

Industrial Gas Handbook Gas Separation And Purification

A guide to membrane separation based on a variety of porous materials with promising separation applications *Microporous Materials for Separation Membranes* offers an in-depth guide that explores microporous materials? potential for membrane applications. The authors?two experts on the topic?examine a wide range of porous materials that have application potential including: microporous silica, porous carbons, zeolites, metal-organic frameworks (MOFs), and porous organic frameworks (POFs). Comprehensive in scope, the book covers a broad range of topics on membrane separations such as: hydrogen recovery, carbon dioxide capture, air purification, hydrocarbon separation, pervaporation, and water treatment. In addition, this up-to-date resource explores the most recent materials for preparing microporous membranes and explores the most promising applications for industrial use. This important book: -Examines the use of microporous materials as membranes to perform with different gases and liquids -Offers an overview of the basic knowledge of membrane separation and an intense examination of separations -Describes the state-of-the-art of membrane separation with porous materials -Highlights the most promising applications of industrial interest Written for scientists working in the fields of membranes, gas and liquid, *Microporous Materials for Separation Membranes* offers a valuable guide to the potential of microporous materials for membrane applications.

Mass transfer along with separation processes is an area that is often quite challenging to master, as most volumes currently available complicate the learning by teaching mass transfer linked with heat transfer, rather than focusing on more relevant techniques. With this thoroughly updated second edition, *Mass Transfer and Separation Processes: Principles and Applications* presents a highly thoughtful and instructive introduction to this sophisticated material by teaching mass transfer and separation processes as unique though related entities. In an ever increasing effort to demystify the subject, with this edition, the author— Avoids more complex separation processes Places a greater emphasis on the art of simplifying assumptions Conveys a greater sense of scale with the inclusion of numerous photos of actual installations Makes the math only as complicated as necessary while reviewing fundamental principles that may have been forgotten The book explores essential principles and reinforces the concepts with classical and contemporary illustrations drawn from the engineering, environmental, and biological sciences. The theories of heat conduction and transfer are utilized not so much to draw analogies but rather to make fruitful use of existing solutions not seen in other texts on the subject. Both an introductory resource and a reference, this important text serves environmental, biomedical, and engineering professionals, as well as anyone wishing to gain a grasp on this subject and its increasing relevance across a number of fields. It fills a void in traditional chemical engineering literature by providing access to the principles and working practices that allow mass transfer theory to be applied to separation processes.

The Handbook of Membrane Separations: Chemical, Pharmaceutical, and Biotechnological Applications provides detailed information on membrane separation technologies as they have evolved over the past decades. To provide a basic

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understanding of membrane technology, this book documents the developments dealing with these technologies. It explores chemical, pharmaceutical, food processing and biotechnological applications of membrane processes ranging from selective separation to solvent and material recovery. This text also presents in-depth knowledge of membrane separation mechanisms, transport models, membrane permeability computations, membrane types and modules, as well as membrane reactors. Membrane processes have wide industrial applications. This handbook reviews the published literature covering many existing and emerging uses, presents an in-depth description of common uses in the chemical, petrochemical, petroleum, commercialized membrane processes, and gives a state-of-the-art review of new membrane processes for environmental, water treatment, pharmaceutical, medical, food, dairy, beverage, paper, and textile concepts under development. It is intended to be a single source of underlying principles, membranes, membrane modules, process applications include: (1) dialysis for the purification of human blood (the artificial kidney), (2) sign, applications, and cost estimates. It is also electro dialysis for the desalination of brackish water, a first attempt to bridge the gap between the water to produce potable water, (3) reverse osmosis for the desalination of seawater, (4) There are several groups which may benefit from this handbook. It can be used as educational material for industrial personnel engaged in membrane separations. For scientists and engineers active in research and development in wine, and soft drinks. Since membrane processes generally have low capital investment, as a source of reference for the entire field.

Cryogenics Safety Manual: A Guide to Good Practice, Third Edition promotes the safe application and development of low temperature engineering. The book also details the hazards involved in the operation, handling, and development of cryogenic devices. The text is divided into five chapters. Chapter 1 describes the health precautions and legislations involved in the field. Chapter 2 tackles the specific hazards and safety measures in handling and maintaining air separation plants. Chapter 3 discusses the precautions to be observed in the different procedures concerning natural gas, ethylene, and methane. Chapter 4 covers the proper safety measures and maintenance of plants and equipment designed to handle liquid and gas states of hydrogen at low temperatures, and Chapter 5 talks about the special precautions in handling helium, neon, krypton, and xenon. Chemists, physicists, engineers, and safety personnel involved in the field of cryogenics would benefit from this helpful guide.

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 science and engineering. This giant reference, sponsored by the American Gas Association and written by a staff of 150 specialists, answers any general or specific engineering information requirement in regard to natural, liquefied petroleum, and manufactured gases. It presents in concise, orderly fashion all "working" facts and data on fuel gases needed by engineers, industry, and government personnel. The Handbook brings together in one

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volume and 125 chapters all conceivable engineering methods and operating data of the entire gas industry, from source to burner. Tables, graphs, charts, equations, and illustrations clarify and illuminate a text that is crammed with the kind of information that is virtually unobtainable elsewhere.

Your personal Ullmann's: Chemical and physical characteristics, production processes and production figures, main applications, toxicology and safety information are all to be found here in one single resource - bringing the vast knowledge of the Ullmann's Encyclopedia to the desks of industrial chemists and chemical engineers. The ULLMANN'S perspective on polymers and plastics brings reliable information on more than 1500 compounds and products straight to your desktop Carefully selected "best of" compilation of 61 topical articles from the Encyclopedia of Industrial Chemistry on economically important polymers provide a wealth of chemical, physical and economic data on more than 1000 different polymers and hundreds of modifications Contains a wealth of information on the production and use of all industrially relevant polymers and plastics, including organic and inorganic polymers, fibers, foams and resins Extensively updated: more than 30% of the content has been added or updated since the launch of the 7th edition of the Ullmann's encyclopedia in 2011 and is now available in print for the first time 4 Volumes

A unique, well-documented, and forward-thinking work, the second edition of Handbook of Natural Gas Transmission and Processing continues to present a thoroughly updated, authoritative, and comprehensive description of all major aspects of natural gas transmission and processing. It provides an ideal platform for engineers, technologists, and operations personnel working in the natural gas industry to get a better understanding of any special requirements for optimal design and operations of natural gas transmission pipelines and processing plants. First book of its kind that covers all aspects of natural gas transmission and processing Provides pivotal updates on the latest technologies, which have not been addressed in-depth in any existing books Offers practical advice for design and operation based on sound engineering principles and established techniques Examines ways to select the best processing route for optimal design of gas-processing plants Contains new discussions on process modeling, control, and optimization in gas processing industry

Gas separation membranes offer a number of benefits over other separation technologies, and they play an increasingly important role in reducing the environmental impacts and costs of many industrial processes. This book describes recent and emerging results in membrane gas separation, including highlights of nanoscience and technology, novel polymeric and inorganic membrane materials, new membrane approaches to solve environmental problems e.g. greenhouse gases, aspects of membrane engineering, and recent achievements in industrial gas separation. It includes: Hyperbranched polyimides, amorphous glassy polymers and perfluorinated copolymers Nanocomposite (mixed matrix) membranes Polymeric magnetic membranes Sequestration of CO₂ to reduce global warming Industrial applications of gas separation Developed from sessions of the most recent International Congress on Membranes and Membrane Processes, Membrane Gas Separation gives a snapshot of the current situation, and presents both fundamental results and applied achievements.

Almost every modern manufacturing process relies on industrial gases, and sales of

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such gases are expected to rise by around 45% over the next five years. Here, experienced and authoritative experts from one of the two world's largest producer of industrial gases impart their knowledge on atmospheric, noble and synthesized gases, carbon dioxide, LNG, acetylene and other fuel gases, as well as special and medical gases. Modern applications, e.g., the use of hydrogen in fuel cells, are included as well. This practical text is rounded off by a section on logistics.

Offers detailed coverage of the petrochemical applications of large-volume industrial gases. The text examines the factors that influence the cost of producing and delivering gases and the economic reasons for choosing specific manufacturing methods. It emphasizes the commercial areas that employ industrial gases as feedstocks.

A carefully selected compilation of the most relevant articles from the online edition of "ULLMANN's Encyclopedia of Industrial Chemistry", this three-volume handbook contains a wealth of information on energy sources, energy generation and storage, fossil and renewable fuels as well as the associated processing technology. Fossil as well as renewable fuels, nuclear technology, power generation and storage technologies are treated side by side, providing a unique overview of the entire global energy industry. New or updated articles include such classical topics as coal technologies, oil and gas, as well as cutting-edge technologies, such as biogas, thermoelectricity and solar technology. The result is an in-depth survey of industrial-scale energy technology.

The monograph consists of ten chapters, with three basic themes. First, gas-separation technology is introduced and the sources and uses of industrial gases are described. The second part includes a description of those industries which use gas separation and an analysis of the gas-separation processes themselves. The last part describes the plant hardware and its design.

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The conventional approach for energy saving in a process system is to maximize heat recovery without changing any process conditions by using pinch technology. "Self-heat recuperation technology" was developed to achieve further energy saving in the process system by eliminating the necessity for any external heat input, such as firing or imported steam. Advanced Energy Saving and its Applications in Industry introduces the concept of self-heat recuperation and the application of such technology to a wide range of processes from heavy chemical complexes to other processes such as drying and gas separation processes, which require heating and cooling during operation. Conventional energy saving items in a utility system are applied and implemented based on a single site approach, however, when looking at heavy chemical complexes, it was apparent that the low-grade heat discharged as waste from a refinery could also be used in an adjacent petrochemical plant. There could therefore be a large energy saving potential by utilizing the surplus heat across the sites. Advanced Energy Saving and its Applications in Industry assesses conventional approaches to industrial energy saving and explains and outlines new methods to provide even greater energy saving potential. Advanced Energy Saving and its Applications in Industry provides a key resource and research tool for all those involved in developing the energy efficiency of industrial processes. Researchers, industry professionals and even students with an interest in green engineering will find the summaries of the conventional and suggested new methods useful when attempting to advance further development within this field.

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The aim of this book is to present in a single volume an up-to-date account of the chemistry and chemical engineering which underlie the major areas of the chemical process industry. This most recent edition includes several new chapters which comprise important threads in the industry's total fabric. These new chapters cover waste minimization, safety considerations in chemical plant design and operation, emergency response planning, and statistical applications in quality control and experimental planning. Together with the chapters on chemical industry economics and wastewater treatment~ they provide a unifying base on which the reader can most effectively apply the information provided in the chapters which describe the various areas of the chemical process industries. The ninth edition of this established reference work contains the contributions of some fifty experts from industry, government, and academe. I have been humbled by the breadth and depth of their knowledge and expertise and by the willingness and enthusiasm with which they shared their knowledge and insights. They have, without exception, been unstinting in their efforts to make their respective chapters as complete and informative as possible within the space available. Errors of omission, duplication, and shortcomings in organization are mine. Grateful acknowledgment is made to the editors of technical journals and publishing houses for permission to reproduce illustrations and other materials and to the many industrial concerns which contributed drawings and photographs. Comments and criticisms by readers will be welcome.

Materials Science of Membranes for Gas and Vapor Separation is a one-stop reference for the latest advances in membrane-based separation and technology. Put together by an international team of contributors and academia, the book focuses on the advances in both theoretical and experimental materials science and engineering, as well as progress in membrane technology. Special attention is given to comparing polymer and inorganic/organic separation and other emerging applications such as sensors. This book aims to give a balanced treatment of the subject area, allowing the reader an excellent overall perspective of new theoretical results that can be applied to advanced materials, as well as the separation of polymers. The contributions will provide a compact source of relevant and timely information and will be of interest to government, industrial and academic polymer chemists, chemical engineers and materials scientists, as well as an ideal introduction to students.

This manual contains necessary and useful information and data in an easily accessible format relating to the use of membranes. Membranes are among the most important engineering components in use today, and each year more and more effective uses for membrane technologies are found - for example: water purification, industrial effluent treatment, solvent dehydration by per-vaporation, recovery of volatile organic compounds, protein recovery, bioseparations and many others. The pace of change in the membrane industry has been accelerating rapidly in recent years, occasioned in part by the demand of end-users, but also as a result of the investment in R&D by manufacturers. To reflect these changes the author has obtained the latest information from some of the leading suppliers in the business. In one complete volume this unique handbook gives practical guidance to using selected membrane processes in individual industries while also providing a useful guide to equipment selection and usage. Processes for clearing gases from dust in wet-type dust separators are widely applied in many industries for technological purposes and environmental control. Among goals

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of these processes is to ensure high efficiency of dust removal with minimum energy costs. This book presents the newest scientific research data under the theory and practice of wet clearing of industrial gases from dispersion particles. The authors consider the modern aspects of the separation process and gas-dispersed impurities. The book covers three main sections on working out and research of the following types of wet gas purifiers: dynamic scrubbers, wet gas clean apparatuses of shock-inertial act, and bubble dust traps. Each section considers the engineering and technological aspects of circuit design, including the theoretical fundamentals of process of gas cleaning, trial and error methods and calculation of apparatuses of wet gas cleaning, and construction of new gas clean apparatuses, their operational characteristics, and recommendations about application. In the literature there are no reliable methods of efficient clearing of gas emissions in scrubbers. This creates complexities at calculation and designing of these apparatuses and also complicates process intensification. The authors develop methods of calculation of process of gas cleaning on the basis of studying of hydrodynamic characteristics of apparatuses. Supplemented with over 200 helpful illustrations, this book offers an exposition of the chemical natures of hypothetical black box membranes and those of specific polymers. Chemical structure at the functional group level is considered as the synthesis of steric and polar factors.

This book introduces recent developments of membrane technologies applied to gas and water treatments, energy processes and environmental issues. Novel knowledge and mechanisms on membrane fabrication and usage in energy, chemical, and environmental engineering are detailed in 12 book chapters from France, UK, Spain, China, Nigeria, Iran and Pakistan. The information in this book will be useful for engineers, students, and experts in these fields.

Solid—Gas Separation presents a brief and highly technical account of the principles and technology of gas-cleaning. The book deals with three associated aspects of gas-cleaning: the relevant dimensionless groups, the efficiency of separation and the economics of gas cleaning. The text begins with the discussion of the principles of particle separation and classification of equipment; general characteristics of equipment; and dimensionless groups for modeling and equipment scale-up.

Subsequent chapters are devoted to the examination of the efficiency of separation, aero-mechanical dry separators, scrubbers, electrostatic precipitators, and filters. The last chapter deals with the economics of gas-cleaning equipment selection.

Environmental and industrial engineers will find the text very useful.

Ceramic Membranes for Reaction and Separation is the first single-authored guide to the developing area of ceramic membranes. Starting by documenting established procedures of ceramic membrane preparation and characterization, this title then focuses on gas separation. The final chapter covers ceramic membrane reactors;- as distributors and separators, and general engineering considerations. Chapters include key examples to illustrate membrane synthesis, characterisation and applications in industry. Theoretical principles, advantages and disadvantages of using ceramic membranes under the various conditions are discussed where applicable.

Volume 1 of a 4-volume series is a concise, authoritative and an eminently readable and enjoyable experience related to hydrogen production, storage and usage for portable and stationary power. Although the major focus is on hydrogen, discussion of

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fossil fuels and nuclear power is also presented where appropriate. This monograph is written by recognized experts in the field, and is both timely and appropriate as this decade will see application of hydrogen as an energy carrier, for example in transportation sector. The world's reliance on fossil fuels is due to the ever growing need for energy to sustain life and on-going progress; however exploitation also brings consequences such as emission of carbon, nitrogen and sulfur dioxides into the atmosphere. The collective influence of these photochemical gases is production of acid rain and an alternation of global temperatures, leading to record high temperatures in many parts of the world. The fossil fuel is unsustainable and thus there is a critical need for alternative sustainable energy resources. One universal energy carrier is hydrogen, which is the focus of this volume. This book is suitable for those who work in the energy field as technical experts, including engineers and scientists, as well as managers, policy and decision-makers, environmentalists and consultants. Students and practitioners such as lectures, teachers, legislators and their aids in the field of energy will find this book invaluable and a practical handbook or guide in the field of sustainable energy with emphasis on hydrogen as an energy carrier.

Production of industrial alcohol is an age old practice. But with time, the usage areas as well as production techniques have gone through a major transformation. Industrial alcohol is distilled ethyl alcohol (C_2H_5OH), normally of high proof, produced and sold for other than beverage purposes. It is usually distributed in the form of pure ethyl alcohol, completely denatured alcohol, especially denatured alcohol and proprietary solvent blends. Ethyl Alcohol is the common name for the hydroxyl derivative of the hydrocarbon ethane. Industrial alcohol is distilled ethyl alcohol normally of high proof, produced and sold for other than beverage purposes. Industrial alcohol finds its applications in many chemical industries, pharmaceutical industries, Ink Industries and various allied applications. Much of this alcohol is obtained synthetically from ethylene. However, its production from microbial fermentation using variety of cheap sugary substrates is still commercially important. The various substrates used for ethanol production are sugar crops such as sugarcane, sugar beet, sorghum, etc. provide a good substrate. Bye product of these crop processing, e.g., molasses, sweet sorghum syrup, etc. are the most common substrates. Cereals like maize, wheat, rice etc are also used for ethanol production. Distillation of industrial alcohol, which is normally not used for consumption, can be made in a two step process. The process of distillation is one with a slow dynamics making it essential to have a carefully planned and designed control system. Ethyl alcohol or ethanol ranks second only to water as the most widely used solvent in chemical industry and as these industries have expanded, so the demand for industrial alcohol has increased. Some of the fundamentals of the book are base case production of alcohol, survey and natural alcohols manufacture, alcohol from wheat straw, alcohol from sacchariferous feed stocks, conventional process used in Indian distilleries, fermentation, distillation, continuous rectification and reflux ratio, alcohol recovery, quality of alcohol, steam economy, fuel oil separation, trihydric and polyhydric alcohols, coal gasification, methanol synthesis, coal gasification and raw gas purification, synthesis gas preparation, methanol synthesis and purification, badger conceptual design. This handbook on Industrial alcohol technology provides complete details on process and the technology used in the production of ethanol from various sugar crops and cereals and also briefs the different types of monohydric, trihydric and

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polyhydric alcohols. This handbook will be very helpful to its readers who are just beginners in this field and will also find useful for upcoming entrepreneurs, existing industries, technical institution, etc.

Can hydrogen and electricity supply all of the world's energy needs? Handbook of Hydrogen Energy thoroughly explores the notion of a hydrogen economy and addresses this question. The handbook considers hydrogen and electricity as a permanent energy system and provides factual information based on science. The text focuses on a large cross section o

Drawing on Frank G. Kerry's more than 60 years of experience as a practicing engineer, the Industrial Gas Handbook: Gas Separation and Purification provides from-the-trenches advice that helps practicing engineers master and advance in the field. It offers detailed discussions and up-to-date approaches to process cycles for cryogenic separation of air, adsorption processes for front-end air purification, and related process control and instrumentation. The book uses SI units in accordance with international industry and covers topics such as chronological development, industrial applications, air separation technologies, noble gases, front end purification systems, insulation, non-cryogenic separation, safety, cleaning for oxygen systems, economics, and product liquefaction, storage, and transportation. No other book currently available takes the practical approach of this book — they are either outdated, too theoretical, or narrow in focus. In a clear and effective presentation, Industrial Gas Handbook: Gas Separation and Purification covers the principles and applications of industrial gas separation and purification.

Surveys the selection, design, and operation of most of the industrially important separation processes. Discusses the underlying principles on which the processes are based, and provides illustrative examples of the use of the processes in a modern context. Features thorough treatment of newer separation processes based on membranes, adsorption, chromatography, ion exchange, and chemical complexation. Includes a review of historically important separation processes such as distillation, absorption, extraction, leaching, and crystallization and considers these techniques in light of recent developments affecting them.

The depletion of natural energy resources provides evidential adverse impacts on world economy functionality. The strong requirement of a sustainable energy supply has escalated intensive research and the discovery of cleaner energy sources, as well as efficient energy management practices. In the context of a circular economy, this research not only targets the optimisation of resources utilisation at different stages but also emphasises the eco-design of products to extend production life spans. Based on this concept, this book discusses the roles of process integration approaches, renewable energy sources utilisation and design modifications in addressing the process energy and exergy efficiency improvement. The primary focus is to enhance the economic and environmental performance through process analysis, modelling and optimisation. The articles mainly show the contribution of each aspect: (a) design and numerical study for innovative energy-efficient technologies, (b) process integration—heat and power, (c) process energy efficiency or emission analysis, and (d) optimisation of renewable energy resources' supply chain. The articles are based on the latest contribution of this journal's Special Issues in the 21st conference entitled "Process Integration, Modelling and Optimisation for Energy Saving and Pollution

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Reduction (PRES)". This book is complemented with an editorial review to highlight the broader state-of-the-art development.

Industrial gases are inextricably woven into the fabric of modern manufacturing. From the primary extraction of raw materials, through their intermediate processing to manufacture metals, chemicals and ceramics, to the fabrication of sophisticated industrial, consumer and food products, gases are used across the whole spectrum of industry. The isolation, manufacture and supply of these gases is a major industry in itself; the 300 million tones of gas used each year generates sales in excess of \$20 billion. In terms of tonnage, nitrogen has become the most used industrial gas, finding applications across the whole range of industry. It is still manufactured by liquifying and then distilling air, but as applications develop and demand increases, newer methods of isolation, such as pressure swing absorption and membrane separation will become important. This new book introduces the main industrial gases and the gases industry, it discusses the main technologies for their isolation, separation, manufacture and handling. In addition, the book contains an overview of the main applications of industrial gases and a brief discussion of new production processes and applications. Chemists, chemical engineers, physicists and technologists involved in the research and development, production or utilisation of industrial gases will find this concise book an essential and accessible reference source. For advanced students of these disciplines, the book provides a fascinating overview of this important industry.

Natural gas has become the world's primary supply of energy in the last decades. It is naturally occurring from the decomposition of organic materials, over the past 150 million years ago, into hydrocarbons. It is considered one of the most useful energy sources and the fastest growing energy source in the world. This book presents state-of-the-art advances in natural gas emerging technologies. It contains ten chapters divided into three sections that cover natural gas technology, utilization, and alternative.

Substantially revising and updating the classic reference in the field, this handbook offers a valuable overview and myriad details on current chemical processes, products, and practices. No other source offers as much data on the chemistry, engineering, economics, and infrastructure of the industry. The Handbook serves a spectrum of individuals, from those who are directly involved in the chemical industry to others in related industries and activities. It provides not only the underlying science and technology for important industry sectors, but also broad coverage of critical supporting topics. Industrial processes and products can be much enhanced through observing the tenets and applying the methodologies found in chapters on Green Engineering and Chemistry (specifically, biomass conversion), Practical Catalysis, and Environmental Measurements; as well as expanded treatment of Safety, chemistry plant security, and Emergency Preparedness. Understanding these factors allows them to be part of the total process and helps achieve optimum results in, for example, process development, review, and modification. Important topics in the energy field, namely nuclear, coal, natural gas, and petroleum, are covered in individual chapters. Other new chapters include energy conversion, energy storage, emerging nanoscience and technology. Updated sections include more material on biomass conversion, as well as three chapters covering biotechnology topics, namely, Industrial Biotechnology, Industrial Enzymes, and Industrial Production of Therapeutic Proteins.

While the PSE community continues its focus on understanding, synthesizing,

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modeling, designing, simulating, analyzing, diagnosing, operating, controlling, managing, and optimizing a host of chemical and related industries using the systems approach, the boundaries of PSE research have expanded considerably over the years. While early PSE research was largely concerned with individual units and plants, the current research spans wide ranges of scales in size (molecules to processing units to plants to global multinational enterprises to global supply chain networks; biological cells to ecological webs) and time (instantaneous molecular interactions to months of plant operation to years of strategic planning). The changes and challenges brought about by increasing globalization and the the common global issues of energy, sustainability, and environment provide the motivation for the theme of PSE2012: Process Systems Engineering and Decision Support for the Flat World. Each theme includes an invited chapter based on the plenary presentation by an eminent academic or industrial researcher Reports on the state-of-the-art advances in the various fields of process systems engineering Addresses common global problems and the research being done to solve them

Membrane Technology - a clean and energy saving alternative to traditional/conventional processes. Developed from a useful laboratory technique to a commercial separation technology, today it has widespread and rapidly expanding use in the chemical industry. It has established applications in areas such as hydrogen separation and recovery of organic vapors from process gas streams, and selective transport of organic solvents, and it is opening new perspectives for catalytic conversion in membrane reactors. Membrane technology provides a unique solution for industrial waste treatment and for controlled production of valuable chemicals. This book outlines several established applications of membranes in the chemical industry, reviews the available membranes and membrane processes for the field, and discusses the huge potential of this technology in chemical processes. Each chapter has been written by an international leading expert with extensive industrial experience in the field.

An international and interdisciplinary team of leading experts from both academia and industry report on the wide range of hot applications for MOFs, discussing both the advantages and limits of the material. The resulting overview covers everything from catalysis, H₂ and CH₄ storage and gas purification to drug delivery and sensors. From the Contents: - Design of Porous Coordination Polymers/Metal-Organic Frameworks: Past, Present and Future - Design of Functional Metal-Organic Frameworks by Post-Synthetic Modification - Thermodynamic Methods for Prediction of Gas Separation in Flexible Frameworks - Separation and purification of gases by MOFs - Opportunities for MOFs in CO₂ capture from flue gases, natural gas and syngas by adsorption - Manufacture of MOF thin films on structured supports for separation and catalysis - Research status of Metal-Organic Frameworks for on-board cryo-adsorptive hydrogen storage applications - Separation of xylene isomers - Metal-Organic Frameworks as Catalysts for Organic Reactions - Biomedical applications of Metal Organic Frameworks - Metal Organic Frameworks for Biomedical Imaging - Luminescent Metal-Organic Frameworks - Deposition of thin films for sensor applications - Industrial MOF Synthesis - MOF shaping and immobilisation A must-have for every scientist in the field.

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