

Environmental Pollution Control Engineering By C S Rao

During the last two decades, the environmental pollution regulations have undergone a vast change. Attempts have been made to refine the conventional technologies and to develop new technologies to meet increasingly more stringent environmental quality criteria. The challenge that one faces today is to meet these stringent requirements in an environmentally acceptable and cost effective manner. The present book addresses the application of the state-of-the-art technology to the solutions to today's problems in industrial effluent pollution control and environmental protection. The highlight of this book is the inclusion of the salient features of process modifications and other important methods and techniques for the minimization of wastes. The chapter on process modification for waste minimization provides new technical features and tools, latest technologies and techniques, and other industrial operations. Besides, the text covers the role of an environmental engineer in the methodology for making pollution control decisions. **KEY FEATURES :** Includes numerous self-explanatory tabular and diagrammatic representations. Presents pollution problems of few chemical and processing industries. Provides case studies on environmental pollution problems and their prevention. Analyzes thoroughly the planning and strategies of environmental protection. Designed as a textbook for the undergraduate students of civil and chemical engineering, this book will also be useful to the

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postgraduate students of environmental science and engineering.

The book illustrates theories of sustainable development from physical, chemical and biological aspects, and then introduces technologies to prevent pollution of water, air, solid waste and noise, finally concludes with ecological environmental protection and restoration techniques.

With interdisciplinary features and abundant case studies, it is an essential reference for researchers and industrial engineers.

In the debate over pollution control, the price of pollution is a key issue. But which is more costly: clean up or prevention? From regulations to technology selection to equipment design, *Air Pollution Control Technology Handbook* serves as a single source of information on commonly used air pollution control technology. It covers environmental regulations and their history, process design, the cost of air pollution control equipment, and methods of designing equipment for control of gaseous pollutants and particulate matter. This book covers how to: Review alternative design methods Select methods for control Evaluate the costs of control equipment Examine equipment proposals from vendors With its comprehensive coverage of air pollution control processes, the *Air Pollution Control Technology Handbook* is a detailed reference for the practicing engineer who prepares the basic process engineering and cost estimation required for the design of an air pollution control system. It discusses the topics in depth so that you can apply the methods and equations presented and proceed with equipment design.

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Compiling knowledge gained through more than 50 years of experience in environmental engineering technology, this book illustrates the application of fundamental concepts in microbiology to provide a sound basis for the design and operation of various biological systems used in solving environmental challenges in the air, water, and soil. Environmental Pollution Control Microbiology emphasizes the quantitative relationships of microbial growth and metabolism, beginning an examination of the overall metabolism and resulting growth of bacteria, fungi, algae, protozoa, rotifers, and other microorganisms and explains how bacteria bring about the stabilization of biodegradable organic pollutants.

This book will cater to the needs of students who want to pursue a Diploma in Engineering, Degree in Engineering (B.Tech/B.E., B.Sc.(Engg.) students. Postgraduate degree in Engineering (M. Tech, M.E.) students. AMIE (Associate membership of Indian Institute of Metals) examination. AMIChE (Associate Membership of Indian Institute of Chemical Engineers) examination. AIC (Associateship of Institute of Chemist) examination. Practicing engineers in the field of environmental engineering. Environmental engineering professionals. A rigorous and thorough analysis of the production of air pollutants and their control, this text is geared toward chemical and environmental engineering students. Topics include combustion, principles of aerosol behavior, theories of the removal of particulate and gaseous pollutants from effluent streams, and air pollution control strategies. 1988 edition.Reprint of the

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Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1988 edition.

A panel of respected air pollution control educators and practicing professionals critically survey the both principles and practices underlying control processes, and illustrate these with a host of detailed design examples for practicing engineers. The authors discuss the performance, potential, and limitations of the major control processes-including fabric filtration, cyclones, electrostatic precipitation, wet and dry scrubbing, and condensation-as a basis for intelligent planning of abatement systems,. Additional chapters critically examine flare processes, thermal oxidation, catalytic oxidation, gas-phase activated carbon adsorption, and gas-phase biofiltration. The contributors detail the Best Available Technologies (BAT) for air pollution control and provide cost data, examples, theoretical explanations, and engineering methods for the design, installation, and operation of air pollution process equipment. Methods of practical design calculation are illustrated by numerous numerical calculations.

Covers cost estimation, incineration, adsorption devices, flue gas desulfurization, control of nitrogen oxides, particulate emissions control, cyclonic devices, electrostatic precipitators, and fabric filters

Originally published in 1974 this volume brings together contributions from lawyers, a nuclear physicist, a landscape architect, biologist, engineers and a former Inspector of the International Atomic Energy Agency. It covers technical and legal

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information on air, water, sea, land and noise pollution and provides a comprehensive guide, summary and introduction to the journal literature in separate but relevant disciplines. All of the contributors have specialised in studies in pollution control and contributed to the debate on use and management of the environment.

This new edition of *The Science of Environmental Pollution* presents common-sense approaches and practical examples based on scientific principles, models, and observations, but keeps the text lively and understandable for scientists and non-scientists alike. It addresses the important questions regarding environmental pollution: What is it? What is its impact? What are the causes and how can we mitigate them? But more than this, it stimulates new ways to think about the issues and their possible solutions. This third edition has been updated throughout, and contains new information on endocrine disruptors in drinking water, contaminated sediments in surface waters, hydraulic fracturing wastewater, and more. Also, it will include new case studies, examples, and study questions.

Environmental issues continue to attract attention at all levels. Some sources say that pollution is the direct cause of climate change; others deny that the possibility even exists. This text sorts through the hyperbole, providing concepts and guidelines that not only aid in understanding the issues, but equip

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readers with the scientific rationale required to make informed decisions.

Offers up-to-date technical information on current and potential pollution control and waste minimization practices, providing industry-specific case studies, techniques and models.

Environmental Pollution Control Engineering
New Age International

Leading pollution control educators and practicing professionals describe how various combinations of different cutting-edge process systems can be arranged to solve air, noise, and thermal pollution problems. Each chapter discusses in detail a variety of process combinations, along with technical and economic evaluations, and presents explanations of the principles behind the designs, as well as numerous variant designs useful to practicing engineers. The emphasis throughout is on developing the necessary engineering solutions from fundamental principles of chemistry, physics, and mathematics. The authors also include extensive references, cost data, design methods, guidance on the installation and operation of various air pollution control process equipment and systems, and Best Available Technologies (BAT) for air thermal and noise pollution control.

Engineers in multiple disciplines—environmental, chemical, civil, and mechanical—contribute to our understanding of air pollution control. To that end,

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Noel de Nevers has incorporated these multiple perspectives into an engaging and accessible overview of the subject. While based on the fundamentals of chemical engineering, the book is accessible to any reader with only one year of college chemistry. In addition to detailed discussions of individual air pollutants and the theory and practice of air pollution control devices, de Nevers devotes seven chapters to topics that influence device selection and design, such as atmospheric models and U.S. air pollution law. The Third Edition's many in-text examples and end-of-chapter problems provide a more complex treatment of the concepts presented. Significant updates include more discussion on the problem of greenhouse gas emissions and a thorough look at the Volkswagen diesel-emission scandal.

Handbook of Chemical Technology and Pollution Control integrates industrial chemistry with pollution control and environmental chemistry. This unified approach provides practicing professionals and consultants with a concise yet authoritative handbook covering the Key Features, relative importance, and environmental impact of currently operating chemical processes. It also meets the critical needs of students training for industrial careers. Handbook of Chemical Technology and Pollution Control considers community, municipal, power generation, industrial, and transportation

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components of environmental impact. The book covers the major inorganic and organic commodity chemicals; aluminum, iron and steel, and copper production; pulp and paper; fermentation; petroleum production and refining. It also includes key topics and process details for major peterochemicals and large-scale consumer and engineering polymers. This single, convenient volume describes aspects of recycling at the industrial and post-consumer levels, and emphasizes a quantitative approach as used in the author's well-known lifecycle work with disposable and reusable cups. 0-12-350811-8

Key Features

- * Covers historical background and new developments in a single, authoritative handbook *
- * Presents integrated treatment of chemical technology with emission control chemistry *
- * Includes tables throughout that give current and trend data *
- * Considers community, municipal, power generation, industrial, and transportation components of environmental impact *
- * Provides many references to further reading *
- * Contains review questions that offer working experience with the information and concepts

This book defines environmental reaction engineering principles, including reactor design, for the development of processes that provide an environmental benefit. With regard to pollution prevention, the focus is primarily on new reaction and reactor technologies that minimize the

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production of undesirable side-products (pollutants), but the use of reaction engineering as a means of treating wastes that are produced through other means is also considered. First is a section on environmentally benign combustion. The three papers discuss methods of reducing the formation of PAHs and NO_x, as well as other environmentally sensitive combustion products. The next section contains a collection of contributions that involve the use of a catalyst to support the reaction. Following this is a section on the use of supercritical fluid solvents as environmentally friendly media for chemical reactions. Finally, a series of papers is presented in which novel reactor designs are utilized to obtain product yields not possible in conventional reactor systems. These include the use of reactor-absorber systems, reactive distillation, and reactive membranes. The book concludes with a chapter contributed by the editors which discusses the educational aspects of pollution prevention. It is necessary for future generations of engineers to be trained to design processes that are inherently environmentally benign. This chapter assembles resource materials for educators which will spark the creative instincts of the researchers using the materials contained within this book to develop new resources for pollution prevention education. The broad spectrum of topics included in this book indicates the diversity of this area, and the vibrant

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nature of the ongoing research. The possibilities of producing desirable products without the formation of waste byproducts are bounded only by the creativity of the reaction engineer.

New introductory textbook designed for a one-semester course in environmental technology. Created to appeal to a range of students, it combines lucid presentations of environmental technologies with fascinating stories and biographies illustrating milestones in environmental science and engineering.

This book provides a fully comprehensive, rigorous and refreshing treatment of 'Air Pollution and Control' covering present day technology and developments. It covers various new topics like bioaerosols or aeroallergens and hazardous air pollutants including diesel exhaust and dioxins. The book is intended to meet the requirements of (a) Undergraduate and postgraduate students of particularly Environmental and Mechanical Engineering and also other branches of Engineering, (b) Technologists, designers, operation and maintenance engineers of industries, electrical power plants, heat and power utilities, (c) Aspirants for competitive examinations of IAS, IES, IFS, PCS, and aspirants for various state and private technical services, etc. and (d) General readers interested in the field for better understanding and knowledge. The book is divided into 20 chapters and presents

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enormous information covering all aspects of Air Pollution in various sectors relevant to Indian conditions. Each of the following chapters is followed by questions at the end based upon the text.

Green Polymers and Environment Pollution Control examines the latest developments in the important and growing field of producing conventional polymers from sustainable sources. Presenting cutting-edge research from a group of leading international researchers from academia, government, and industrial institutions, the book explains what green polymers are, why green polymers are needed, which green polymers to use, and how manufacturing companies can integrate them into their manufacturing operations. It goes on to provide guidelines for implementing sustainable practices for traditional petroleum-based plastics, biobased plastics, and recycled plastics. With recent advancements in synthesis technologies and the discovery of new functional monomers, research shows that green polymers with better properties can be produced from renewable resources. The book describes these advances in synthesis, processing, and technology. It provides not only state-of-the-art information but also acts to stimulate research in this direction. Green Polymers and Environment Pollution Control offers an excellent resource for researchers, upper-level graduate students, brand owners, environment and sustainability managers,

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business development and innovation professionals, chemical engineers, plastics manufacturers, agriculture specialists, biochemists, and suppliers to the industry to debate sustainable, economic solutions for polymer synthesis.

The past few years have seen the emergence of a growing, widespread desire in this country, and indeed everywhere, that positive actions be taken to restore the quality of our environment, and to protect it from the degrading effects of all forms of pollution—air, noise, solid waste, and water. Since pollution is a direct or indirect consequence of waste, if there is no waste, there can be no pollution, and the seemingly idealistic demand for "zero discharge" can be construed as a demand for zero waste. However, as long as there is waste, we can only attempt to abate the consequent pollution by converting it to a less noxious form. In those instances in which a particular type of pollution has been recognized, three major questions usually arise: 1, How serious is the pollution? 2, Is the technology to abate it available? and 3, Do the costs of abatement justify the degree of abatement achieved? The principal intention of this series of books is to help the reader to formulate answers to the last two of the above three questions. The traditional approach of applying tried-and-true solutions to specific pollution problems has been a major factor contributing to the success of environmental engineering, and in large measure

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has accounted for the establishing of a "methodology of pollution control.

Environmental Pollution and Control, Third Edition focuses on the aspects of environmental engineering science and technology, including water pollution, wastewater, sludge treatment, and water pollution legislation. The book first elaborates on environmental and water pollution and measurement of water quality. Discussions focus on chemical oxygen demand, bacteriological measurements, heavy metals, effect of pollution on streams, lakes, and oceans, biodegradation, population responses, and exposure and latency. The publication also takes a look at water supply and water treatment, including disinfection, filtration, settling, coagulation and flocculation, water transmission, and groundwater and surface water supplies. The manuscript examines the collection and treatment of wastewater, sludge treatment and disposal, and nonpoint source water pollution. Topics include control technologies applicable to nonpoint source pollution, sources of sludge, ultimate disposal, onsite wastewater disposal, central wastewater treatment, and tertiary treatment. The text also elaborates on water pollution law, solid wastes, resource recovery, and hazardous wastes. The publication is a valuable reference for environmental pollution experts and readers interested in environmental pollution and control.

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This handbook provides information for professionals attempting to reduce and eliminate air pollution problems. It contains information on all aspects of air pollution, and also examines the technical aspects of air pollution control equipment. Many practical applications are provided, and the text is referenced to assist the reader in further research. The major scientific areas of air pollution are brought together with practical engineering solutions, and will help air quality and pollution control managers to reduce maintenance costs and prevent deterioration of installations.

Introductory technical guidance for civil, environmental and mechanical engineers and construction managers interested in air pollution control equipment and systems. Here is what is discussed:1. CYCLONE COLLECTORS2. FABRIC FILTERS3. SCRUBBERS AND PRECIPITATORS4. SULFUR AND NITROGEN OXIDES CONTROL5. AIR STRIPPING

Environmental engineers work to increase the level of health and happiness in the world by designing, building, and operating processes and systems for water treatment, water pollution control, air pollution control, and solid waste management. These projects compete for resources with projects in medicine, transportation, education, and other fields that have a similar objective. The challenge is to make the investments efficient – to get the best

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project outputs with a minimum of inputs. Cost Engineering for Pollution Prevention and Control examines how to identify the best solution by judging alternatives with respect to some measure of system performance, such as total capital cost, annual cost, annual net profit, return on investment, cost-benefit ratio, net present worth, minimum production time, maximum production rate, minimum energy utilization, and so on. Key Features: Explains how to estimate preliminary costs, how to compare the life cycle costs of alternative projects, how to find the optimal balance between capital costs and operating costs. Emphasis is placed on formulating the problem rather than on the mathematical details of how the calculations are done. Provides numerous practical examples and case studies. Includes end-of-chapter exercises dealing with water, wastewater, air pollution, solid wastes, and remediation projects. The important concepts presented in this book can be understood by those students who have taken an introductory course in environmental engineering. Advanced knowledge of process design is not required. The material can also be utilized by engineers, managers, and others who would benefit from a better understanding of how engineers look at problems.

Air pollution control and air quality engineering are some of the key subjects in any environmental engineering curriculum. This book will cover topics that are fundamental to pollution

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control engineers and professionals, including air pollution and its management through regulatory approaches, calculating and estimating emissions, and applying con

This new edition of the premier air pollution textbook is completely updated and revised to include all components of the 1990 Clean Air Act Amendments. *Fundamentals of Air Pollution, Third Edition* covers the spectrum of topics pertinent to the study of air pollution: elements, sources, effects, measurement, monitoring, meteorology, and regulatory and engineering control. In addition, the textbook features new chapters on atmospheric emissions from hazardous waste sites, air pathways from hazardous waste sites, and the long-term effects of air pollution on the earth. It also presents updated information on acidic development, long-distance transport, atmospheric chemistry, and mathematical modeling. With extensive references, suggested reading lists, questions, and new figures and tables, this text will serve as an invaluable resource for students and practitioners alike. * This new edition features coverage of: Regulatory requirements of the Clean Air Act Amendments of 1990 New developments in the modelling of air quality Air pollution control Air pollution engineering/atmospheric chemistry

Written by experts, *Indoor Air Quality Engineering* offers practical strategies to construct, test, modify, and renovate industrial structures and processes to minimize and inhibit contaminant formation, distribution, and accumulation. The authors analyze the chemical and physical phenomena affecting contaminant generation to optimize system function and design, improve human health and safety, and reduce odors, fumes, particles, gases, and toxins within a variety of interior environments. The book includes applications in Microsoft Excel®, Mathcad®, and Fluent® for analysis of contaminant concentration in various flow fields and air

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pollution control devices.

Air pollution control can be approached from a number of different engineering disciplines environmental, chemical, civil, and mechanical. To that end, Noel de Nevers has written an engaging overview of the subject. While based on the fundamentals of chemical engineering, the treatment is accessible to readers with only one year of college chemistry. In addition to discussions of individual air pollutants and the theory and practice of air pollution control devices, de Nevers devotes about half the book to topics that influence device selection and design, such as atmospheric models and U.S. air pollution law. The generous number of end-of-chapter problems are designed to develop more complex thinking about the concepts presented and integrate them with readers personal experience increasing the likelihood of deeper understanding.

Complex environmental problems are often reduced to an inappropriate level of simplicity. While this book does not seek to present a comprehensive scientific and technical coverage of all aspects of the subject matter, it makes the issues, ideas, and language of environmental engineering accessible and understandable to the nontechnical reader. Improvements introduced in the fourth edition include a complete rewrite of the chapters dealing with risk assessment and ethics, the introduction of new theories of radiation damage, inclusion of environmental disasters like Chernobyl and Bhopal, and general updating of all the content, specifically that on radioactive waste. Since this book was first published in 1972, several generations of students have become environmentally aware and conscious of their responsibilities to the planet earth. Many of these environmental pioneers are now teaching in colleges and universities, and have in their classes students with the same sense of dedication and resolve that they themselves brought

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to the discipline. In those days, it was sometimes difficult to explain what indeed environmental science or engineering was, and why the development of these fields was so important to the future of the earth and to human civilization. Today there is no question that the human species has the capability of destroying its collective home, and that we have indeed taken major steps toward doing exactly that. And yet, while, a lot has changed in a generation, much has not. We still have air pollution; we still contaminate our water supplies; we still dispose of hazardous materials improperly; we still destroy natural habitats as if no other species mattered. And worst of all, we still continue to populate the earth at an alarming rate. There is still a need for this book, and for the college and university courses that use it as a text, and perhaps this need is more acute now than it was several decades ago. Although the battle to preserve the environment is still raging, some of the rules have changed. We now must take into account risk to humans, and be able to manipulate concepts of risk management. With increasing population, and fewer alternatives to waste disposal, this problem is intensified. Environmental laws have changed, and will no doubt continue to evolve. Attitudes toward the environment are often couched in what has become known as the environmental ethic. Finally, the environmental movement has become powerful politically, and environmentalism can be made to serve a political agenda. In revising this book, we have attempted to incorporate the evolving nature of environmental sciences and engineering by adding chapters as necessary and eliminating material that is less germane to today's students. We have nevertheless maintained the essential feature of this book -- to package the more important aspects of environmental engineering science and technology in an organized manner and present this mainly technical material to a nonengineering audience. This book

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has been used as a text in courses which require no prerequisites, although a high school knowledge of chemistry is important. A knowledge of college level algebra is also useful, but calculus is not required for the understanding of the technical and scientific concepts. We do not intend for this book to be scientifically and technically complete. In fact, many complex environmental problems have been simplified to the threshold of pain for many engineers and scientists. Our objective, however, is not to impress nontechnical students with the rigors and complexities of pollution control technology but rather to make some of the language and ideas of environmental engineering and science more understandable.

This Revised Edition Of The Book On Environmental Pollution Control Engineering Features A Systematic And Thorough Treatment Of The Principles Of The Origin Of Air, Water And Land Pollutants, Their Effect On The Environment And The Methods Available To Control Them. The Demographic And Environmental Trends, Energy Consumption Patterns And Their Impact On The Environment Are Clearly Discussed. Application Of The Physical, And Chemical Engineering Concepts To The Design Of Pollution Control Equipment Is Emphasized. Due Importance Is Given To Modelling, Quality Monitoring And Control Of Specific Major Pollutants. A Separate Chapter On The Management Of Hazardous Wastes Is Added. Information Pertaining To Indian Conditions Is Given Wherever Possible To Help The Reader Gain An Insight Into India Sown Pollution Problems. This Book Is Mainly Intended As A Textbook For An Integrated One-Semester Course For Senior Level Undergraduate Or First Year Post-Graduate Engineering Students And Can Also Serve As A Reference Book To Practising Engineers And Decision Makers Concerned With Environmental Pollution Control.

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From the alleys of the world environment comes a handbook dealing with air pollution, its control, and engineering. This is a step by step guide divided into segments, taking you into a long journey to make you aware of the major crisis facing the world environment today. This will transform the way you think about the atmosphere and the air we inhale. The misconceptions regarding atmospheric condition will go for a toss, on reading through this book. Air Pollution Control Engineering is geared towards the havoc air pollutants and harmful emissions creating in the sub-atmospheric strata. It is eroding the ozone layer, essential for human health and vis-a-vis, leading to a cascading effect of harmful incidents. In a threadbare explanation, all sources of air pollutants and their resultant effects are depicted in detail in this book.

Sorbents Materials for Controlling Environmental Pollution: Current State and Trends presents data on current use and future trends regarding sorbent materials employed against soil, water, and air pollution. The book is organized first by use and research for a variety of geographic areas. It will then focus on different sorbent materials and their uses, followed by various pollutants and their management. Including updated and extensive data from an assortment of sources, the book is organized to be very accessible, including with an interactive table to help identify the results of appropriate sorbents for each environmental compartment. The growing concern regarding soil, water and air pollution all over the world has implications for climate change and sustainability, making Sorbents Materials for Controlling Environmental Pollution: Current State and Trends an important reference for environmental scientists to identify tools for moving forward in solving these problems. Includes data and examples from various geographic locations worldwide Synthesizes data for a variety of sorbent material from different sources Presents data for various kinds of pollutants

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across environmental spheres, including soil, water, and air
Utilizes an interactive table for quicker access to data and results

Membrane Based Technologies for Environmental Pollution Control explains the application of this green technology while offering a systematic approach for accurately utilizing mathematical modeling methods for optimizing system design and scale-up. The book provides in-depth coverage of membrane processes, materials and modules, along with their potential application in various pollution control systems. Each chapter provides a systematic approach for dynamic model development and solutions. With this reference, researchers and those responsible for the design of pollution control systems will find a source that can maximize their efforts to reduce or prevent pollutants from entering all types of environmental media. Provides a systematic approach for designing membrane technology based systems for pollution reduction or prevention in all types of environmental media
Includes case studies to illustrate actual projects to explain the problems and solutions associated with system scale-up
Introduces dynamic modeling and analysis for process intensification

A 25-year tradition of excellence is extended in the Fourth Edition of this highly regarded text. In clear, authoritative language, the authors discuss the philosophy and procedures for the design of air

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pollution control systems. Their objective is twofold: to present detailed information on air pollution and its control, and to provide formal design training for engineering students. New to this edition is a comprehensive chapter on carbon dioxide control, perhaps the most critical emerging issue in the field. Emphasis is on methods to reduce carbon dioxide emissions and the technologies for carbon capture and sequestration. An expanded discussion of control technologies for coal-fired power plants includes details on the capture of NO_x and mercury emissions. All chapters have been revised to reflect the most recent information on U.S. air quality trends and standards. Moreover, where available, equations for equipment cost estimation have been updated to the present time. Abundant illustrations clarify the concepts presented, while numerous examples and end-of-chapter problems reinforce the design principles and provide opportunities for students to enhance their problem-solving skills. A comprehensive guide for both fundamentals and real-world applications of environmental engineering

Written by noted experts, Handbook of Environmental Engineering offers a comprehensive guide to environmental engineers who desire to contribute to mitigating problems, such as flooding, caused by extreme weather events, protecting populations in coastal areas threatened by rising sea levels, reducing illnesses caused by polluted air, soil,

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and water from improperly regulated industrial and transportation activities, promoting the safety of the food supply. Contributors not only cover such timely environmental topics related to soils, water, and air, minimizing pollution created by industrial plants and processes, and managing wastewater, hazardous, solid, and other industrial wastes, but also treat such vital topics as porous pavement design, aerosol measurements, noise pollution control, and industrial waste auditing. This important handbook: Enables environmental engineers to treat problems in systematic ways Discusses climate issues in ways useful for environmental engineers Covers up-to-date measurement techniques important in environmental engineering Reviews current developments in environmental law for environmental engineers Includes information on water quality and wastewater engineering Informs environmental engineers about methods of dealing with industrial and municipal waste, including hazardous waste Designed for use by practitioners, students, and researchers, Handbook of Environmental Engineering contains the most recent information to enable a clear understanding of major environmental issues.

Industrial Pollution Control: Issues and Techniques Second Edition Nancy J. Sell This revised guide incorporates all the important information on pollution sources, control methods, and pollution

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regulations generated since publication of the previous edition in 1981. This edition surveys the impacts of every type of pollution on health, plants, materials, and weather. It discusses how different types of pollution are produced, laws governing specific emissions, and both existing and emerging air, water, and solid waste control techniques. Detailed sections zero in on processing methods, pollution production, and control methods in specific industries, including chemical, physical, and economic factors that inhibit better pollution control. Case studies offer insights into processes that directly minimize emissions or indirectly reduce them by decreasing energy needs. Pollution issues of iron and steel manufacturing, foundry operations, metals finishing, cement manufacture, glass manufacture, paper and pulp, food processing, brewing, tanning, and chemical industries are probed in depth. Among the new pollution control strategies covered are: *

- Regulations, treatment techniques, and disposal methods for hazardous wastes
- * Direct steelmaking processes that reduce pollution
- * Modified glassmaking furnaces that decrease pollution
- * Non-chlorine pulp bleaching sequences that curtail production of toxic substances such as dioxin
- * Secondary fiber utilization and reduction of PCB emissions
- * Resource recovery from sludges and ashes
- * Chemical spill containment and cleanup
- * Uses of degradation and recycling to reduce plastics

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waste Coverage of the impact of U.S. regulations, status of the U.S. environment, continuing problems, economic costs, and cost-benefit issues further increases the value of this source to environmental engineers and scientists working for the EPA, state regulatory agencies, or consulting engineering firms. This guide is also a vital reference for environmentalists working with advocacy groups, and environmental or process engineers in industry.

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