

Adsorption Analysis Equilibria And Kinetics Series On Chem Engineering

This book is the proceedings of the second Pacific Basin Conference on Adsorption Science and Technology that was held May 14-18, 2000 in Brisbane, Australia.

A comprehensive review of environmental remediation is presented with an emphasis on the role of clay minerals in water purification. In the first chapter, important aspects of environmental problems and possible solutions are discussed. In the second chapter, the application of natural clay minerals as environmental cleaning agents are explained. The discussion is focused on the role of different types of clay materials in hazardous substance removal from air, aqueous solutions, wastewater, aquaculture, ground water, etc. In the next chapter, the modification of clay materials is explored including the preparation of clay composite materials for environmental remediation. Various aspects of clay material modifications and the effects of clay surface chemistry on the removal of hazardous material is also discussed. Next, the equilibrium and kinetics of hazardous substance adsorption is presented. This chapter summarizes recent studies on the removal of hazardous substances from aqueous solutions and the environment using various types of clay minerals. The brief also includes various models used in adsorption studies and touches on the characterization of clay minerals.

As nanomaterials get smaller, their properties increasingly diverge from their bulk material counterparts. Written from a materials science perspective, Adsorption and Diffusion in

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Nanoporous Materials describes the methodology for using single-component gas adsorption and diffusion measurements to characterize nanoporous solids. Concise, yet comprehensive, the book covers both equilibrium adsorption and adsorption kinetics in dynamic systems in a single source. It presents the theoretical and mathematical tools for analyzing microporosity, kinetics, thermodynamics, and transport processes of the adsorbent surface. Then it examines how these measurements elucidate structural and morphological characteristics of the materials. Detailed descriptions of the phenomena include diagrams, essential equations, and fully derived, concrete examples based on the author's own research experiences and insight. The book contains chapters on statistical physics, dynamic adsorption in plug flow bed reactors, and the synthesis and modification of important nanoporous materials. The final chapter covers the principles and applications of adsorption for multicomponent systems in the liquid phase. Connecting recent advances in adsorption characterization with developments in the transport and diffusion of nanoporous materials, this book is ideal for scientists involved in the research, development, and applications of new nanoporous materials.

Adsorption Analysis: Equilibria And Kinetics (With Cd Containing Computer Matlab Programs)World Scientific

Advances in Gas Processing: Proceedings of the 2nd Annual Gas Processing Symposium 11-14 January, 2010, Doha, Qatar, reviews the state of knowledge in gas processing. The contributions are organized around five main themes: (i) environmental sustainability; (ii) natural gas processing technologies; (iii) energy efficiency in operations; (iv) design and safety; and (v) operational excellence. The papers on environmental sustainability cover topics such as the biogasification of waste monoethanolamine; the role of LNG in a carbon constrained

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world; and sustainable water management. The papers on natural gas processing technologies include the removal of acid gases from natural gas streams via membrane technology and selective control of Fischer-Tropsch synthesis hydrocarbons product distribution. The papers on energy efficiency in operations cover lifted turbulent jet flame in a cross-flow; novel hybrid biomass and coal processes; and the adoption of plug-in hybrid electric vehicles (PHEVs). The papers on design and safety include studies on the optimal design and operation of a GTL process and efficient design, operating, and control strategies for LNG plants. The papers on operational excellence deal with topics such as chemicals in gas processing; the monitoring and optimization of hydrocarbon separation equipment; and the inhibition of gas hydrate formation. * Provides a state-of-the-art review of gas processing technologies * Covers design, operating tools, and methodologies * Includes case studies and practical applications
Proceedings of the 20th International Cryogenic Engineering Conference

This book focuses on the utilization of bio-resources and their conversion pathways for a sustainable future. Tapping into bio-resources by means of thermochemical and biochemical processes has attracted researchers from all over the world; it is a broad area that has given birth to concepts like the biorefinery, as well as a new stream known as biotechnology. Its scope includes biochemical and microbiological engineering, biocatalysis and biotransformation, biosynthesis and metabolic engineering, bioprocess and biosystem engineering, bioenergy and biorefineries, cell culture and biomedical engineering, food, agricultural and marine biotechnology, bioseparation and biopurification engineering, bioremediation and environmental biotechnology, etc. The book discusses a host of new technologies now being used to tap these resources with innovative bioprocesses. All chapters

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are based on outstanding research papers selected for and presented at the IconSWM 2018 conference.

Over the last decade, the biggest advances in physical chemistry have come from thinking smaller. The leading edge in research pushes closer to the atomic frontier with every passing year. Collecting the latest developments in the science and engineering of finely dispersed particles and related systems, *Finely Dispersed Particles: Micro-, Nano-, and Atto-Engineering* explores heat, mass, momentum and electron transfer phenomena of well-characterized interfaces at the milli-, micro-, nano-, and atto-scales. An interdisciplinary team of leading experts from around the world discuss recent concepts in the physics and chemistry of various well-studied interfaces of rigid and deformable particles in homo- and hetero-aggregate dispersed systems, including emulsions, dispersoids, foams, fluosols, polymer membranes, and biocolloids. The contributors clearly elucidate the hydrodynamic, electrodynamic, and thermodynamic instabilities that occur at interfaces, as well as the rheological properties of interfacial layers responsible for droplets, particles, and droplet-particle-film structures in finely dispersed systems. The book examines structure and dynamics from various angles, such as relativistic and non-relativistic theories, molecular orbital methods, and transient state theories. With a comprehensive survey of our current understanding, *Finely Dispersed Particles: Micro-, Nano-, and Atto-Engineering* provides a solid platform for further exploration and discovery at increasingly smaller scales.

This book illustrates key sustainability issues in global textile and fashion value chains, by examining individual types of fibers either at a single step in or along

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the entire value chain. It approaches sustainability-related issues in the textile and fashion value chain from an interdisciplinary and holistic viewpoint, with each contribution linking questions on the textile and fashion value chain to various drivers, indicators and concepts of sustainability. Each chapter represents a single step in the textile and fashion value chain, exploring and considering a wide range of interwoven and interdependent technological, environmental, social, political and economic aspects. Various fibers, textile engineering and chemical treatment steps, as well as innovative business concepts and regulatory frameworks across the entire textile and fashion value chain are identified, analyzed, discussed and critically evaluated. The book provides a systematic overview of the potential and challenges of sustainable textile and fashion value chains, making it of interest to practitioners and scientists in sustainability science, environmental economics, and business, management and innovation. Further, it offers a valuable source of information for industrial and mechanical engineering researchers, and for students in the areas of textile engineering, fashion, or the apparel and clothing industry.

Taking greater advantage of powerful computing capabilities over the last several years, the development of fundamental information and new models has led to major advances in nearly every aspect of chemical engineering. Albright's

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Chemical Engineering Handbook represents a reliable source of updated methods, applications, and fundamental concepts that will continue to play a significant role in driving new research and improving plant design and operations. Well-rounded, concise, and practical by design, this handbook collects valuable insight from an exceptional diversity of leaders in their respective specialties. Each chapter provides a clear review of basic information, case examples, and references to additional, more in-depth information. They explain essential principles, calculations, and issues relating to topics including reaction engineering, process control and design, waste disposal, and electrochemical and biochemical engineering. The final chapters cover aspects of patents and intellectual property, practical communication, and ethical considerations that are most relevant to engineers. From fundamentals to plant operations, Albright's Chemical Engineering Handbook offers a thorough, yet succinct guide to day-to-day methods and calculations used in chemical engineering applications. This handbook will serve the needs of practicing professionals as well as students preparing to enter the field.

ENVIRONMENTAL ENGINEERING IN THE HISTORICAL PERSPECTIVE

Lucjan Pawlowski Information bombarding the nowadays Man may suggest that the world is on the way to an ecological catastrophe. I do not disregard the

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dangers we are facing now, but I would like to remind that since the beginning of existence Man has been facing numerous threats of an ecological character. First, they were caused by natural phenomena, such as huge forest fires, floods, earth quakes, and later on, caused by the development of our civilisation, Man who was becoming more and more powerful in his abilities started creating new, anthropogenic threats. We may look pessimistically at the development of our civilisation, having in mind the catastrophes caused by Man's activity; we may also look at the examples showing the development of knowledge and the skills derived from it, which enable the elimination of threats and, at the same time making Man's life richer. It is not possible to make an in-depth analysis of the phenomena mentioned above in a short opening speech of the Congress. Nevertheless, I would like to share with you an optimistic reflection. I think that we can observe two trends in the development of our civilisation - good alternates with evil, environmental threats with the hope for their overcoming, and events swing to both sides like a pendulum in a clock. Energy saving and emission reduction are two of the greatest challenges facing the world today. Heat energy storage can save fuel and effectively use renewable sources. Heat energy storage is decisive for many energy saving measures and promises a reliance on non-traditional renewable energy sources. However, most

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recent research focused on material selection is scattered, disembodied, and sometimes contradictory. *Technology Development for Adsorptive Heat Energy Converters: Emerging Research and Opportunities* is an essential publication that offers a cohesive examination of methods of energy storage and conversion. Highlighting a broad range of topics including composite materials, operating principles, and structural characteristics, this book is ideally designed for developers, policymakers, researchers, academicians, students, and engineers in the fields of materials engineering, renewable energy, and environmental engineering.

Sorbent Deformation discusses the theoretical and experimental study of the deformation of solid bodies during their ad- or absorptive interaction with gases or vapours. The book is the first monograph which deals with the problem of ad- and absorbent non-inertness, compiled from a 15-year study by the author on swelling or deformed ad- and absorptive systems. The results from the study are of practical and scientific value to engineers and scientists in the areas of physical chemistry, chemical engineering and environmental control. They could also be of interest to those looking to solve problems in such areas as forecasting, technological processing and fuel drying stimulation. - Provides novel, practical information on the behaviour of the systems used in environment

control · Presents the derivation of the equation describing single- and multicomponent adsorption and absorption in swelling / deformed systems · Identifies the results of direct measurements on ad- and absorbent deformations (charcoals, clay minerals, organic cation substituted clay minerals, etc.) with a new high sensitivity method

Biomass can be converted to energy, biofuels, and bioproducts via thermochemical conversion processes, such as combustion, pyrolysis, and gasification. Combustion technology is most widely applied on an industrial scale. However, biomass gasification and pyrolysis processes are still in the research and development stage. The major products from these processes are syngas, bio-oil, and char (called also biochar for agronomic application). Among these products, biomass chars have received increasing attention for different applications, such as gasification, co-combustion, catalysts or adsorbents precursors, soil amendment, carbon fuel cells, and supercapacitors. This Special Issue provides an overview of biomass char production methods (pyrolysis, hydrothermal carbonization, etc.), characterization techniques (e.g., scanning electronic microscopy, X-ray fluorescence, nitrogen adsorption, Raman spectroscopy, nuclear magnetic resonance spectroscopy, X-ray photoelectron spectroscopy, and temperature programmed desorption and mass spectrometry),

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their properties, and their suitable recovery processes.

The Handbook of Zeolite Science and Technology offers effective analyses of salient cases selected expressly for their relevance to current and prospective research. Presenting the principal theoretical and experimental underpinnings of zeolites, this international effort is at once complete and forward-looking, combining fundamental concepts with the most sophisticated data for each scientific subtopic and budding technology. Supplying over 750 figures, and 350 display equations, this impressive achievement in zeolite science observes synthesis through the lens of MFI (ZSM-5 and silicalite). Chapters progress from conceptual building blocks to complex research presentations.

The aim of this book has been to explore the variety of phenomena associated with the major forms of the material, while laying the foundation for a clear and detailed working and understanding of the materials. We tried to present new types of advanced materials, which are currently a hot topic, and provide readers with a selective review of important improvements in the field. I believe that every chapter in this book presents the progress in the subject and describes the latest advances in microporous and mesoporous materials.

This book shows the promising future and essential issues on the storage of the supercritical gases, including hydrogen, methane and carbon dioxide, by

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adsorption with controlling the gas-solid interaction by use of designed nanoporous materials. It explains the reason why the storage of these gases with adsorption is difficult from the fundamentals in terms of gas-solid interaction. It consists of 14 chapters which describe fundamentals, application, key nanoporous materials (nanoporous carbon, metal organic frame works, zeolites) and their storage performance for hydrogen, methane, and carbon dioxide. Thus, this book appeals to a wide readership of the academic and industrial researchers and it can also be used in the classroom for graduate students focusing on clean energy technology, green chemistry, energy conversion and storage, chemical engineering, nanomaterials science and technology, surface and interface science, adsorption science and technology, carbon science and technology, metal organic framework science, zeolite science, nanoporous materials science, nanotechnology, environmental protection, and gas sensors. 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

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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

With the recent advent of nanotechnology, research and development in the area of nanostructured materials has gained unprecedented prominence. Novel materials with potentially exciting new applications are being discovered at a much higher rate than ever before. Innovative tools to fabricate, manipulate, characterize and evaluate such materials are being developed and expanded. To

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keep pace with this extremely rapid growth, it is necessary to take a breath from time to time, to critically assess the current knowledge and provide thoughts for future developments. This book represents one of these moments, as a number of prominent scientists in nanostructured materials join forces to provide insightful reviews of their areas of expertise, thus offering an overall picture of the state--the art of the field. Nanostructured materials designate an increasing number of materials with designed shapes, surfaces, structures, pore systems, etc.

Nanostructured materials with modified surfaces include those whose surfaces have been altered via such techniques as grafting and tethering of organic or organometallic species, or through various deposition procedures including electro, electroless and vapor deposition, or simple adsorption. These materials find important applications in catalysis, separation and environmental remediation. Materials with patterned surfaces, which are essential for the optoelectronics industry, constitute another important class of surface-modified nanostructured materials. Other materials are considered nanostructured because of their composition and internal organization.

The NATO Advanced Research Workshop "Role of Interfaces in Environmental Protection" has been held on May 27-30, 2002 in Miskolc, Hungary, under leadership of co-directors Prof Sandor Barany from the University of Miskolc,

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Hungary, and Prof Nataliya Klymenko, National Academy of Sciences of Ukraine. The objective of the ARW was to highlight colloidal and biocolloidal aspects of environmental pollution and technologies to monitor, remediate, abate and prevent pollution. It is known that the solution of majority of environmental problems is closely connected with phenomena at the interfaces. The behaviour, transport of dispersed particles in the environment, the main phase separation methods in water treatment, purification of liquids, aerosols removal, many soil remediation processes as well as the methods of protection of human organisms from hazardous matters, are based on concepts of colloid chemistry, i.e. properties of interfaces and their behaviour in different media. Examples of these methods are: filtration, ultrafiltration, flotation, coagulation, hetero-coagulation and flocculation, adsorption, adhesion of micro-organisms to surfaces, membrane separation methods, etc. A very important and special aspect of the topic is the human protection using colloid-chemical approaches, i.e. the adsorption, aggregation and adagulation properties of different materials. Examples are: adsorption of hazardous organic materials, drugs, heavy metals and radionuclides on activated carbon, silica, cellulose derivatives, etc. This book is an Up-to-date and authoritative account on physicochemical principles, pharmaceutical and biomedical applications of hydrogels. It consists of

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eight contributions from different authors highlighting properties and synthesis of hydrogels, their characterization by various instrumental methods of analysis, comprehensive review on stimuli-responsive hydrogels and their diverse applications, and a special section on self-healing hydrogels. Thus, this book will equip academia and industry with adequate basic and applied principles related to hydrogels.

This book is intended to present for the first time experimental methods to measure equilibria states of pure and mixed gases being adsorbed on the surface of solid materials. It has been written for engineers and scientists from industry and academia who are interested in adsorption based gas separation processes and/or in using gas adsorption for characterization of the porosity of solid materials. This book is the result of a fruitful collaboration of a theoretician (JUK) and an experimentalist (RS) over more than twelve years in the field of gas adsorption systems at the Institute of Fluid- and Thermodynamics (IFT) at the University of Siegen, Siegen, Germany. This collaboration resulted in the development of several new methods to measure not only pure gas adsorption, but gas mixture or coadsorption equilibria on inert porous solids. Also several new theoretical results could be achieved leading to new types of so-called adsorption isotherms based on the concepts of molecular association and –

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phenomenologically speaking – on that of thermodynamic phases of fractal dimension. Naturally, results of international collaboration of the authors over the years (1980-2000) also are included.

This book provides recent advances in research on drying of particulate and porous materials. It is based on a selection of papers presented at the XI Polish Drying Symposium 2005. The contributions cover theoretical, as well as experimental and modeling research on heat and mass transfer processes during drying of porous material and fluidized beds. The book is a pioneering contribution to the science and technology of drying of particulate solids.

The declared objective of this book is to provide an introductory review of the various theoretical and practical aspects of adsorption by powders and porous solids with particular reference to materials of technological importance. The primary aim is to meet the needs of students and non-specialists who are new to surface science or who wish to use the advanced techniques now available for the determination of surface area, pore size and surface characterization. In addition, a critical account is given of recent work on the adsorptive properties of activated carbons, oxides, clays and zeolites. Provides a comprehensive treatment of adsorption at both the gas/solid interface and the liquid/solid interface Includes chapters dealing with experimental methodology and the

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interpretation of adsorption data obtained with porous oxides, carbons and zeolites Techniques capture the importance of heterogeneous catalysis, chemical engineering and the production of pigments, cements, agrochemicals, and pharmaceuticals

This book aims to provide the scientific community with a novel and valuable approach based on fractal geometry concepts on the important properties and processes of diverse environmental systems. The interpretation of complex environmental systems using modern fractal approaches is compared and contrasted with the more classical approaches. The book will provide the fundamental knowledge necessary for solving practical environmental problems. Furthermore, it examines how the fractal approach has been applied in order to understand the structure and reactivity of natural, environmental systems including flocs, sediments, soils, microorganisms and humic substances.

This thesis presents a combination of material synthesis and characterization with process modeling. In it, the CO₂ adsorption properties of hydrotalcites are enhanced through the production of novel supported hybrids (carbon nanotubes and graphene oxide) and the promotion with alkali metals. Hydrogen is regarded as a sustainable energy carrier, since the end users produce no carbon emissions. However, given that most of the hydrogen produced worldwide comes

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from fossil fuels, its potential as a carbon-free alternative depends on the ability to capture the carbon dioxide released during manufacture. Sorption-enhanced hydrogen production, in which CO₂ is removed as it is formed, can make a major contribution to achieving this. The challenge is to find solid adsorbents with sufficient CO₂ capacity that can work in the right temperature window over repeated adsorption-desorption cycles. The book presents a highly detailed characterization of the materials, together with an accurate measurement of their adsorption properties under dry conditions and in the presence of steam. It demonstrates that even small quantities of graphene oxide provide superior thermal stability to hydrotalcites due to their compatible layered structure, making them well suited as volume-efficient adsorbents for CO₂. Lastly, it identifies suitable catalysts for the overall sorption-enhanced water gas shift process. Activated Carbon Compendium provides a critical in-depth analysis of recent research into activated carbons, focussing on their wide-ranging applications, and the complexity and flexibility in their manufacture and use. Professor Harry Marsh has selected and reviewed 27 key papers originally published in Carbon over the last five years. The compendium represents an indispensable review of key work in the area. Areas include: The Activation Process, Modifications to Porosity, Properties of Activated carbons, Applications, Theoretical.

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This is the first volume on adsorption using green adsorbents and is written by international contributors who are the leading experts in the adsorption field. The first volume provides an overview of fundamentals and design of adsorption processes. For people who are new to the field, the book starts by two overview chapters presenting the principles and properties of wastewater treatment and adsorption processes. The book also provides a comprehensive source of knowledge on acid-base properties of biosorbents. It discusses fractal-like kinetic models for fluid-solid adsorption, reports on the chemical characterization of oxidized activated carbons for metal removal, and the use of magnetic biosorbents in water treatment. Furthermore, the thermodynamic properties of metals adsorption by green adsorbents, and biosorption of polycyclic aromatic hydrocarbons and organic pollutants are reviewed, and finally the recent trends and impact of nanomaterials as green adsorbent and potential catalysts for environmental applications are summarized. 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

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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.

Introduction to Zeolite Molecular Sieves, 3rd Edition presents a collection of the most important results and ideas in the field of molecular sieve chemistry and technology, the most important experimental techniques related to the research activities in molecular sieves, and identifies new areas of molecular sieve chemistry. Chapters start at a reasonably simple entry level, but also covers the present state-of-the-art in the field. Topics covered include structure, synthesis, characterization, ion exchange, adsorption, diffusion, separations, and natural zeolites. * 6 years since the last edition this book brings together the rapid development within the field of molecular sieve chemistry and applications * Accessible to newcomers to the field, also containing valuable information for experienced researchers * 27 chapters written by renowned scientists in their field, including updates on some 2nd edition chapters

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This book covers topics of equilibria and kinetics of adsorption in porous media. Fundamental equilibria and kinetics are dealt with for homogeneous as well as heterogeneous particles. Five chapters of the book deal with equilibria and eight chapters deal with kinetics. Single component as well as multicomponent systems are discussed. In kinetics analysis, we deal with the various mass transport processes and their interactions inside a porous particle. Conventional approaches as well as the new approach using Maxwell-Stefan equations are presented. Various methods to measure diffusivity, such as the Differential Adsorption Bed (DAB), the time lag, the diffusion cell, chromatography, and the batch adsorber methods are also covered by the book. It can be used by lecturers and engineers who wish to carry out research in adsorption. A number of programming codes written in MatLab language are included so that readers can use them directly to better understand the behavior of single and multicomponent adsorption systems.

The problem of storing hydrogen safely and effectively is one of the major technological barriers currently preventing the widespread adoption of hydrogen as an energy carrier and the subsequent transition to a so-called hydrogen economy. Practical issues with the storage of hydrogen in both gas and liquid form appear to make reversible solid state hydrogen storage the most promising

potential solution. Hydrogen Storage Materials addresses the characterisation of the hydrogen storage properties of the materials that are currently being considered for this purpose. The background to the topic is introduced, along with the various types of materials that are currently under investigation, including nanostructured interstitial and complex hydrides, and porous materials, such as metal-organic frameworks and microporous organic polymers. The main features of Hydrogen Storage Materials include: an overview of the different types of hydrogen storage materials and the properties that are of interest for their practical use; descriptions of the gas sorption measurement methods used to determine these properties, and the complementary techniques that can be used to help corroborate hydrogen uptake data; and extensive coverage of the practical considerations for accurate hydrogen sorption measurement that drive both instrument design and the development of experimental methodology. Hydrogen Storage Materials provides an up-to-date overview of the topic for experienced researchers, while including enough introductory material to serve as a useful, practical introduction for newcomers to the field. This book publishes the proceedings of the Eighth International Conference on Modelling, Measuring and Prediction of Water Pollution. Water pollution is a subject of growing public concern. The scientific community has responded very

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rapidly to the need for studies capable of relating the pollutant discharge with changes in the water quality. The results of these studies are permitting industries to employ more efficient methods of controlling and treating waste loads, and water authorities to enforce stricter regulations regarding this matter. Bringing together papers from world renowned experts in this field, the text encompasses themes such as: Groundwater and Aquifer Contamination; Wastewater Treatment; Re-use of Water; Lakes, Rivers and Wetlands; Coastal Areas and Seas; Biological Effects; Agricultural Pollution; Oil Spills; Mathematical and Physical Modeling; Experimental and Laboratory Work; Surveying Techniques, Monitoring and Remote Sensing; Remediation Studies; Health Risk; Social and Economic Issues; Pollution Prevention; GIS and Remote Sensing Applications; Environmental Management and Decision Analysis; Environmental Impact Assessment.

Colloidal systems occur everywhere-in soils, seawater, foodstuff, pharmaceuticals, paints, blood, biological cells, and microorganisms. *Colloids and Interfaces in Life Sciences and Bionanotechnology, Second Edition*, gives a concise treatment of physicochemical principles determining interrelated colloidal and interfacial phenomena. New in the This book provides researchers and graduate students with an overview of the latest developments in and applications of adsorption processes for water treatment and purification. In particular, it covers current topics in connection with the modeling and design of adsorption

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processes, and the synthesis and application of cost-effective adsorbents for the removal of relevant aquatic pollutants. The book describes recent advances and alternatives to improve the performance and efficacy of this water purification technique. In addition, selected chapters are devoted to discussing the reliable modeling and analysis of adsorption data, which are relevant for real-life applications to industrial effluents and groundwater. Overall, the book equips readers with a general perspective of the potential that adsorption processes hold for the removal of emerging water pollutants. It can readily be adopted as part of special courses on environmental engineering, adsorption and water treatment for upper undergraduate and graduate students. Furthermore, the book offers a valuable resource for researchers in water production control, as well as for practitioners interested in applying adsorption processes to real-world problems in water treatment and related areas.

Artificial organs may be considered as small-scale process plants, in which heat, mass and momentum transfer operations and, possibly, chemical transformations are carried out. This book proposes a novel analysis of artificial organs based on the typical bottom-up approach used in process engineering. Starting from a description of the fundamental physico-chemical phenomena involved in the process, the whole system is rebuilt as an interconnected ensemble of elemental unit operations. Each artificial organ is presented with a short introduction provided by expert clinicians. Devices commonly used in clinical practice are reviewed and their performance is assessed and compared by using a mathematical model based approach. Whilst mathematical modelling is a fundamental tool for quantitative descriptions of clinical devices, models are kept simple to remain focused on the essential features of each process. Postgraduate students and researchers in the field of chemical and

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biomedical engineering will find that this book provides a novel and useful tool for the analysis of existing devices and, possibly, the design of new ones. This approach will also be useful for medical researchers who want to get a deeper insight into the basic working principles of artificial organs.

This text introduces a special class of polymeric ligand exchanger (PLE) with high affinities for anionic ligands. Volume 14 discusses the potential and advantages of micro- and nanofiltration membrane processes for removal of metals; details prevailing equilibrium relationships and supporting experimental data for systems where leaching and ion exchange take place simultaneously; covers cases of uranium cation and gold cyanide anion bisorption and modelling of engineered systems.

This book introduces a variety of treatment technologies, such as physical, chemical, and biological methods for the treatment of gas emissions, wastewater, and solid waste. It provides a useful source of information for engineers and specialists, as well as for undergraduate and postgraduate students, in the areas of environmental science and engineering.

This book reviews principles, techniques and applications of metal, metal oxides, metal sulfides and metal-organic frameworks for removal and degradation of pollutants. Natural materials are often much more advanced than synthetic materials in terms of circularity and are functional, often biodegradable, recyclable and generate little waste. They are, therefore, a source of inspiration of new synthetic materials. In particular, recent research has focused on various types of functional materials such as organic, inorganic, nanostructured and composites for the remediation of environmental pollution.

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