Adsorption Technology Design

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MWH’s Water TreatmentAdsorption Technology and DesignAdsorption Technology for Air and Water Pollution ControlEnvironmental WaterApplications in Industry;Introduction to AdsorptionEmerging Technologies for Sustainable Desalination Handbook;Process Design Manual for Carbon Adsorption/Adsorption, Ion Exchange and Catalysis;Demonstration of Carbon Adsorption Technology for Petroleum Dry Cleaning Plants;Adsorption Technology in Water Treatment;Process Design Manual for Carbon Adsorption;Groundwater Treatment Technology;Chemical Engineering Volume 2;Adsorption Technology and Design;Adsorption Refrigeration Technology;Simulated Moving Bed Technology;Adsorption Technology in Water Treatment;Fluoride Removal from Groundwater by Adsorption Technology;Gas Purification;Adsorption Technology in Water Treatment;Statistical Design - Chemometrics;Particle Technology and Applications;Adsorption Processes for Water Treatment;Industrial Chemical Process Analysis and Design;Adsorption Processes for Water Treatment and Purification;Activated Carbon Adsorption for Wastewater Treatment;Adsorption Design for Wastewater Treatment;Design, Simulation and Optimization of Adsorptive and Chromatographic Separations: A Hands-On Approach;Science and Technology;Design, Simulation and Optimization of Adsorptive and Chromatographic Separations: A Hands-On Approach;Adsorption technology and design;Adsorption Technology Guide;Fluoride Removal from Groundwater by Adsorption Technology;Process Equipment and Plant Design;Rational Design of Next-generation Nanomaterials and Nanodevices for Water Applications;Proceedings of the 3rd International Conference on Separation Technology;Green Adsorbents for Pollutant Removal;Principles of Chemical Separations with Environmental Applications;Efficient Petrochemical Processes

A GUIDE TO THE DESIGN, OPERATION, CONTROL, TROUBLESHOOTING, OPTIMIZATION AS WELL AS THE RECENT ADVANCES IN THE FIELD OF PETROCHEMICAL PROCESSES Efficient Petrochemical Processes: Technology, Design and Operation is a guide to the tools and methods for energy optimization and process design. Written by a panel of experts on the topic, the book highlights the application of these methods on petrochemical technology such as the aromatics process unit. The authors describe practical approaches and tools that focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields through better design, operation, and optimization. The text is divided into sections that cover the range of essential topics: petrochemical technology description; process design considerations; reaction and separation design; process integration; process system optimization; types of revamps; equipment assessment; common operating issues; and troubleshooting case analysis. This important book: Provides the basic knowledge related to fundamentals, design, and operation for petrochemical processes Applies process integration techniques and optimization techniques that improve process design and operations in the petrochemical process Provides practical methods and tools for industrial practitioners Puts the focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields Contains information on the most recent advances in the field. Written for managers, engineers, and operators working in process industries as well as university students, Efficient Petrochemical Processes: Technology, Design and Operation explains the most recent advances in the field of petrochemical processes and discusses in detail catalytic and adsorbent materials, reaction and separation mechanisms.

Adsorption processes have played a central role in water treatment for many years but their importance is on the rise with the continuous discoveries of new micropollutants in the water cycle (pharmaceuticals for example). In addition to the classical application in drinking water treatment, other application fields are attracting increasing interest, such as wastewater treatment, groundwater remediation, treatment of landfill leachate, and so on. Based on the author's long-term experience in adsorption research, the scientific monograph treats the theoretical fundamentals of adsorption technology for water treatment from a practical perspective. It presents all the basics needed for experimental adsorption studies as well as for process modelling and adsorber design. Topics discussed in the monograph include: introduction into basic concepts and practical applications of adsorption processes; adsorbents and their characterisation, single and multi-solute adsorption equilibria, adsorption kinetics, adsorption dynamics in fixed-bed adsorbers and fixed-bed adsorber design, regeneration and reactivation of adsorbents, introduction into geoosorption processes in bank filtration and groundwater recharge. According to the increasing importance of micropollutants in the water cycle, particular attention is paid to their competitive adsorption in presence of background organic matter. Clear illustrations, extensive literature references and a useful index make this work indispensable for both scientists and technicians involved in water treatment.

Despite the fact that nanotechnology has been present for a few decades, there is a big gap between what nanotechnology is perceived and what nanotechnology can truly offer in all sectors of water. The question to be answered is 'what more can we expect from nanotechnology' in the water field? The rational nano-design starts with well-defined problem definitions, necessitates interdisciplinary approaches, involves 'think-outside-the-box', and represents the future growth point of environmental nanotechnology. However, it is still largely new to the educated public and even scientists and engineers in water fields. Therefore, it is the purpose of this book to promote the concept of rational nano-design and to demonstrate its creativity, innovation, and excitement. This book presents a series of carefully selected rationally designed nano-materials/devices/surfaces, which represent drastically different, ground-breaking, and eye-opening approaches to conventional problems to embody the concept of nano-design and to illustrate its remarkable potential to change the face of the research in water industry in the future. Each of the book contributors is world-renowned expert in the burgeoning field of rational nano-design for applications. Rational Design of Next-generation Nanomaterials and Nanodevices for Water Applications is intended for undergraduates, graduates, scientists and professionals in the fields of environmental science, material science, chemistry, and chemistry engineering. It provides coherent and good material for teaching, research, and professional reference. Contents: Introduction to rational nano-design for water applications; Rational design of smart materials/surfaces with switchable oil wettability for sustainable oil-spill cleanup; Rational design of three-dimensional macroscale porous electrodes for bioelectrochemical systems; Design of (photo)electrochemical active membranes as next-generation filtration devices; Hierarchical materials as a design concept for multifunctional membranes; Rational design of functional nanoporous materials to confine water pollutant in controlled nano-space; A
next-generation forward osmosis draw solution design; Rational design of magnetic permanently-confined micelle arrays (Mag-PCMAs) materials for sustainable water and soil remediation; Rational design of an all-in-one lab-on-chip device for direct seawater desalination; Design of micro-sized microbial fuel cells as miniature energy harvesters.  

Author: Peng Wang, King Abdullah University of Science and Technology

In the Eastern corridor of Northern region of Ghana, presence of high fluoride concentration in the groundwater has made many drilled boreholes unusable for drinking. Little is, however, known about the factors contributing to the occurrence of high fluoride in this part of Ghana and it’s spatial distribution. Treatment of the fluoride-contaminated groundwater by adsorption is also hampered by the lack of suitable adsorbents that are locally available. Based on principal component analysis, and saturation indices calculations, this thesis highlights that, the predominant mechanisms controlling the fluoride enrichment probably include calcite precipitation and Na/Cl exchange processes, both of which deplete Ca from the groundwater, and promote the dissolution of fluoride. The mechanisms also include F-/OH- anion exchange processes, as well as evaporative processes which concentrate the fluoride ions, hence increasing its concentration in the groundwater. Spatial mapping showed that the high fluoride groundwater occur predominantly in the Saboba, Cheriponi and Yendi districts. The thesis further highlights that, modifying the surface of Indigenous materials by an aluminium coating process, is a very promising approach to develop a suitable fluoride adsorbent. Aluminium oxide coated media reduced fluoride in water from 5.0 ± 0.2 mg/L to ≤ 1.5 mg/L (which is the WHO health based guideline for fluoride), in both batch and continuous flow column experiments in the laboratory. Kinetic and isotherm studies, thermodynamic calculations, as well as analytical results from Fourier Transform Infrared Spectroscopy and Raman spectroscopy, suggest the mechanism of fluoride adsorption onto aluminium oxide coated media involved both physisorption and chemisorption processes. Field testing in a fluorotic community in Northern Ghana showed that the adsorbent is also capable of treating fluoride-contaminated groundwater in field conditions, suggesting it is a promising defluoridation adsorbent. The adsorbent also showed good regenerability potential that would allow re-use, which could make it practically and economically viable.  

Additional research is, however, required to further increase the fluoride adsorption capacity of developed adsorbent.

Adsorption Processes for Water Treatment discusses the application of adsorption in water purification. The book is comprised of 10 chapters that detail the carbon and resin adsorptive processes for potable water treatment. The text first covers the elements of surface chemistry and then proceeds to discussing adsorption models. Chapter 3 tackles the kinetics of adsorption, while Chapter 4 deals with batch systems and fixed fluid beds. Next, the book talks about the physical and chemical properties of carbon. The next two chapters discuss the adsorption of organic compounds and the removal of inorganic compounds, respectively. The eighth chapter presents operational, pilot plant, and case studies. Chapter 9 discusses the biological activated carbon treatment of drinking water, and Chapter 10 covers the adsorption of macrotetricular resins. The book will be of great use to both researchers and professionals involved in the research and development of water treatment process.

Adsorption: it’s the most important method for removing organic contaminants from wastewater streams. Students and professionals alike in the fields of water/wastewater treatment and environmental engineering have expressed tremendous interest in learning and understanding adsorption processes. Adsorption Design for Wastewater Treatment fulfills the need for a true textbook on this increasingly important subject. From the basics of the adsorption process to specifics on system design, this overview serves a dual purpose: study manual and design guide. Straightforward explanations and illustrations make Adsorption Design for Wastewater Treatment ideal for junior, senior and graduate-level university courses. Practicing engineers will find the book especially useful for accurate, direct advice on designing batch and fixed-bed adsorption systems. Contaminant removal will be an ever-present challenge to environmental engineers. Gain a clear understanding of one of the most important cleanup methods with Adsorption Design for Wastewater Treatment.

Groundwater treatment is unique. Removing the sources of contamination, as we did when we cleaned a river or lake, is only the first step. A groundwater remediation must include cleaning of the body of water itself, the aquifer. The revised and updated edition of Groundwater Treatment Technology provides a complete review of the technologies developed over the past 10 years for groundwater treatment. It also explains the design techniques that are required to apply those technologies successfully in a groundwater cleanup. Featured areas of coverage include: Specific design methods for the various technologies that are merely described in other publications Physical/chemical and treatability properties of 30 organic compounds that are most often encountered in groundwater situations Detailed strategies for remediation New biological treatment methods Specific data on treatment methods as applied in the field Practical suggestions on applications of technologies for groundwater treatment Drawing on his experience as a designer of over 100 groundwater treatment systems, Evan K. Nyer starts by showing how to develop the data necessary to define what type of treatment is necessary. He then explains how groundwater treatment is unique. Nyer follows with expert accounts of specific treatment technologies. Physical/chemical organic methods such as air stripping, carbon adsorption, and pure compound removal are explored in detail. In addition, new techniques including UV Oxidation and other emerging technologies are explained and directly related to groundwater design situations. An entire chapter is devoted to biological methods, one of the most promising areas for organic groundwater treatment. There is also comprehensive coverage of inorganic methods, that addresses everything from precipitation to solids/liquid separation and advanced ion removal methods. This definitive sourcebook also contains helpful cost factor analyses, plus representative case histories showing how the techniques of groundwater treatment have been applied in the field. Wide-ranging, authoritative, and completely updated, the Second Edition of Groundwater Treatment Technology is essential reading for wastewater engineers, industrial managers, hydrologists, soil experts, government officials, and environmental lawyers who want to keep abreast of the latest developments in this important field.

A comprehensive resource to the construction, use, and modification of the wide variety of adsorptive and chromatographic separations Design, Simulation and Optimization of Adsorptive and Chromatographic Separations offers the information needed to effectively design, simulate, and optimize adsorptive and chromatographic separations for a wide range of industrial applications. The authors've noted experts in the field?cover the fundamental principles, the applications, and a range of modeling techniques for the processes. The text presents a unified approach that includes the ideal and intermediate equations and offers a wealth of hands-on case studies that employ
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the definitive guide to the theory and practice of water treatment engineering THIS NEWLY REVISED EDITION of the classic reference provides complete, up-to-date coverage of both theory and practice of water treatment system design. The Third Edition brings the field up to date, addressing new regulatory requirements, ongoing environmental concerns, and the emergence of pharmacological agents and other new chemical constituents in water. Written by some of the foremost experts in the field of public water supply, Water Treatment, Third Edition maintains the book's broad scope and reach, while reorganizing the material for even greater clarity and readability. Topics span from the fundamentals of water chemistry and microbiology to the latest methods for detecting constituents in water, leading-edge technologies for implementing water treatment processes, and the increasingly important topic of managing residuals from water treatment plants. Along with hundreds of illustrations, photographs, and extensive tables listing chemical properties and design data, this volume: Introduces a number of new topics such as advanced oxidation and enhanced coagulation Discusses treatment strategies for removing pharmaceuticals and personal care products Examines advanced treatment technologies such as membrane filtration, reverse osmosis, and ozone addition Details reverse osmosis applications for brackish groundwater, wastewater, and other water sources Provides new case studies demonstrating the synthesis of full-scale treatment trains A must-have resource for engineers designing or operating water treatment plants, Water Treatment, Third Edition is also useful for students of civil, environmental, and water resources engineering.

Proceedings of the NATO Advanced Study Institute, Vimeiro, Portugal, July 17-29, 1988

Emerging Technologies for Sustainable Desalination Handbook provides professionals and researchers with the latest treatment activities in the advancement of desalination technology. The book enables municipalities and private companies to custom-design sustainable desalination plants that will minimize discharge, energy costs and environmental footprint. Individual case studies are included to illustrate the benefits and drawback of each technique. Sections discuss a multitude of recently developed, advanced processes, along with notable advances made in existing technologies. These processes include adsorption, forward osmosis, humidification and dehumidification, membrane distillation, pervaporation and spray type thermal processes. In addition, theoretical membrane materials, such as nanocomposite and carbon nanotube membranes are also explored. Other chapters cover the desalination of shale gas, produced water, forward osmosis for agriculture, desalination for crop irrigation, and seawater for sustainable agriculture. International in its coverage, the chapters of this handbook are contributed by leading authors and researchers in all relevant fields. Expertly explains recent advances in sustainable desalination technology, including nanocomposite membranes, carbon nanotube membranes, forward reverse osmosis and desalination by pervaporation Provides state-of-the-art techniques for minimizing system discharge, energy cost and environmental footprint Includes individual case studies to illustrate the benefits and drawbacks of each technique Discusses techniques for the custom-design of sustainable desalination plants for municipalities, private companies and industrial operations

Chemical Engineering Volume 2 covers the properties of particulate systems, including the character of individual particles and their behaviour in fluids. Sedimentation of particles, both singly and at high concentrations, flow in packed and fluidised beds and filtration are then examined. The latter part of the book deals with separation processes, such as distillation and gas absorption, which illustrate applications of the fundamental principles of mass transfer introduced in Chemical Engineering Volume 1. In conclusion, several techniques of growing importance - adsorption, ion exchange, chromatographic and membrane separations, and process intensification - are described. A logical progression of chemical engineering concepts, volume 2 builds on fundamental principles contained in Chemical Engineering volume 1 and these volumes are fully cross-referenced Reflects the growth in complexity and stature of chemical engineering over the last few years Supported with further reading at the end of each chapter and graded problems at the end of the book

This volume is a guide to the state of the art of activated carbon adsorption technology as applied to wastewater treatment. This book surveys this body of knowledge and is a detailed description of current technology.

This book treats the theoretical fundamentals of adsorption technology for water treatment from a practical perspective. It presents all the basics needed for experimental adsorption studies as well as for process modeling and adsorber design. According to the increasing importance of micropollutants in the water cycle, particular attention is paid to their competitive adsorption in the presence of background organic matter. The current edition considers recent developments in adsorption theory and practice.
This book contains papers presented in the 3rd International Conference on Separation Technology 2020 (ICoST 2020) held from 15 to 16th August 2020 at Johor, Malaysia. This proceeding contains papers presented by academics and industrial practitioners showcasing the latest advancements and findings in field of separation technology. The papers are categorized under the following tracks and topics of research: Environment Engineering Biotechnology Absorption and Adsorption Technology Wastewater Treatment ICoST 2020 covers multidisciplinary perspectives on separation research and aims to promote scientific information interchange between academics, researchers, graduates and industry professionals worldwide. This conference provides opportunities for the delegates to exchange new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration.

Gives readers a detailed understanding of adsorption refrigeration technology, with a focus on practical applications and environmental concerns. Systematically covering the technology of adsorption refrigeration, this book provides readers with a technical understanding of the topic as well as detailed information on the state-of-the-art from leading researchers in the field. Introducing readers to background on the development of adsorption refrigeration, the authors also cover the development of adsorbents, various thermodynamic theories, the design of adsorption systems and adsorption refrigeration cycles. The book guides readers through the research process, covering key aspects such as: the principle of adsorption refrigeration; choosing adsorbents according to different characteristics; thermodynamic equations; methods for the design of heat exchangers for adsorbers; and the advanced adsorption cycles needed. It is also valuable as a reference for professionals working in these areas. Covers state-of-the-art of adsorption research and technologies for relevant applications, working from adsorption working pairs through to the application of adsorption refrigeration technology for low grade heat recovery. Assesses sustainable alternatives to traditional refrigeration methods, such as the application of adsorption refrigeration systems for solar energy and waste heat. Includes a key chapter on the design of adsorption refrigeration systems as a tutorial for readers new to the topic; the calculation models for different components and working processes are also included. Takes real-world examples giving an insight into existing products and installations and enabling readers to apply the knowledge to their own work. Academics researching low grade energy utilization and refrigeration; Graduate students of refrigeration and low grade energy utilization; Experienced engineers wanting to renew knowledge of adsorption technology. Engineers working at companies developing adsorption chillers; Graduate students working on thermally driven systems; Advanced undergraduates for the Refrigeration Principle as a part of thermal driven refrigeration technology.

The aim of this book is to provide all those involved in designing and running adsorption processes with a guide to adsorption technology and design.

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 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.

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Adsorption, Ion Exchange and Catalysis is essentially a mixture of environmental science and chemical reactor engineering. More specifically, three important heterogeneous processes, namely, adsorption, ion exchange and catalysis, are analysed, from fundamental kinetics to reactor design with emphasis on their environmental applications. In Chapter 1, the subject of air and water pollution is dealt with. Data about pollutants and emission sources are given and the treatment methods are shortly presented. In Chapter 2, the very basics and historical development of adsorption, ion exchange and catalysis are presented as well as their environmental applications. Chapter 3 is devoted to heterogeneous processes and reactor analysis. All types of reactors are described in depth and reactor modelling, hydraulics and mass/heat transfer phenomena are examined for each type of reactor. Chapters 4 and 5 are dedicated to adsorption & ion exchange and catalysis, respectively. The basic principles are presented including kinetics, equilibrium, mass/heat transfer phenomena as well as the analytical solutions of the reactor models presented in Chapter 3. In the sixth chapter, the subject of scale up is approached. The two Annexes at the end of the book contain physical properties of substances of environmental interest as well as unit conversion tables. Finally, nearly all the examples contained are based on real experimental data found in literature with environmental interest. Most of the examples consider all aspects of operation design – kinetics, hydraulics and mass transfer. * Provides basic knowledge of major environmental problems and connects them to chemical engineering.

The world is facing a drinking water crisis. Besides continuous population growth, uneven distribution of water resources and periodic droughts have forced scientists to search for new and effective water treatment, remediation and recycling technologies. Therefore, there is a great need for the development of suitable, inexpensive and rapid wastewater treatment and reuse or conservation methods. This title discusses different types of wastewater treatment, remediation and recycling techniques, like adsorption, membrane filtration and reverse osmosis. It also provides guidance for the selection of the appropriate technologies or their combinations for specific applications so that one can select the exact and accurate technology without any problem. The book comprises detailed discussion on the application of various technologies for water treatment, remediation and recycling technologies and provides an update on the development in water treatment, detailed analysis of their features and economic analysis, bridging the current existing information gap. Each chapter is also documented by references and updated citations. Provides guidance for the selection of the appropriate technologies to industrialists and
government authorities for the selection of exact, inexpensive technologies for specific problem solving. Discusses the developments of inexpensive and rapid wastewater treatment, remediation and recycling. Gives information on the application of analytical techniques, such as GC, LC, IR, and XRF for analysing and measuring water. Provides an updated development in water treatment technologies, detailed analysis of their features and economic analysis, enabling to choose a problem-specific solution. Completely updates the current knowledge in this field, bridging the current existing information gap.

Adsorption is of considerable industrial importance and is a major part of many different processes throughout the chemical and process industries, including many reactions - chemical and bio-chemical, purification and filtration, gas and liquid processing and catalysis. Adsorption is a complex process and this makes the correct design and implementation of its operation all the more critical. The aim of this book is to provide all those involved in designing and running adsorption processes with a straightforward guide to the essentials of adsorption technology and design. It will therefore be an important addition to the bookshelves of both student and professional chemical, plant and process engineers in industries as varied as the petrochemical, pharmaceutical and food processing fields. Adsorption is of considerable industrial importance and is a major part of many different processes throughout the chemical and process industries, including many reactions - chemical and bio-chemical, purification and filtration, gas and liquid processing and catalysis. Adsorption is a complex process and this makes the correct design and implementation of its operation all the more critical. The aim of this book is to provide all those involved in designing and running adsorption processes with a straightforward guide to the essentials of adsorption technology and design. It will therefore be an important addition to the bookshelves of both student and professional chemical, plant and process engineers in industries as varied as the petrochemical, pharmaceutical and food processing fields. This book is practically based - other books are research level monographs. This is about the basic design and implementation of an important industrial process. Written as a straightforward and concise guide.

Process Equipment and Plant Design: Principles and Practices takes a holistic approach towards process design in the chemical engineering industry, dealing with the design of individual process equipment and its configuration as a complete functional system. Chapters cover typical heat and mass transfer systems and equipment included in a chemical engineering curriculum, such as heat exchangers, heat exchanger networks, evaporators, distillation, absorption, adsorption, reactors and more. The authors expand on additional topics such as industrial cooling systems, extraction, and topics on process utilities, piping and hydraulics, including instrumentation and safety basics that supplement the equipment design procedure and help to arrive at a complete plant design. The chapters are arranged in sections pertaining to heat and mass transfer processes, reacting systems, plant hydraulics and process vessels, plant auxiliaries, and engineered safety as well as a separate chapter showcasing examples of process design in complete plants. This comprehensive reference bridges the gap between industry and academia, while exploring best practices in design, including relevant theories in process design making this a valuable primer for fresh graduates and professionals working on design projects in the industry. Serves as a consolidated resource for process and plant design, including process utilities and engineered safety. Bridges the gap between industry and academia by including practices in design and summarizing relevant theories. Presents design solutions as a complete functional system and not merely the design of major equipment. Provides design procedures as pseudo-code/flow-chart, along with practical considerations.

This practical book is valuable for a diversity of applications in both air and water pollution. Adsorption Technology usually deals with control of organic compounds, such as VOCs, pesticides, phenolics, and complex synthetic organics. However, it is also used to control certain inorganic compounds such as heavy metals, reduced sulfur gases, and chlorine. Much original work, including original figures.

Particle Technology and Applications presents the theoretical and technological background of particle science and explores up-to-date applications of particle technologies in the chemical, petrochemical, energy, mechanical, and materials industries. It looks at the importance of particle science and technology in the development of efficient chemical processes and novel functional materials. With peer-reviewed chapters written by a select group of academic and industry experts, the book provides examples of particle technology and its advanced industrial applications. It includes the necessary scientific background of particle technology as well as relevant technological details of the application areas. This helps readers grasp specific details of the applied technology, since the advanced particle technology can directly or synergistically have an impact on outcomes, such as the development of a targeted functional material, enhancement of existing processing techniques, and modification of the properties of existing materials. Presenting a consistent scientific treatment of all topics, this comprehensive yet accessible book covers a variety of practical applications and relevant theoretical foundation of particle science and technology. It will help readers tackle new challenges in process and product development and create new methodologies in the clean technology sector.

Volume I contains a brief review of adsorption history and its development for practical purposes up until now. It also presents some important information on adsorbents and catalysis as well as on the methods of their characterization. The part of this volume dealing with practical industrial applications includes chapters presenting advanced technical tools for high capacity adsorption separation of liquid and gas mixtures, development of new adsorbents for removal of hazardous contaminants from combustion flue gases and wastewaters, degasification of coal seams and fabrication of inorganic membranes and their applications. A comprehensive review is also included on contemporary utility of self-assembled monolayers, adsorption proteins and their role in modern industry, adsorption methods in technology of optical fibre glasses, sol-gel technology, solid desiccant dehumidification systems, etc. The articles give both the scientific backgrounds of the phenomena discussed and emphasize their practical aspects. The chapters give not only broad coverage in the fields of adsorption, design data and adsorbent materials for industrial applications for the period 1967-1997 concludes the book.

Statistical Design-Chemometrics is applicable to researchers and professionals who wish to perform experiments in chemometrics and carry out analysis of the data in the most efficient way possible. The language is clear, direct and oriented towards real applications. The book provides 106 exercises with answers to accompany the study of theoretical principles. Forty two cases studies with real data are presented showing designs and the complete statistical analyses for problems in the areas chromatography, electroanalytical and electrochemistry, calibration, polymers, gas adsorption, semiconductors, food technology, biotechnology, photochemistry, catalysis.
detergents and ceramics. These studies serve as a guide that the reader can use to perform correct data analyses. -Provides 42 case studies containing step-by-step descriptions of calculation procedures that can be applied to most real optimization problems -Contains 106 theoretical exercises to test individual learning and to provide classroom exercises and material for written tests and exams -Written in a language that facilitates learning for physical and biological scientists and engineers - Takes a practical approach for those involved in industrial optimization problems

This book provides practical guidance for the design of liquid and vapor phase devices for the adsorption of organic chemicals. The adsorptive media addressed include granular activated carbon (GAC) and other alternative adsorption carbon media, such as powdered activated carbon (PAC) and non-carbon adsorbents. Adsorption Design Guide addresses various adsorption media types, applicability, use of various adsorption process technologies, equipment and ancillary component design, availability, advantages, disadvantages, regeneration methods, costs, and safety considerations. The equipment can be installed alone or as part of an overall treatment train, based on site-specific factors. Carbon, in various forms, has been used to adsorb contaminants for some time. The first documented use of carbon as an adsorbent was for medical purposes, in the form of wood char in 1550 B.C. The first documented use for water treatment was in 200 B.C. "to remove disagreeable tastes." In 1785 experimental chemists learned that carbon could accumulate unwanted contaminants from water. Carbon in the activated form was first used as a filter medium in the late 1800s. The understanding of carbon adsorption progressed in the late 19th and early 20th centuries, when vapor phase organic carbon was developed and given its first widespread use as a defense against gas warfare during WWI. The first GAC filters used for water treatment were installed in Europe in 1929. The first GAC filters for water treatment in the United States were installed in Bay City, Michigan, in 1930. In the 1940s, GAC was found to be an efficient purification and separation technology for the synthetic chemical industry. By the late 1960s and early 1970s, GAC was found to be very effective at removing a broad spectrum of synthetic chemicals from water and gases (i.e., from the vapor phase).

A comprehensive resource to the construction, use, and modification of the wide variety of adsorptive and chromatographic separations Design, Simulation and Optimization of Adsorptive and Chromatographic Separations offers the information needed to effectively design, simulate, and optimize adsorptive and chromatographic separations for a wide range of industrial applications. The authors? noted experts in the field?cover the fundamental principles, the applications, and a range of modeling techniques for the processes. The text presents a unified approach that includes the ideal and intermediate equations and offers a wealth of hands-on case studies that employ the rigorous simulation packages Aspen Adsorption and Aspen Chromatography. The text reviews the effective design strategies, details design considerations, and the assumptions which the modelers are allowed to make. The authors also cover shortcut design methods as well as mathematical tools that help to determine optimal operating conditions. This important text: - Covers everything from the underlying phenomena to model optimization and the customization of model code -Includes practical tutorials that allow for independent review and study - Offers a comprehensive review of the construction, use, and modification of the wide variety of adsorptive and chromatographic separations -Contains contributions from three noted experts in the field Written for chromatographers, process engineers, chemists, and other professionals, Design, Simulation and Optimization of Adsorptive and Chromatographic Separations offers a comprehensive review of the construction, use, and modification of adsorptive and chromatographic separations.