

Activated Carbon Classifications Properties And Applications Chemical Engineering Methods And Technology

This book introduces the use of bio-waste as a raw material for the preparation of activated carbon (AC) for dyes removal. Activated carbon was derived from assorted materials that have potential to function as a good adsorbent, especially for dyes removal in wastewater treatment. This book was written as a case study to help readers understand the function of AC in each system and approach. This book includes applications of AC derived from corncob; palm tree empty fruit bunch; seashell; eggshell; spent coffee ground; rubber wood saw dust; kenaf fiber and coconut frond in dyes removal and wastewater treatment. The efficiency of activated carbon prepared from various bio-wastes is evaluated by calculating the removal rate of dyes in wastewater. This unique book features eight chapters pertinent to the current situation, as loads of dye effluent are being discharged into the environment. The characterization of the produced AC is analysed using various instrumentations such as scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIRS) and X-ray diffraction (XRD). The book will attract Eastern and Western researchers and scholars at all levels of degree qualification, industrial practitioners and entrepreneurs in the field of bio-waste.

Emerging and Nanomaterial Contaminants in Wastewater: Advanced Treatment Technologies describes the state-of-the-art of remediation technologies, such as those involving nanotechnology, filtration devices (e.g. membranes), strategies involving adsorption and precipitation processes, development of new sorbents, nanosorbents, biosorbents, green technology, bio-electrokinetics, degradation of pollutants, advanced oxidative process, oxidative electrochemical and photocatalytic processes, catalytic degradation, and emerging hybrid technologies, such as photocatalyst membrane photoreactors using TiO₂. Scientists and researchers in academia and industry will benefit from this comprehensive resource on the fundamental science behind the mechanisms at which wastewater sources can be purified from emerging contaminants. Provides a fundamental understanding of emerging contaminants to help readers select appropriate remediation technologies Discusses, in detail, new and advanced green technologies that remove emerging contaminants from wastewater Shows how to ensure water quality and save public health by protecting water resources from contaminants

Following in the lineage of Adsorption by Carbons (Bottani & Tascon, 2008), this work explores current research within contemporary novel carbon adsorbents. Both basic and applied aspects are discussed for this important class of materials. The first section of the book introduces physical adsorption and carbonaceous materials, and is followed by a section concerning the fundamentals of adsorption by carbons. This leads to development of a series of theoretical concepts that serve as an introduction to the following section in which adsorption is mainly envisaged as a tool to characterize the porous texture and surface chemistry of carbons. Particular attention is paid to novel nanocarbons, and the electrochemistry of adsorption by carbons is also addressed.

Finally, several important technological applications of gas and liquid adsorption by carbons in areas such as environmental protection and energy storage constitute the last section of the book. Encompasses fundamental science of adsorption by carbons, in one location, supporting current R&D without extensive literature review Describes adsorption as it is currently applied to major novel types of carbon materials, including carbon gels, carbide-derived carbons, zeolite-templated carbons, hydrothermal carbons, carbon nanohorns and graphene Specific discussion of fuel storage, environmental remediation and biomedical applications, of contemporary interest to many surface chemists and applications-focused researchers Biochar is the carbon-rich product when biomass (such as wood, manure or crop residues) is heated in a closed container with little or no available air. It can be used to improve agriculture and the environment in several ways, and its stability in soil and superior nutrient-retention properties make it an ideal soil amendment to increase crop yields. In addition to this, biochar sequestration, in combination with sustainable biomass production, can be carbon-negative and therefore used to actively remove carbon dioxide from the atmosphere, with major implications for mitigation of climate change. Biochar production can also be combined with bioenergy production through the use of the gases that are given off in the pyrolysis process. This book is the first to synthesize the expanding research literature on this topic. The book's interdisciplinary approach, which covers engineering, environmental sciences, agricultural sciences, economics and policy, is a vital tool at this stage of biochar technology development. This comprehensive overview of current knowledge will be of interest to advanced students, researchers and professionals in a wide range of disciplines.

Electrochemical Capacitors: Fundamentals to Applications

Current Trends in Chromatographic Research Technology and Techniques

Nanomaterials in Chromatography

Biochar for Environmental Management

Oil in the Sea III

Activated Carbon Surfaces in Environmental Remediation

Activated carbons produced in the German Democratic Republic are tested with regard to their capability to adsorb radioiodine and radioactive methyl iodide. The physico-chemical properties of the available types of activated carbon are summarized. Activated carbons with most favorable properties are selected, considering different parameters. It is attempted to improve the adsorptive properties of the selected carbons by preparing them with $\text{Cu}(\text{NO}_3)_2$, AgNO_3 or KI . Furthermore, the influence of water vapor, temperature and carbon dioxide on the effectiveness of the carbon was tested. Methods and results of the tests are presented.

This book reviews health hazards associated with wastewater use and water pollutants. Chapters present applications of green materials made of agricultural waste, activated carbon and magnetic materials for wastewater treatment. The removal of toxic metals using algal biomass and the removal of toxic dyes using chitosan composite materials are also discussed. The book includes reviews on the removal of phenols, pesticides, and on the use of ionic liquid-modified activated carbon for the treatment of textile wastewater.

Carbon-Based Material for Environmental Protection and Remediation presents an overview of carbon-based technologies and processes, and examines their usefulness and efficiency for environmental preservation and remediation. Chapters cover topics ranging from pollutants removal to new processes in materials science. Written for interested readers with strong scientific and technological backgrounds, this book will appeal to scientific advisors at private companies, academics, and graduate students.

Metal Oxide–Carbon Hybrid Materials: Synthesis, Properties and Applications reviews the advances in the fabrication and application of metal oxide–carbon-based nanocomposite materials. Their unique properties make them ideal materials for gas-sensing, photonics, catalysis, opto-electronic, and energy-storage applications. In the first section, the historical background to the hybrid materials based on metal oxide–carbon and the hybridized metal oxide composites is provided. It also highlights several popular methods for the preparation of metal oxide–carbon composites through solid-state or solution-phase reactions, and extensively discusses the materials' properties. Fossil fuels and renewable energy sources cannot meet the ever-increasing energy demands of an industrialized and technology-driven global society. Therefore, the role of metal oxide–carbon composites in energy generation, hydrogen production, and storage devices, such as rechargeable batteries and supercapacitors, is of extreme importance. These problems are discussed in the second section of the book. Rapid industrialization has resulted in serious environmental issues which in turn have caused serious health problems that require the immediate attention of researchers. In the third section, the use of metal oxide–carbon composites in water purification, photodegradation of industrial contaminants, and biomedical applications that can help to clean the

environment and provide better healthcare solutions is described. The final section is devoted to the consideration of problems associated with the development of sensors for various applications. Numerous studies performed in this area have shown that the use of composites can significantly improve the operating parameters of such devices. Metal Oxide–Carbon Hybrid Materials: Synthesis, Properties and Applications presents a comprehensive review of the science related to metal oxide–carbon composites and how researchers are utilizing these materials to provide solutions to a large array of problems. Reviews the fundamental properties and fabrication methods of metal-oxide–carbon composites Discusses applications in energy, including energy generation, hydrogen production and storage, rechargeable batteries, and supercapacitors Includes current and emerging applications in environmental remediation and sensing

Vanadium Catalysis

Properties, Synthesis, Characterization, and Applications

Soil Remediation and Plants

Characteristics

Activated Carbon for Water and Wastewater Treatment

Syntheses and Applications

Activated Carbon Fiber and Textiles provides systematic coverage of the fundamentals, properties, and current and emerging applications of carbon fiber textiles in a single volume, providing industry professionals and academics working in the field with a broader understanding of these materials. Part I discusses carbon fiber principles and production, including precursors and pyrolysis, carbon fiber spinning, and carbonization and activation. Part II provides more detailed analysis of the key properties of carbon fiber textiles, including their thermal, acoustic, electrical, adsorption, and mechanical behaviors. The final section covers applications of carbon fiber such as filtration, energy protection, and energy and gas storage. Features input from an editor who is an expert in his field: Professor Jonathan Chen has a wealth of experience in the area of activated carbon fiber materials Provides systematic and comprehensive coverage of the key aspects of activated carbon fiber textiles, from their principles, processing, and properties to their industrial applications Offers up-to-date coverage of new technology for the fiber and textiles industries Covers applications such as filtration, energy protection, and energy and gas storage

Petroleum refining and process engineering is constantly changing. No new refineries are being built, but companies all over the world are still expanding or re-purposing huge percentages of their refineries every year, year after year. Rather than building entirely new plants, companies are spending billions of dollars in the research and development of new processes that can save

time and money by being more efficient and environmentally safer. Biodesulfurization is one of those processes, and nowhere else it is covered more thoroughly or with more up-to-date research of the new advances than in this new volume from Wiley-Scrivener. Crude oil consists of hydrocarbons, along with other minerals and trace elements. Sulfur is the most abundant element after carbon and hydrogen, then comes after it nitrogen, and they usually concentrated in the higher boiling fractions of the crude oil. The presence of sulfur compounds causes the corrosion of refining facilities and catalysts poisoning. Moreover, the presence of nitrogen-compounds directly impacts the refining processes via; poisoning the cracking catalysts and inhibiting the hydrodesulfurization catalysts. In addition, both have bad impacts on the environment, throughout the sulfur and nitrogen oxide emissions. Removing this sulfur and nitrogen from the refining process protects equipment and the environment and creates a more efficient and cost-effective process. Besides the obvious benefits to biodesulfurization, there are new regulations in place within the industry with which companies will, over the next decade or longer, spend literally tens, if not hundreds, of billions of dollars to comply. Whether for the veteran engineer needing to update his or her library, the beginning engineer just learning about biodesulfurization, or even the student in a chemical engineering class, this outstanding new volume is a must-have. Especially it covers also the bioupgrading of crude oil and its fractions, biodenitrogenation technology and application of nanotechnology on both bio-desulfurization and denitrogenation technologies.

The first comprehensive textbook on the timely and rapidly developing topic of inorganic porous materials This is the first textbook to completely cover a broad range of inorganic porous materials. It introduces the reader to the development of functional porous inorganic materials, from the synthetic zeolites in the 50's, to today's hybrid materials such as metal-organic frameworks (MOFs), covalent organic frameworks (COFs) and related networks. It also provides the necessary background to understand how porous materials are organized, characterized, and applied in adsorption, catalysis, and many other domains. Additionally, the book explains characterization and application from the materials scientist viewpoint, giving the reader a practical approach on the characterization and application of the respective materials. Introduction to Inorganic Porous Materials begins by describing the basic concepts of porosity and the different types of pores, surfaces, and amorphous versus crystalline materials, before introducing readers to nature's porous materials. It then goes on to cover everything from adsorption and catalysis to amorphous materials such as silica to inorganic carbons and Periodic Mesoporous Organosilicas (PMOs). It discusses the synthesis and applications of MOFs and the broad family of COFs. It concludes with a look at future prospects and emerging trends in the field. The only complete book of its kind to cover the wide variety of inorganic and hybrid porous materials A comprehensive reference and outstanding tool for any course on inorganic porous materials, heterogeneous catalysis, and adsorption Gives students and investigators the opportunity to learn about porous materials, how to characterize them, and understand how they can be applied in different fields Introduction to Inorganic Porous Materials is an excellent book for students and professionals of inorganic chemistry and materials science with an interest in porous materials, functional inorganic materials, heterogeneous catalysis and adsorption, and solid state characterization techniques.

This book delivers a comprehensive overview of the characteristics of several types of materials that are widely used in the current era of supercapacitors; namely, architected carbon materials, transition metal oxides and conducting polymers. It provides readers with a complete introduction to the fundamentals of supercapacitors, including the development of new electrolytes and electrodes, while highlighting the advantages, challenges, applications and future of these materials. This book is part of the Handbook of Nanocomposite Supercapacitor Materials. Supercapacitors have emerged as promising devices for electrochemical energy storage, playing an important role in energy harvesting for meeting the current demands of increasing global energy consumption. The handbook covers the materials science and engineering of nanocomposite supercapacitors, ranging from their general characteristics and performance to materials selection, design and construction. Covering both fundamentals and recent developments, this handbook serves a readership encompassing students, professionals and researchers throughout academia and industry, particularly in the fields of materials chemistry, electrochemistry, and energy storage and conversion. It is ideal as a reference work and primary resource for any introductory senior-level undergraduate or beginning graduate course covering supercapacitors.

Advanced Treatment Technologies

Adsorption and Its Applications in Industry and Environmental Protection: Applications in environmental protection

Carbon-Based Material for Environmental Protection and Remediation

Introduction to Porous Materials

Nanostructures for Oral Medicine

Integrated Processing Technologies for Food and Agricultural By-Products

This book is based on the lectures and contributions of the NATO Advanced Study Institute on "Nanoscience and Nanotechnology in Security and Protection Against CBRN Threats" held in Sozopol, Bulgaria, September 2019. It gives a broad overview on this topic as it combines articles addressing the preparation and characterization of different nanoscaled materials (metals, oxides, glasses, polymers, carbon-based, etc.) in the form of nanowires, nanoparticles, nanocomposites, nanodots, thin films, etc. and contributions on their applications in diverse security and safety related fields. In addition, it presents an interdisciplinary approach drawing on the Nanoscience and Nanotechnology know-how of authors from Physics, Chemistry, Engineering, Materials Science and Biology. A further plus-point of the book, which represents the knowledge of experts from over 20 countries, is the combination of longer papers introducing the background on a certain topic, and brief contributions highlighting specific applications in different security areas.

APPLIED WATER SCIENCE VOLUME 2 The second volume in a new two-volume set on applied water science, this book provides understanding, occurrence, identification, toxic effects and control of water pollutants in an aquatic environment using green chemistry protocols. The high rate of industrialization around the world has led to an increase in the rate of anthropogenic activities which involve the release of different types of contaminants into the aquatic environment. This generates high environmental risks, which could affect

health and socio-economic activities if not treated properly. There is no doubt that the rapid progress in improving water quality and management has been motivated by the latest developments in green chemistry. Over the past decade, sources of water pollutants and the conventional methods used for the treatment of industrial wastewater treatment have flourished. Water quality and its adequate availability have been a matter of concern worldwide particularly in developing countries. According to a World Health Organization (WHO) report, more than 80% of diseases are due to the consumption of contaminated water. Heavy metals are highly toxic and are a potential threat to water, soil, and air. Their consumption in higher concentrations gives hazardous outcomes. Water quality is usually measured in terms of chemical, physical, biological, and radiological standards. The discharge of effluent by industries contains heavy metals, hazardous chemicals, and a high amount of organic and inorganic impurities that can contaminate the water environment, and hence, human health. Therefore, it is our primary responsibility to maintain the water quality in our respective countries. This book provides understanding, occurrence, identification, toxic effects and control of water pollutants in an aquatic environment using green chemistry protocols. It focuses on water remediation properties and processes including industry-scale water remediation technologies. This book covers recent literature on remediation technologies in preventing water contamination and its treatment. Chapters in this book discuss remediation of emerging pollutants using nanomaterials, polymers, advanced oxidation processes, membranes, and microalgae bioremediation, etc. It also includes photochemical, electrochemical, piezoacoustic, and ultrasound techniques. It is a unique reference guide for graduate students, faculties, researchers and industrialists working in the area of water science, environmental science, analytical chemistry, and chemical engineering. This outstanding new volume: Provides an in-depth overview of remediation technologies in water science Is written by leading experts in the field Contains excellent, well-drafted chapters for beginners, graduate students, veteran engineers, and other experts alike Discusses current challenges and future perspectives in the field Audience: This book is an invaluable guide to engineers, students, professors, scientists and R&D industrial specialists working in the fields of environmental science, geoscience, water science, physics and chemistry.

Since the early 1970s, experts have recognized that petroleum pollutants were being discharged in marine waters worldwide, from oil spills, vessel operations, and land-based sources. Public attention to oil spills has forced improvements. Still, a considerable amount of oil is discharged yearly into sensitive coastal environments. Oil in the Sea provides the best available estimate of oil pollutant discharge into marine waters, including an evaluation of the methods for assessing petroleum load and a discussion about the concerns these loads represent. Featuring close-up looks at the Exxon Valdez spill and other notable events, the book identifies important research questions and makes recommendations for better analysis of "and more effective measures against" pollutant discharge. The book discusses: Input "where the discharges come from, including the role of two-stroke engines used on recreational craft. Behavior or fate "how oil is affected by processes such as evaporation as it moves through the marine environment. Effects "what we know about the effects of petroleum hydrocarbons on marine organisms and ecosystems. Providing a needed update on a problem of international importance, this

book will be of interest to energy policy makers, industry officials and managers, engineers and researchers, and advocates for the marine environment.

Activated Carbon Surfaces in Environmental Remediation provides a comprehensive summary of the environmental applications of activated carbons. In order to understand the removal of contaminants and pollutants on activated carbons, the theoretical bases of adsorption phenomena are discussed. The effects of pore structure and surface chemistry are also addressed from both science and engineering perspectives. Each chapter provides examples of real applications with an emphasis on the role of the carbon surface in adsorption or reactive adsorption. The practical aspects addressed in this book cover the broad spectrum of applications from air and water cleaning and energy storage to warfare gas removal and biomedical applications. This book can serve as a handbook or reference book for graduate students, researchers and practitioners with an interest in filtration, water treatment, adsorbents and air cleaning, in addition to environmental policies and regulations. Addresses fundamental carbon science and how it relates to applications of carbon surfaces Describes the broad spectrum of activated carbon applications in environmental remediation Serves as a handbook or reference book for graduate students, researchers and practitioners in the field

Science and Technology

Laboratory Studies on the Adsorption of Radioiodine and Iodine Compounds on Activated Carbon

Metal Oxide-Carbon Hybrid Materials

Biodesulfurization in Petroleum Refining

Prospects and Challenges

Applied Water Science, Volume 2

Carbon materials form pores ranging in size and morphology, from micropores of less than 1nm, to macropores of more than 50nm, and from channel-like spaces with homogenous diameters in carbon nanotubes, to round spaces in various fullerene cages, including irregularly-shaped pores in polycrystalline carbon materials. The large quantity and rapid rate of absorption of various molecules made possible by these attributes of carbon materials are now used in the storage of foreign atoms and ions for energy storage, conversion and adsorption, and for environmental remediation. Porous Carbons: Syntheses and Applications focuses on the fabrication and application of porous carbons. It considers fabrication at three scales: micropores, mesopores, and macropores. Carbon foams, sponges, and 3D-structured carbons are detailed. The title presents applications in four key areas: energy storage, energy conversion, energy adsorption, including batteries, supercapacitors, and fuel cells and environmental remediation, emphasizing the importance of pore structures at the three scales, and the diffusion and storage of various ions and molecules. The book presents a short history of each technique and material, and assesses advantages and disadvantages. This focused book provides

researchers with a comprehensive understanding of both pioneering and current synthesis techniques for porous carbons, and their modern applications. Presents modern porous carbon synthesis techniques and modern applications of porous carbons Presents current research on porous carbons in energy storage, conversion and adsorption, and in environmental remediation Provides a history and assessment of both pioneering and current cutting-edge synthesis techniques and materials Covers a significant range of precursor materials, preparation techniques, and characteristics Considers the future development of porous carbons and their various potential applications

Volume II contains chapters written by authoritative specialists on the broad spectrum of environmental topics in order to find a way for intense anthropogenic activities to coexist with the natural environment. The book highlights a wide spectrum of themes referring to the environmental analysis and control and molecular modelling of both sorbents and adsorption environmentally-friendly processes. Also covered are new trends in applications of colloidal science for protecting soil systems, purification and production of drinking water, water and groundwater treatment, new environmental adsorbents for removal of pollutants from wastewaters and sewages, selective sorbents for hot combustion gases, some corrosion aspects and ecological adsorption of heating and cooling pumps. The volume concludes with a comprehensive bibliography, which includes the period 1967-1997, on adsorptive separations, environmental applications, PSA, parametric pumping, ion-exchange and chromatography. All articles give both the scientific background of the phenomena discussed and indicate practical aspects.

High surface area, a microporous structure, and a high degree of surface reactivity make activated carbons versatile adsorbents, particularly effective in the adsorption of organic and inorganic pollutants from aqueous solutions. Activated Carbon Adsorption introduces the parameters and mechanisms involved in the activated carbon adsorption

The soil is being contaminated continuously by a large number of pollutants. Among them, heavy metals are an exclusive group of toxicants because they are stable and difficult to disseminate into non-toxic forms. The ever-increasing concentrations of such pollutants in the soil are considered serious threats toward everyone's health and the environment. Many techniques are used to clean, eliminate, obliterate or sequester these hazardous pollutants from the soil. However, these techniques can be costly, labor intensive, and often disquieting. Phytoremediation is a simple, cost effective, environmental friendly and fast-emerging new technology for eliminating toxic heavy metals and other related soil pollutants. Soil Remediation and Plants provides a common platform for biologists, agricultural engineers, environmental scientists, and chemists, working with a common aim of finding sustainable solutions to various environmental issues. The book provides an overview of ecosystem approaches and phytotechnologies and their cumulative significance in relation to solving various environmental problems. Identifies the molecular mechanisms through which plants are able to

remediate pollutants from the soil Examines the challenges and possibilities towards the various phytoremediation candidates Includes the latest research and ongoing progress in phytoremediation

Inputs, Fates, and Effects

Wastewater and Water Quality

Biochemical Engineering and Biotechnology

Activated Carbon Fiber and Textiles

Beneficiation, Utilization, Transport Phenomena and Prospective

Organic Pollutants

Feeding our globally expanding population is one of the most critical challenges of our time and improving food and agricultural production efficiencies is a key factor in solving this problem. Currently, one-third of food produced for humans is wasted, and for every pound of food produced, roughly an equal amount of nonfood by-product is also generated, creating a significant environmental impact. In Integrated Processing Technologies for Food and Agricultural By-Products experts from around the world present latest developments, recognizing that while some by-products have found use as animal feed or are combusted for energy, new technologies which integrate conversion of production and processing by-products into higher-value food or nonfood products, nutraceuticals, chemicals, and energy resources will be a critical part of the transition to a more sustainable food system. Organized by agricultural crop, and focusing on those crops with maximum economic impact, each chapter describes technologies for value-added processing of by-products which can be integrated into current food production systems. Integrated Processing Technologies for Food and Agricultural By-Products is a valuable resource for industry professionals, academics, and policy-makers alike. Provides production-through-processing coverage of key agricultural crops for a thorough understanding and translational inspiration Describes and discusses major by-product sources, including physical and chemical biomass characterizations and associated variability in detail Highlights conversions accomplished through physical, biological, chemical, or thermal methods and demonstrates examples of those technologies

This book presents topical research in the study of activated carbon, which includes topics such as the surface chemistry of activated carbons and as catalyst supports; thermal processing of activated carbons from agro-industrial wastes; activated carbon as a metal oxide support; Virtual Porous Carbon (VPC) models and combining ozone and activated carbon for water and wastewater treatment.

Recent years have seen an expansion in speciality uses of activated carbons including medicine, filtration, and the purification of liquids and gaseous media. Much of current research and information surrounding the nature and use of activated carbon is scattered throughout various literature, which has created the need for an up-to-date comprehensive and integrated review reference. In this book, special attention is paid to porosities in all forms of carbon, and to the modern-day materials which use activated carbons - including fibres, clothes, felts and monoliths. In addition, the use of activated carbon in its granular and powder forms to facilitate usage in liquid and gaseous media is explored. Activated Carbon will make essential reading for Material Scientists, Chemists and Engineers in academia and industry. Characterization of porosity The surface chemistry of the carbons Methods of activation and mechanisms of adsorption Computer modelling of structure and porosity within carbons Modern instrumental analytical methods

Nanostructures for Oral Medicine presents an up-to-date examination of the applications and effects of nanostructured materials in oral medicine, with each chapter addressing recent developments, specific applications, and uses of nanostructures in the oral administration of therapeutic agents in dentistry. The book also includes coverage of the biocompatibility of nanobiomaterials and their remarkable potential in improving human health and in reducing environmental pollution. Emerging advances, such as Dr. Franklin Tay's concept of a new nanotechnology process of growing extremely small, mineral-rich crystals and guiding them into the demineralized gaps between collagen fibers to prevent the aging and degradation of resin-dentin bonding is also discussed. This work will be of great value to those who work in oral medicine, providing them with a resource to gain a greater understanding of how nanotechnology can help them create more efficient, cost-effective products. In addition, it will be of great interest to those who work in materials science who wish to gain a greater appreciation of how nanostructured materials are applied in this field. Outlines the major uses of nanostructured materials for oral medicine, including the properties of each material discussed and how it should best be applied Explores how nanostructured materials enable the creation of more effective drug delivery systems in oral medicine Discusses how novel uses of nanostructured materials may be applied in oral medicine to create more effective devices

Handbook of Nanocomposite Supercapacitor Materials I

Emerging and Nanomaterial Contaminants in Wastewater

Activated Carbon

Bio-Waste As Potential Activated Carbon in Remediating Dye Solution

Waste Biomass Management - A Holistic Approach

Advances and Applications

This book describes the different methodologies for producing and synthesizing silver nanoparticles (AgNPs) of various shapes and sizes. It also provides an in-depth understanding of the new methods for characterizing and modifying the properties of AgNPs as well as their properties and applications in various fields. This book is a useful resource for a wide range of readers, including scientists, engineers, doctoral and postdoctoral fellows, and scientific professionals working in specialized fields such as medicine, nanotechnology, spectroscopy, analytical chemistry diagnostics, and plasmonics.

Water is accepted as the most important source of life. It is assumed that life began in water and spread from there to the whole world. But water has been polluted anthropogenically since the beginning of the industrial revolution in the late 19th century. At the end of the 20th century, most water sources cannot be used for aquaculture, irrigation, and human use. Therefore, for sustainable development, we have to protect our water sources on Earth, because it's the only planet we have!

Recent important discoveries and developments in nanotechnology have had a remarkable and ever-increasing impact on many industries, especially materials science, pharmaceuticals, and biotechnology. Nanocarriers have been investigated for a wide variety of different medical applications. Some examples of these nanocarriers include polymersomes, liposomes, micelles and carbon-based nanomaterials. Within this book, the authors describe different features of carbon nanotubes (CNTs), survey the properties of both the multi-walled and single-walled varieties, and cover their applications in drug and gene delivery. In addition, the book explains the structure and properties of CNTs prepared by different method, and discussed their isolation and purification. The future of CNTs in the field of biomedical science will depend on minimizing their adverse effects by careful study of their structure and properties. Chemical separations are of central importance in many areas of environmental science, whether it is the clean up of polluted water or soil, the treatment of discharge streams from chemical processes, or modification of a specific process to decrease its environmental impact. This book is an introduction to

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chemical separations, focusing on their use in environmental applications. The authors first discuss the general aspects of separation technology as a unit operation. They also describe how property differences are used to generate separations, the use of separating agents, and the selection criteria for particular separation techniques. The general approach for each technology is to present the chemical and/or physical basis for the process and explain how to evaluate it for design and analysis. The book contains many worked examples and homework problems. It is an ideal textbook for undergraduate and graduate students taking courses on environmental separations or environmental engineering.

Synthesis, Properties and Uses

Process, Technologies and Applications

Clean Coal Technologies

Integration of Adsorption and Biological Treatment

Remediation Technologies

Classifications, Properties and Applications

Agricultural and food industry waste materials have been an important feedstock for activated carbon production for many years. In the development of cleaner energy production and utilization processes, new advanced carbon materials with enhanced properties have been studied. Techniques to tailor pore structure and surface chemistry can produce better carbon materials for energy storage, electrode materials, and selective adsorption of pollutants. This book surveys available waste materials and processes for carbon production and then reviews the recent developments in the use of carbon materials for energy storage, as catalyst supports, and for environmental applications.

Nanomaterials in Chromatography: Current Trends in Chromatographic Research Technology and Techniques provides recent advancements in the wide variety of chromatographic techniques applied to nanotechnology. As nanomaterials' unique properties can improve detection sensitivity and miniaturize the devices used in analytical procedures, they can substantially affect the evaluation and analysis ability of scientists and researchers and foster exciting developments in separation science. The book includes chapters on such crucial topics as the use of nanomaterials in sample preparation and the legalization of nanomaterials, along with a section on reducing the cost of the analysis process, both in terms of chemicals and time consumption. Presents several techniques for nanomaterials in chromatography, including well-known materials like carbon nanomaterials and functionalized nanomaterials Includes suggested readings at the end of each chapter for those who need further information or specific details, from standard handbooks, to journal articles Covers not only applications of nanomaterials in chromatography, but also their environmental impact in terms of toxicity and economic effects

This book gives an overview on techniques and future perspectives of various aspects of waste biomass management. It also presents the economic and environmental evaluation, and also the monetary value-benefits and sustainability of the different processes. Recycling processes of lignocellulosic biomass from palm oil mill waste are covered, as well as from sugar industry waste and agriculture waste. It also includes thermal and non-thermal technologies for resource recovery from waste biomass. Challenges in the reuse and recycling of waste biomass are discussed, i.e., the hygienic safety in biomass management and bioremediation technologies for conversion into valuable products. The book is aiming at scientists, researchers and students alike, who are working in the research areas pertaining to waste management

This book presents the state of art of the several advanced approaches to beneficiation of coal. The influence of recent technology attains the advantages of processing coal, purification studies, rheological behavior, and the mineral beneficiation. The experts collected in this volume have contributed significantly to the enrichment in the in depth knowledge not only in context of working knowledge, but also future prospects of clean coal

technology. Describes mineral beneficiation of coal through physical-chemical processes; Examines rheological behavior and pipeline transport of coal water slurry resulting in reduction of overall transportation cost of coal; Illustrates synergistic effect of natural and synthetic mixed surfactant system in the stabilization of high concentration coal water slurry.

Carbon Nanotubes in Drug and Gene Delivery

Nanoscience and Nanotechnology in Security and Protection against CBRN Threats

Monitoring, Risk and Treatment

Green Carbon Materials

Green Materials for Wastewater Treatment

Porous Carbons

Activated carbons have been found a large variety of applications in several fields, such as chromatography, medicine, gas storage and environmental protection, among others. Most of these applications requires tailored physical-chemistry properties, regarding purity, particles shape, mechanical resistance, homogeneity, surface composition, specific surface area and porosity. Because of their especial properties, activated carbons have attracted increasing attention for several years. As supports and catalysts, they have been used in several reactions both in gas and liquid phases, such as hydrogenation/dehydrogenation, oxidation/reduction, decomposition of hydrocarbons, halogenation and methanation, among others. This book reviews the applications, preparation, properties synthesis, and uses of activated carbon.

This book discusses multiways in the porous materials. It involves materials with a large number of holes, and it highlights the synthesis, structure, and surface properties of porous materials closely related to more applications, such as support, catalyst, energy storage, chemical reactions, and optical applications. It studies the effect of the filling materials, the thermal treatments, and the porous density in the improvement of physical properties, electrical and energy efficiency, and the generation of new materials. Some synthetic process will be discussed with the effect of some parameters on the final characteristics of the prepared porous structures.

Organic pollutants cause several environmental problems if discharged to air or water body. The occurrence of organic pollutants in the ecosystem, their risk and removal methods are very important issues. This book deals with several aspects of organic pollutants, especially in the light of organic pollutants monitoring, risk assessment as well as the practical application of different techniques for removing it from the environment. The book is divided into three sections contains 9 chapters. The first section explains monitoring of organic pollutants in soil and water. The second section discusse its risk to human, soil and plants. The third section focus on the different treatment process for the removal of organic pollutants.

This monograph provides comprehensive coverage of technologies which integrate adsorption and biological processes in water and wastewater treatment. The authors provide both an introduction to the topic as well as a detailed discussion of theoretical and practical considerations. After a review of the basics involved in the chemistry, biology and technology of integrated adsorption and biological removal, they discuss the setup of pilot- and full-scale treatment facilities, covering powdered as well as granular

activated carbon. They elucidate the factors that influence the successful operation of integrated systems. Their discussion on integrated systems expands from the effects of environmental to the removal of various pollutants, to regeneration of activated carbon, and to the analysis of such systems in mathematical terms. The authors conclude with a look at future needs for research and development. A truly valuable resource for environmental engineers, environmental and water chemists, as well as professionals working in water and wastewater treatment.

Activated Carbon Adsorption

Porosity

Principles of Chemical Separations with Environmental Applications

Novel Carbon Adsorbents

Synthesis, Properties and Applications

Silver Micro-Nanoparticles

Biochemical Engineering and Biotechnology, 2nd Edition, outlines the principles of biochemical processes and explains their use in the manufacturing of every day products. The author uses a direct approach that should be very useful for students in following the concepts and practical applications. This book is unique in having many solved problems, case studies, examples and demonstrations of detailed experiments, with simple design equations and required calculations. Covers major concepts of biochemical engineering and biotechnology, including applications in bioprocesses, fermentation technologies, enzymatic processes, and membrane separations, amongst others Accessible to chemical engineering students who need to both learn, and apply, biological knowledge in engineering principals Includes solved problems, examples, and demonstrations of detailed experiments with simple design equations and all required calculations Offers many graphs that present actual experimental data, figures, and tables, along with explanations

Vanadium is one of the more abundant elements in the Earth's crust and exhibits a wide range of oxidation states in its compounds making it potentially a more sustainable and more economical choice as a catalyst than the noble metals. A wide variety of reactions have been found to be catalysed by homogeneous, supported and heterogeneous vanadium complexes and the number of applications is growing fast. Bringing together the research on the catalytic uses of this element into one essential resource, including theoretical perspectives on proposed mechanisms for vanadium catalysis and an overview of its relevance in biological processes, this book is a useful reference for industrial and academic chemists alike.