovery, which is beneficial for economic and environmental reasons, is still limited due to challenges arising from downstream processing. For instance, microbial recovery (bioleaching) of metals from their ores is an established

technology with a number of full-scale applications. Bioleaching of electronic wastes to recover metals is also a highly promising technology with low environmental impact and high cost-effectiveness; yet, this technology is still at its infancy. As the individual chapters of this book focuses on the applications and limitations of different technologies, this book will serve as an excellent resource for chemical engineers, environmental engineers, mining engineers, biotechnologists, graduate students and researchers in these areas.

Phytoremediation of Toxic Metals - Ilya Raskin



2000

An in-depth look at the most promising technology for metal remediation. With current cleanup methodologies offering no real solution to the serious environmental implications of toxic metal contamination, there is a growing need among remediation professionals for effective, affordable, nonpolluting alternatives to energy-intensive engineering processes. This book presents one such promising alternative—the extraordinary new technology of phytoremediation. Through first-rate contributions from the top scientists in the field,

Phytoremediation of Toxic Metals surveys worldwide pioneering efforts in the use of plants to treat contamination of such metals as lead, cadmium, chromium, and even radionuclides. The authors explore all major aspects of the technology—how it utilizes the metal-accumulating properties of selected or engineered plants to remove toxic metals from soils and water, how to transfer knowledge from the laboratory to the field, and what methods are most viable for commercial application. Complete, state-of-the-art coverage includes: \* The economic advantages of plant-based technology \* Regulatory

considerations for future phytoremediation \*

Phytoextraction, phytostabilization, and  
phytofiltration of toxic metals \* Photostabilization  
of metals using hybrid poplar trees \*

Phytovolatilization for the special case of mercury  
and selenium \* The biological mechanisms of  
metal-accumulating plants

Principles of Water Treatment - Kerry J. Howe  
2012-11-06

Principles of Water Treatment has been  
developed from the best selling reference work  
Water Treatment, 3rd edition by the same author  
team. It maintains the same quality writing,

illustrations, and worked examples as the larger  
book, but in a smaller format which focuses on  
the treatment processes and not on the design of  
the facilities.

**Air, Gas, and Water Pollution Control Using  
Industrial and Agricultural Solid Wastes  
Adsorbents** - Tushar Kanti Sen 2017-10-20

Air and water pollution occurs when toxic  
pollutants of varying kinds (organic, inorganic,  
radioactive and so on) are directly or indirectly  
discharged into the environment without adequate  
treatment to remove these potential pollutants.  
There are a total of 13 book chapters in three

sections contributed by significant number of expert authors around the world, aiming to provide scientific knowledge and up-to-date development of various solid wastes based cost-effective adsorbent materials and its sustainable application in the removal of contaminates/pollutants from air, gas and water. This book is useful for the professions, practicing engineers, scientists, researchers, academics and undergraduate and post-graduate students' interest on this specific area. Key Features: • Exclusive compilation of information on use of industrial and agricultural waste based adsorbents

for air and water pollution abatement. • Explores utilization of industrial solid wastes in adsorptive purification and agricultural and agricultural by-products in separation and purification. • Discusses cost-effective solid wastes based emerging adsorbents. • Alternative adsorbents in the removal of a wide range of contaminants and pollutants from water is proposed. • Includes performance of unit operations in waste effluents treatment.

Instrumental Methods in Metal Ion Speciation -  
Imran Ali 2006-03-14

The knowledge of metal ion speciation is

essential for predicting the exact toxicities of metal ion species in the environment. Metal ions can exist in various oxidation states, each of which possesses different physical and chemical properties as well as exhibit varying toxicities. Often, toxicity data is unreliable because it is based on metal io

**Adsorption from Aqueous Solution** - Walter J. Weber 1968

Green Adsorbents for Pollutant Removal -

Grégorio Crini 2018-07-31

This is the second volume on adsorption using

green adsorbents and is written by international contributors who are the leading experts in the adsorption field. Together with the first volume they show a typical selection of green materials used in wastewater treatment, with emphasis on industrial effluents. This second volume focuses on innovative materials. It presents hemp-based materials for metal removal, and the use of leaves for metal removal. It describes the biosorption of metals and metalloids on various materials and discusses the recent advances in cellulose-based adsorbents used in environmental purposes. Furthermore, activated carbons from

food wastes, aerogels and bones, and municipal solid waste biochar as efficient materials for pollutant removal, respectively are reviewed as well as biosorption of dyes onto microbial biosorbents and the use of mushroom biomass to remove pollutants are looked at. The volume also includes detailed review of green adsorbents for removal of antibiotics, pesticides and endocrine disruptors and the use of pillared interlayered clays as innovative materials for pollutant removal. Finally, the use of green adsorbents for radioactive pollutant removal from natural water is discussed. The audience for this book includes

students, environmentalists, engineers, water scientists, civil and industrial personnel who wish to specialize in adsorption technology.

Academically, this book will be of use to students in chemical and environmental engineering who wish to learn about adsorption and its fundamentals. It has also been compiled for practicing engineers who wish to know about recent developments on adsorbent materials in order to promote further research toward improving and developing newer adsorbents and processes for the efficient removal of pollutants from industrial effluents. It is hoped that the book

will serve as a readable and useful presentation not only for undergraduate and postgraduate students but also for the water scientists and engineers and as a convenient reference handbook in the form of numerous recent examples and appended information.

**Advances in Materials Science for Environmental and Energy Technologies V - Tatsuki Ohji**

2016-09-27

This proceedings volume contains a collection of 20 papers from the following symposia held during the 2015 Materials Science and Technology (MS&T '15) meeting: 7th International

Symposium on Green and Sustainable Technologies for Materials Manufacturing Processing Materials for Nuclear Applications and Extreme Environments Materials Issues in Nuclear Waste Management in the 21st Century Nanotechnology for Energy, Healthcare and Industry Materials for Processes for CO<sub>2</sub> Capture, Conversion and Sequestration Hybrid Organic – Inorganic Materials for Alternative Energy **Environmental Remediation Through Carbon**

**Based Nano Composites - Mohammad Jawaid**

2020-09-25

This book examines carbon-based

nanocomposite materials and their application in various environmental fields, such as wastewater treatment, and air and soil remediation. Featuring illustrations, and tables summarizing the latest research, it gathers up-to-date information on the application of carbon nanocomposites in the removal of environmental pollutants from different sources. Given its scope, the book is a valuable textbook for research students, and a useful handbook and reference resource for researchers, academics and industrial scientists working in the field of environmental pollutants and their safe removal.

### Water Pollution and Remediation: Heavy Metals -

Inamuddin 2020-11-18

Pollution of waters by toxic metals is accelerating worldwide due to industrial and population growth, notably in countries having poor environmental laws, resulting in many diseases such as cancer. Classical remediation techniques are limited. This book reviews new, advanced or improved techniques for metal removal, such as hybrid treatments, nanotechnologies and unconventional adsorbents, e.g. metal-organic frameworks. Contaminants include rare earth elements, arsenic, lead, cadmium, chromium, copper and

effluents from the electronic, textile, agricultural and pharmaceutical industries.

**Ligand - Chandraleka Saravanan 2018-05-23**

The book Ligand describes the diversity and versatility of ligands, covering structural features, donor-acceptor properties and secondary functions like molecular recognition. Moreover, this book also provides a comprehensive account on the applicability like catalysis, sensors, supramolecular assembly, photochemical property, bioinorganic chemistry, and so on. The advancement of fundamentals in ligand design and the control of physicochemical properties of

coordination compounds has largely increased emphasis on understanding the structural and electronic features toward different perspectives in materials science. In this regard, this book has a special appeal to chemists, biologists and others. This book will be beneficial for the graduate students, teachers, researchers and other professionals who are interested to fortify and expand their knowledge in chemistry, biology, microbiology, biotechnology, materials science, environmental science and so on.

**Emerging Techniques for Treatment of Toxic Metals from Wastewater - Akil Ahmad**



2022-09-12

Emerging Techniques for Treatment of Toxic Metals from Wastewater explores the different physical and chemical methods that can be used to remove toxins from wastewater, including adsorption, solvent extraction, ion exchange, precipitation, filtration and photocatalytic degradation. Bringing together contributions from leading experts in the field, the book covers each of the different techniques in detail, combining emergent research outcomes with fundamental theoretical concepts to provide a clear appraisal of the different techniques available, along with

their applications. It is an essential recourse for researchers, industrialists and students concerned with the remediation of toxic metals from water and wastewater. Covers the various techniques for metal removal and their applications in a single source Addresses emerging technologies; chemical, physical, and biological including nanotechnology Brings together novel techniques and their applications for enhancing large scale industrial production signposting opportunities for significant enhancements

*Biosorption of Lead(II) Using Gossypium Hirsutum Seed Cake Biomass* - Muhammad Riaz 2012

The discharge of heavy metals from industrial effluents into aquatic sources has become a matter of concern over the last few decades. For the removal lead (II) ions from aqueous solutions biosorption is a cost effective method especially for the huge volumes of effluents. In the present study effect of cotton (*Gossypium hirsutum*) seed cake biomass on biosorption of lead (II) from aqueous solutions was deliberated. It was indicated that adsorption capacity  $q$ , (mg/g) and percentage adsorption was function of biosorbent size, biosorbent dose, pH and initial lead (II) concentration. Optimized percentage adsorptions

were observed at smaller size of biosorbent 0.355 mm, 0.2 g dose, pH 5.0 and 100 mg/L lead (II) concentration. Kinetic study revealed that adsorption was rapid in first fifteen minutes and equilibrium was achieved after six hours. At equilibrium, the maximum metal uptake was 45.29 mg/g with percentage adsorption 86.68 at pH 5.0. The Langmuir isotherm model with correlation coefficient (0.93) fitted well to the data of biosorption of lead (II), corroborating that the uptake of lead was chemical, saturable and equilibrated mechanism.

Emerging Contaminants - Aurel Nuro 2021-05-27

Emerging Contaminants presents the reader with information on classification, recent studies, and adverse effects on the environment and human health of the main classes of contaminants.

Emerging contaminants are synthetic or natural compounds and microorganisms produced and used by humans that cause adverse ecological and human health effects when they reach the environment. This book is organized into four sections that cover the classification of contaminants and the instrumental techniques used to quantify them, recent studies on pesticides, antibiotics as an important group of

emerging contaminants, and studies of different classes of emerging contaminants such as polybrominated diphenyl ethers (PBDEs), microplastics, and others.

SOUVENIR of 4th International Science Congress

- Prof. Dipak Sharma

*Materials for Modern Technologies IV* - Yue Li

2018-05-04

7th Spring International Conference on Material Sciences and Technology (MST-S 2018)

Selected, peer reviewed papers from the 7th Spring International Conference on Material

Sciences and Technology (MST-S, April 23-25, 2018, Guilin, China)

**Development in Wastewater Treatment Research and Processes** - Susana Rodriguez-Couto  
2021-09-11

Removal of Emerging Contaminants from Wastewater through Bio-nanotechnology showcases profiles of the nonregulated contaminants termed as “emerging contaminants, which comprise industrial and household persistent toxic chemicals, pharmaceuticals and personal care products (PPCPs), pesticides, surfactants and surfactant residues, plasticizers

and industrial additives, manufactured nanomaterials and nanoparticles, microplastics, etc. that are used extensively in everyday life. The occurrence of “emerging contaminants in wastewater, and their behavior during wastewater treatment and production of drinking water are key issues in the reuse and recycling of water resources. This book focuses on the exploitation of Nano-biotechnology inclusive of the state-of-the-art remediate strategies to degrade/detoxify/stabilize toxic and hazardous contaminants and restore contaminated sites, which is not as comprehensively discussed in the

existing titles on similar topics available in the global market. In addition, it discusses the potential environmental and health hazards and ecotoxicity associated with the widespread distribution of emerging contaminants in the water bodies. It also considers the life cycle assessment (LCA) of emerging (micro)-pollutants with suitable case studies from various industrial sources. Provides natural and ecofriendly solutions to deal with the problem of pollution Details underlying mechanisms of nanotechnology-associated microbes for the removal of emerging contaminants Describes numerous successful

field studies on the application of bio-nanotechnology for eco-restoration of contaminated sites Presents recent advances and challenges in bio-nanotechnology research and applications for sustainable development Provides authoritative contributions on the diverse aspects of bio-nanotechnology by world's leading experts

**Wastewater Management Through Aquaculture -**  
B. B. Jana 2018-02-05

This volume provides state-of-the-art information on soil-water interactions in wastewater systems, characterization of wastewater, modes of treatment, safety of wastewater use, water

conservation technologies involved in recycling of sewage in fish culture, biogeochemical cycling bacteria and nutrient dynamics, ecosystem resilient driven wastewater reclamation, bioremediation, aquaponics, ecological integrity, culture practices of fish farming, microbial food web phenomena, fish diseases, environmental economics of wastewater, environmental risk assessment, environmental law and regulations. Given its breadth of coverage, the book will be useful to researchers, teachers, students, administrators, planners, farmers and entrepreneurs interested in the profitable use of

wastewater in the wastes-into-wealth framework of for the benefit of humanity, and in achieving the targets for sanitation and safe wastewater reuse by 2030, specified in the United Nations' Sustainable Development Goals. Concerns are growing about the quality and quantity of fresh water, as severe crises are expected in the near future. Climate change has further worsened the strain on inland water resources, with its major impacts on ecosystems and human life. It is most urgent to protect and conserve inland water resources to maintain vital ecosystem functions. Despite the immense nutrient potentials of

wastewater in terms of phosphorus, nitrogen and potassium and increasingly high rates of urbanization-based wastewater generation, wastewater has traditionally been overlooked as a resource. This produces a threefold loss – environmental degradation, monetary losses from fertilizers, and water. As a result, municipal wastewater offers a win-win strategy for water conservation and environmental protection, while also turning waste into wealth in the form of fish biomass and allied cash crops. Wastewater-fed aquaculture refers to a unique, integrated biosystem in which the wastes generated by the

first system are used by the next subsystem. In wastewater-fed aquaculture biosystems, the organic wastes are recycled into fish biomass mediated through a complex microbial/autotrophic/heterotrophic food web mechanism.

**Handbook of Research on Natural Computing for Optimization Problems** - Mandal, Jyotsna Kumar  
2016-05-25

Nature-inspired computation is an interdisciplinary topic area that connects the natural sciences to computer science. Since natural computing is utilized in a variety of disciplines, it is imperative

to research its capabilities in solving optimization issues. The Handbook of Research on Natural Computing for Optimization Problems discusses nascent optimization procedures in nature-inspired computation and the innovative tools and techniques being utilized in the field. Highlighting empirical research and best practices concerning various optimization issues, this publication is a comprehensive reference for researchers, academicians, students, scientists, and technology developers interested in a multidisciplinary perspective on natural computational systems.

**Heavy Metals Adsorption** - Ajay Kumar Goswami  
2022-11-07

The book reviews the state-of-the art methods developed and used to remove heavy metals. It presents both industrial waste and mineral based adsorbent as well as bio waste materials making the book absolutely a source of low cost methods available till date.

Heavy Metal Toxicity in Public Health - John Kanayochukwu Nduka  
2020-06-24

It is often said that the “dosage” of any substance determines its remedy or poison effect. Heavy metal sources encompass sewage,



pesticides, fertilizers, environmental contamination, occupational exposure/contact through inhalation, ingestion, and skin. Before the advent of technology/the industrial revolution, communicable diseases ravaged the human race but this seems to have given way to non-communicable diseases such as cancers, renal failure, hormonal distortion enzymes, inhibition of fetal growth, and DNA damage causing negative health issues due to heavy metals. This book brings to the fore probably the most recent experimental research/review on heavy metal contamination, remediating techniques, cellular

tissue damage, and toxicological and antioxidant effects of heavy metals. It is hoped that its contents will make interesting reading for all.

**Heavy Metals** - Hosam El-Din M. Saleh

2018-06-27

Fundamental societal changes resulted from the necessity of people to get organized in mining, transporting, processing, and circulating the heavy metals and their follow-up products, which in consequence resulted in a differentiation of society into diversified professions and even societal strata. Heavy metals are highly demanded technological materials, which drive

welfare and progress of the human society, and often play essential metabolic roles. However, their eminent toxicity challenges the field of chemistry, physics, engineering, cleaner production, electronics, metabolomics, botany, biotechnology, and microbiology in an interdisciplinary and cross-sectorial manner. Today, all these scientific disciplines are called to dedicate their efforts in a synergistic way to avoid exposure of heavy metals into the eco- and biosphere, to reliably monitor and quantify heavy metal contamination, and to foster the development of novel strategies to remediate

damage caused by heavy metals.

*Nano-biosorbents for Decontamination of Water, Air, and Soil Pollution* - Adil Denizli 2022-02-04

Nano-biosorbents for Decontamination of Water, Air, and Soil Pollution explores the properties of nanobiosorbents and their applications in the removal of contaminants from the natural environment. The use of nanobiosorbents for environmental protection is a combinational approach that incorporates nanotechnology with naturally occurring biopolymers that form an amalgamation of nano-biopolymers used as sorbent materials in the removal of a variety of

contaminants from wastewaters. This is an important reference source for materials scientists, bioscientists and environmental scientists who are looking to understand how nanobiosorbents are being used for a range of environmental applications. Highlights the environmental applications of chitosan-based, cellulose-based and polymer-based nanoscale biosorbents Explains the advantages of using different types of nanobiosorbents for soil, water and air purification applications Assesses the challenges associated with manufacturing nanobiosorbents cheaply and on an industrial

scale

Advanced Sorption Process Applications - Serpil Edeballi 2019-02-20

At the beginning of the twenty-firstst century, separation processes presented a comprehensive application of the major operations performed by various industries, such as chemical, food, environmental, and biotechnology. Sorption, one of the preferred separation processes because of its effectiveness at different interfaces, has caught the attention of many scientists. This book is aimed at gaining a general knowledge of sorption and a number of extremely important applications,

as well as recognizing its functions and paramount importance in chemical and biochemical plants, including environmental treatment. Moreover, progress in the phenomenon is highlighted in this book. To help provide instruction in the important sorption processes, we have chosen authors who have extensive industrial and academic experience in closing the gap between theory and practice. Crucial progress in the theoretical information section of sorption has been achieved, mainly through the development of new techniques that examine the usage of various sorbents, including

nanomaterials for the removal of various pollutants. We have subdivided the book into several sections, one of which is focused on applications of the sorption process, which presents real results of the recent studies and gives a source of up-to-date literature. The relationship between the sorption process and isotherm and kinetics modeling is analyzed in another chapter. This book will be a reference book for those who are interested in sorption techniques from various industries.

**Heavy Metal Adsorption** - Mohammad Amer  
2010-07

Pollution in our planet by heavy metals is an important environmental problem threatening the health of human populations and natural ecosystems. Agricultural and industrial pollution release large amounts of heavy metals into the atmosphere, surface water, soil, and plants. The aim of this research work is to determine the potential of application of sodium polyphosphate modified kaolinite clay as an adsorbent for the removal of lead (II), zinc (II) and cadmium (II) ions from aqueous solutions. The adsorbent dosage, pH, temperature and contact time were investigated. The adsorption isotherms of all three

metal ions followed well Langmuir equation.

Modified sodium polyphosphate-kaolinite clay was found to remove heavy metal ions efficiently from aqueous solutions with selectivity in the order of  $Pb^{2+} > Zn^{2+} > Cd^{2+}$ . The maximum heavy metal ions adsorbed by modified. The results of this study showed that the sodium polyphosphate-kaolinite clay powder can be efficiently used as a low-cost adsorbent for the removal of divalent lead, zinc and cadmium from aqueous solution.

*Adsorption: Fundamental Processes and*

*Applications* - Mehrorang Ghaedi 2021-03-19

Adsorption: Fundamental Processes and

Applications, Volume 33 in the Interface Science and Technology Series, discusses the great technological importance of adsorption and describes how adsorbents are used on a large scale as desiccants, catalysts, catalyst supports, in the separation of gases, the purification of liquids, pollution control, and in respiratory protection. Finally, it explores how adsorption phenomena play a vital role in many solid-state reactions and biological mechanisms, as well as stressing the importance of the widespread use of adsorption techniques in the characterization of surface properties and the texture of fine

powders. Covers the fundamental aspects of adsorption process engineering Reviews the environmental impact of key aquatic pollutants Discusses and analyzes the importance of adsorption processes for water treatment Highlights opportunity areas for adsorption process intensification Edited by a world-leading researcher in interface science  
Issues in Global Environment: Pollution and Waste Management: 2011 Edition - 2012-01-09  
Issues in Global Environment: Pollution and Waste Management: 2011 Edition is a ScholarlyEditions<sup>™</sup> eBook that delivers timely,

authoritative, and comprehensive information about Global Environment–Pollution and Waste Management. The editors have built Issues in Global Environment: Pollution and Waste Management: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Global Environment–Pollution and Waste Management in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Global Environment: Pollution and Waste Management: 2011 Edition has been

produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>. [Green Adsorbents to Remove Metals, Dyes and Boron from Polluted Water - Inamuddin](#)  
2020-08-31

This book reviews adsorption techniques to clean wastewater, with focus on pollution by dyes and heavy metals. Advanced adsorbents include carbon nanomaterials, biomass, cellulose, polymers, clay, composites and chelating materials.

Acid-treated dried lemna minor as an adsorbent for the removal of copper and lead from an aqueous solution - Yalembrhan Debebe  
2018-06-28

Master's Thesis from the year 2018 in the subject Engineering - Chemical Engineering, grade: 3.96/4.00, Addis Ababa University (Addis Ababa

Institute of Technology), course: Environmental Engineering, language: English, abstract: The general objective of the thesis was investigation of acid treated lemna minor as an adsorbent for removal of Cu (II) and Pb (II) from aqueous solution. Are there sustainable and available bio adsorbents such as lemna minor (duckweed) that can be used for the removal of heavy metals? Can the emerging bio adsorbents actually replace activated carbon which is very expensive adsorbent common today? What is the optimum Operating parameters for biosorption of metal ions under batch studies Heavy metals are



chemical elements with a specific gravity that is at least 5 times the specific gravity of water and are toxic or poisonous even at low concentrations. With increasing generation of heavy metals from industrial activities, many aquatic environments face metal concentrations that exceed water quality criteria designed to protect the environment. They are highly dispersed in a wide variety of economically important minerals. They are released to the environment during mineral extraction process. Therefore, mining activities are the first anthropogenic source of heavy metals. These heavy metals have potential health

risks associated with metal uptake via food chain, dermal absorption or inhaling. High levels of exposure to heavy metals have been proved to cause cancer, organ damage, joint diseases, and in extreme cases, death. Several processes exist for removing dissolved heavy metals, including, ion exchange, precipitation, ultrafiltration, reverse osmosis, electro dialysis and activated carbon. Many of these approaches demand high energy, high cost, advanced operational requirements, result in large amounts of sludge requiring treatment or difficult to treat and be disposed of in an environmentally sound manner, or do not

enable recovery of metals or material.

### **Characterization of Bioactive Components in**

**Edible Algae - Leonel Pereira 2020-04-15**

Algae have been used since ancient times as food for humans, animal feed, agricultural fertilizer, and as a source of substances for therapeutic use. Currently, seaweed represents a vast source of raw materials used in the pharmaceutical, food, traditional medicine, and cosmetics industries. They are nutritionally valuable, both fresh and dried, or as ingredients in a wide variety of pre-made foods. In particular, seaweed contains significant amounts of protein,

lipids, minerals, and vitamins. Information is limited on the role of algae and their metabolites in therapy. Only a few taxa have been studied for use in medicine. Many traditional cultures report the healing powers of selected algae in tropical and subtropical marine forms. This is especially true in the maritime areas of Asia, where the sea plays a significant role in daily activities. However, currently, only a few genera and species of algae are involved in aspects of medicine and therapy. The beneficial uses of seaweed or seaweed products include those that can mimic specific manifestations of human disease, production of

antibiotic compounds, or improved human nutrition.

**Advances in Bioremediation and Phytoremediation for Sustainable Soil Management - Junaid Ahmad Malik 2022**

This edited volume deals with the understanding of the issues concerned with the pollution caused by toxic elements and heavy metals and their impacts on the different agro-ecosystems as well as the techniques involved in sustainable remediation and amelioration of polluted soils. Furthermore, the book is a detailed comprehensive account for the treatment

technologies from unsustainable to sustainable which includes chapters prepared by professionals with expertise in environmental microbiology, biotechnology, bioremediation, and environmental engineering. It focuses on the characterization, reclamation, bioremediation, and phytoremediation of polluted soils. The research presented also highlights some of the significantly important plant and microbial species involved in remediation, the physiology, biochemistry, and the mechanisms of remediation by various plants and microbes, and suggestions for future improvement of bioremediation technology. It offers insights

into the current focus and recent advances in bioremediation and green technology applications for sustainable soil management.

*Reviews of Environmental Contamination and Toxicology Volume 232* - David M. Whitacre  
2014-07-01

Reviews of Environmental Contamination and Toxicology attempts to provide concise, critical reviews of timely advances, philosophy and significant areas of accomplished or needed endeavor in the total field of xenobiotics, in any segment of the environment, as well as toxicological implications.

*Engineered Nanoparticles and the Environment* - Baoshan Xing 2016-08-29

Details the source, release, exposure, adsorption, aggregation, bioavailability, transport, transformation, and modeling of engineered nanoparticles found in many common products and applications Covers synthesis, environmental application, detection, and characterization of engineered nanoparticles Details the toxicity and risk assessment of engineered nanoparticles Includes topics on the transport, transformation, and modeling of engineered nanoparticles Presents the latest developments and knowledge

of engineered nanoparticles Written by world leading experts from prestigious universities and companies

**Wastewater Treatment** - D. G. Rao 2012-07-05

Due to the heterogeneous nature of water streams from diverse domestic and industrial sources, and the equally diverse nature of pollutants that can be physical, chemical, and biological in nature, their treatment methods also must be varied in nature. Responding to this complex situation, *Wastewater Treatment: Advanced Processes and Technologies* p  
*Functional Hybrid Nanomaterials for*

*Environmental Remediation* - Ahmad Fauzi Ismail  
2021-10-01

Functional and structural nanomaterials are emerging materials that display interesting physical and chemical properties because of their size and surface area to volume ratio.

Applications for these materials include uses in removing pollutants from the environment.

Looking at the current state-of-the-art as well as future trends in the use of nanomaterials for tackling environmental issues this book covers everything from the synthesis and characterisation of these materials to their use in

the removal of specific contaminants. Functional Hybrid Nanomaterials for Environmental Remediation is a useful resource both for nanomaterial scientists interested in the real world

application of hybrid nanomaterials and for environmental chemists and environmental engineers interested in novel materials for environmental remediation.