Wet Scrubbers Second Edition

Substitute Natural Gas from Waste: Technical Assessment and Industrial Applications of Biochemical and Thermochemical Processes provides an overview of the science and technology of anaerobic digestion and thermal gasification for the treatment of biomass and unrecyclable waste residues. The book provides both the theoretical and practical basis for the clean and high-efficiency utilization of waste and biomass to produce Bio-Substitute Natural Gas (SNG). It examines different routes to produce bio-SNG from waste feedstocks, detailing solutions to unique problems, such as scale up issues and process integration. Final sections review waste sourcing and processing. This book is an ideal and practical reference for those developing, designing, scaling and managing bio-SNG production and utilization systems. Engineering students will find this to be a comprehensive resource on the application of fundamental concepts of bio-SNG production that are illustrated through innovative, recent case studies. Presents detailed scientific and technical information Describes up-to-date concepts, processes and plants for efficient anaerobic digestion and gasification of wastes and syngas utilization Compares gasification with anaerobic digestion for different situations Proposes alternative strategies to increase efficiency and overcome energy balance limitations Includes benchmarking data and industrial real-life examples to demonstrate the main process features and implementation pathways of bio-SNG systems from dry and wet waste, both in developed and developing countries

This new edition provides a good exposure to the multidisciplinary nature of the subject and deals with various life supporting systems, their ecological aspects and effects on the sustenance of life, covering the bio-geochemical cycles in sufficient detail.Useful for courses taught in departments of science and environment, biotechnology and chemical engineering, the text presents an overview of important aspects of air and water pollution, especially the effects of industrial activities on pollution.Chapters seven and eight, which are new to this edition, discuss chemical toxicology, and waste management _ an area of great importance today. Key Features: ·Discusses catastrophic depletion of oxygen and molecular mechanisms on mutagenesis, and their overall impact on the environment · Analyzes the quantification of pollutants through microbiological and biochemical techniques; eutro-phication level and its impact on Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). · Explains the role and implication of some less common pollutants such as metals, mines, and polymers.

Thoroughly Revised, State-of-the-Art Semiconductor Design, Manufacturing, and Operations Information Written by 70 international experts and reviewed by a seasoned technical advisory board, this fully updated resource clearly explains the cutting-edge processes used in the design and fabrication of IC chips, MEMS, sensors, and other electronic devices. Semiconductor Manufacturing Handbook, Second Edition, covers the emerging technologies that enable the Internet of Things, the Industrial Internet of Things, data analytics, artificial intelligence, augmented reality, and and smart manufacturing. You will get complete details on semiconductor fundamentals, front- and back-end processes, nanotechnology, photovoltaics, gases and chemicals, fab yield, and operations and facilities. •Nanotechnology and microsystems manufacturing •FinFET and nanoscale silicide formation •Physical design for high-performance, low-power 3D circuits •Epitaxi, anneals, RTP, and oxidation •Microlithography, etching, and ion implantations •Physical, chemical, electrochemical, and atomic layer vapor deposition •Chemical mechanical planarization •Atomic force metrology •Packaging, bonding, and interconnects •Flexible hybrid electronics •Flat-panel,flexible display electronics, and photovoltaics •Gas distribution systems •Ultrapure water and filtration •Process chemicals handling and abatement •Chemical and slurry handling systems •Yield management, CIM, and factory automation •Manufacturing execution systems •Advanced process control •Airborne molecular contamination •ESD controls in clean-room environments •Vacuum systems and RF plasma systems •IC manufacturing parts cleaning technology •Vibration and noise design •And much more

This book is a good discussion of various air pollution control equipment. It covers a wide range of equipment and gives a good overview of the principles and applications. Very valuable is the practical experiences that are not commonly available in a typical textbook. The language is easy to understand, especially for those who do not have formal training in air pollution control. It provides hybrid systems such as those applied to biomass gasification, odor control using biological technology, plasma arc waste reduction, and more.

Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. Fully updated processes for the production of renewable and environmentally safe biofuels This thoroughly revised guide presents a complete and up-to-date introduction to biofuels process technology. Written by a team of industry-leading experts, Biofuels Engineering Process Technology, Second Edition shows, step by step, how renewable feedstocks are processed and how biofuels are refined. You will explore the entire spectrum of biofuel processes, including the production of ethanol from sugarcane and corn, biodiesel from animal fats and plant oils, and methane by anaerobic digestion. The book clearly explains newly developed technologies for the production of drop-in biofuels and the use of microbial fuel cells to produce electricity. Coverage includes: • An introduction to biofuel engineering processes • Harvesting energy from biochemical reactions • Microbial modeling of biofuel production • Biofuels feedstocks • Ethanol • Biodiesel • Drop-in biofuels • Biological production of hydrogen • Microbial fuel cells • Methane • And more

Air Pollution, Second Edition, Volume III: Sources of Air Pollution and Their Control discusses the cause, effect, transport, measurement, and control of air pollution. The volume tackles the emissions to the atmosphere from the principal air pollution sources; the control techniques and equipment used to minimize these emissions; the applicable laws, regulations, and standards; and the administrative and organizational procedures used to administer these laws, regulations, and standards. Engineers, physicians, meteorologists, lawyers, economists, sociologists, agronomists, toxicologists, and public administrators will find the book a valuable reference material.

A basic technical book on the design and application of gas cleaning technologies that use liquids, first published in the 1980's and used by plant and environmental engineers, regulatory personnel, and others concerned with air pollution. The second edition enlarges the discussion on the theory of

A facility is only as efficient and profitable as the equipment that is in it: this highly influential book is a powerful resource for chemical, process, or plant engineers who need to select, design or configures plant sucessfully and profitably. It includes updated information on design methods for all standard equipment, with an emphasis on real-world process design and performance. The comprehensive and influential guide to the selection and design of a wide range of chemical process equipment, used by engineers globally • Copious examples of successful applications, with supporting schematics and data to illustrate the functioning and performance of equipment Revised edition, new material includes updated equipment cost data, liquid-solid and solid systems, and the latest information on membrane separation

technology Provides equipment rating forms and manufacturers' data, worked examples, valuable shortcut methods, rules of thumb, and equipment rating forms to demonstrate and support the design process Heavily illustrated with many line drawings and schematics to aid understanding, graphs and tables to illustrate performance data

Thoroughly rewritten and updated to reflect the latest advances in technology and highlighting the environmental aspects now being emphasized within the coal industry, this Second Edition of a highly acclaimed reference/text provides a comprehensive overview of coal science—covering topics ranging from the origins of coal to mining and contemporary uses. Maintaining and enhancing the clarity of presentation that made the first edition so popular, The Chemistry and Technology of Coal, Second Edition: Considers the implications of the Clean Air Act Examines the effects of combustion products on the atmosphere Details practical elements of coal evaluation procedures Clarifies misconceptions concerning the organic structure of coal Discusses the physical, thermal, electrical, and mechanical properties of coal Analyzes the development and current status of combustion and gasification techniques

Hazardous waste management is a complex, interdisciplinary field that continues to grow and change as global conditions change. Mastering this evolving and multifaceted field of study requires knowledge of the sources and generation of hazardous wastes, the scientific and engineering principles necessary to eliminate the threats they pose to people and the environment, the laws regulating their disposal, and the best or most cost-effective methods for dealing with them. Written for students with some background in engineering, this comprehensive, highly acclaimed text does not only provide detailed instructions on how to solve hazardous waste problems but also guides students to think about ways to approach these problems. Each richly detailed, self-contained chapter ends with a set of discussion topics and problems. Case studies, with equations and design examples, are provided throughout the book to give students the chance to evaluate the effectiveness of different treatment and containment technologies.

Wet Scrubbers, Second EditionCRC Press

Supplying a breadth and depth of coverage beyond that found in most traditional texts, Introduction to Human Factors and Ergonomics for Engineers, Second Edition presents and integrates important methods and tools used in the fields of Industrial Engineering, Human Factors and Ergonomics to design and improve jobs, tasks and products. It presents these topics with a practical, applied orientation suitable for engineering undergraduate students. See What's New in the Second Edition: Revised order of chapters to group together topics related to the physical and cognitive aspects of human-integrated systems Substantially updated material emphasizes the design of products people work with, tasks or jobs people perform, and environments in which people live The book has sufficient material to be used in its entirety for a two semester sequence of classes, or in part for a single semester course, focusing on selected topics covered in the text. The authors provide a set of guidelines and principles for the design and analysis of human-integrated systems and highlights their application to industry and service systems. It addresses the topics of human factors, work measurement and methods improvement, and product design an approachable style. The common thread throughout the book is on how better "human factors" can lead to improved safety, comfort, enjoyment, acceptance, and effectiveness in all application arenas. Packed with cases studies and examples, readers can use well beyond the classroom and into their professional lives.

Historically, the development of civilization has upset much of the earth's ecosystem leading to air, land, and water pollution. The author defines pollution as the introduction of a foreign substance into an ecosystem via air, land or water. This book delves into issues that effect the everyday lives of people who come in contact with these hazards. By examining these issues, this body of work aims to stimulate debate and offer solutions to the ever-growing threat to the environment and humanity. Includes problems with each chapter, Explores issues such as control of gaseous emissions, waste recycling and waste disposal, Explains physical and thermal methods of waste management, Provides definitions and resources for future reference, Discusses the history of environmental technology.

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 experienceincreasing the likelihood of deeper understanding.

This book will outline the strategies used in the investigation, characterization, management, and restoration and remediation for various contaminated sites. It will draw on real-world examples from across the globe to illustrate remediation techniques and discuss their applicability. It will provide guidance for the successful corrective action assessment and response programs for any type of contaminated land problem, and at any location. The systematic protocols presented will aid environmental professionals in managing contaminated land and associated problems more efficiently. This new edition will add twelve new chapters, and be fully updated and expanded throughout.

Are you a practicing occupational hygienist wondering how to find a substitute organic solvent that is safer to use than the hazardous one your company is using? Chapter 6 is your resource. Are you a new hygienist looking for an alternative technology as a nonventilation substitute for an existing hazard? Chapter 8 is your resource. Are you looking for an overview of ventilation? Chapters 10 and 11 are your resource? Are you an industrial hygiene student wanting to learn about local exhaust ventilation? Chapters 13 through 16 are your resource. Are you needing to learn about personal protective equipment and respirators? Chapters 21 and 22 are your resources. This new edition brings all of these topics and more right up-to-date with new material in each chapter, including new governmental regulations. While many of the controls of airborne hazards have their origins in engineering, this author has been diligent in explaining concepts, writing equations in understandable terms, and covering the topics of non-ventilation controls, both local exhaust and general ventilation, and receiver controls at the level needed by most IHs without getting too advanced. Taken as a whole, this book provides a unique, comprehensive tool to learn the challenging yet rewarding role that industrial hygiene can play in controlling airborne chemical hazards at work. Most chapters contain a set of practice problems with the solutions available to instructors. Features Written for the novice industrial hygienist but useful to prepare for ABIH certification Explains engineering concepts but requires no prior engineering background Includes specific learning goals that differentiate the depth of learning appropriate to each topic within the fuller information and explanations provided for each chapter Contains updated governmental regulations and abundant references Presents a consistent teaching philosophy and approach throughout the book Deals with both ventilation and non-ventilation controls

Research has shown that inhaling fine particles is a greater health risk than breathing larger particles. Title is "very timely...needed NOW," according to one reviewer Covers a "controversial" but important topic, for which there is a lack of literature and hence guidance for those professionals affected by it Covers legislative background and gives insight into

regulatory and technical matters such as measurement and control of fine particle emissions Combines the practical, theoretical, and regulatory areas of fine particulate monitoring, with "reference to the regulated community" Written by a recognized authority with over 30 years of pollution control experience

Hailed on its initial publication as a real-world, practical handbook, the second edition of Handbook of Water and Wastewater Treatment Plant Operations continues to make the same basic point: water and wastewater operators must have a basic skill set that is both wide and deep. They must be generalists, well-rounded in the sciences, cyber operations, math operations, mechanics, technical concepts, and common sense. With coverage that spans the breadth and depth of the field, the handbook explores the latest principles and technologies and provides information necessary to prepare for licensure exams. Expanded from beginning to end, this second edition provides a no-holds-barred look at current management issues and includes the latest security information for protecting public assets. It presents in-depth coverage of management aspects and security needs and a new chapter covering the basics of blueprint reading. The chapter on water and wastewater mathematics has tripled in size and now contains an additional 200 problems and 350 math system operational problems with solutions. The manual examines numerous real-world operating scenarios, such as the intake of raw sewage and the treatment of water via residual management, and each scenario includes a comprehensive problem-solving practice set. The text follows a non-traditional paradigm based on real-world experience and proven parameters. Clearly written and user friendly, this revision of a bestseller builds on the remarkable success of the first edition. This book is a thorough compilation of water science, treatment information, process control procedures, problem-solving techniques, safety and health information, and administrative and technological trends.

This reviews sources of radioactive waste and introduces radioactive decay and radiation shielding calculations. It covers technical and regulatory aspects of waste management with discussion questions at the end of each chapter to provide an opportunity to explore the many facets of waste management issues. An extensive reference list at the end of each chapter retains the references from the first edition of the book and incorporates references used in preparing this revised text, giving readers an opportunity to look at historical records as well as current information.

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

The fifth edition of a bestseller, Air Quality provides students with a comprehensive overview of air quality, the science that continues to provide a better understanding of atmospheric chemistry and its effects on public health and the environment, and the regulatory and technological management practices employed in achieving air quality goals. Maintaining the practical approach that has made previous editions so popular, the chapters have been reorganized, new material has been added, less relevant material deleted, and new images added, particularly those from Earth satellites. See What’s New in the Fifth Edition: New graphics, images, and an appended list of unit conversions New problems and questions Revisions and updates on the regulatory aspects related to air quality, emissions of pollutants, and particularly in the area of greenhouse gas emissions Updated information on topics that affect air quality such as global warming, climate change, international issues associated with air quality and its regulation, atmospheric deposition, atmospheric chemistry, and health and environmental effects of atmospheric pollution Written in Thad Godish’s accessible style, the book clearly elucidates the challenges we face in our fifth decade of significant regulatory efforts to protect and enhance the quality of the nation’s air. It also highlights the growing global awareness of air quality issues, climate change, and public health concerns in the developing world. The breadth of coverage, review questions at the end of each chapter, extensive glossary, and list of readings put the tools for understanding in your students’ hands.

Since the publication of the first edition of Multiphase Flow with Droplets and Particles, there have been significant advances in science and engineering applications of multiphase fluid flow. Maintaining the pedagogical approach that made the first edition so popular, this second edition provides a background in this important area of fluid mechanics to those new to the field and a resource to those actively involved in the design and development of multiphase systems. See what’s new in the Second Edition: Chapter on the latest developments in carrier-phase turbulence Extended chapter on numerical modeling that includes new formulations for turbulence and Reynolds stress models Review of the fundamental equations and the validity of the traditional "two-fluid" approach Expanded exercises and a solutions manual A quick look at the table of contents supplies a snapshot of the breadth and depth of coverage found in this completely revised and updated text. Suitable for a first-year graduate (5th year) course as well as a reference for engineers and scientists, the book is clearly written and provides an essential presentation of key topics in the study of gas-particle and gas-droplet flows.

Numerous nutritional findings and extensive evidence on the health benefits of diet and exercise have emerged since the publication of the successful first edition. Recent concerns about trans isomers acting like saturated fatty acids have encouraged formulation changes that require fats and oils processors to revise their preparation techniques. U

A basic technical book on the design and application of gas cleaning technologies that use liquids, first published in the 1980's and used by plant and environmental engineers, regulatory personnel, and others concerned with air pollution. The second edition enlarges the discussion on the theory of operation, includes new sections on hybrid scrubber systems and irrigated fiberbed filters that use Brownian motion capture techniques, and incorporates the more stringent air pollution regulations. Annotation copyright by Book News, Inc., Portland, OR

Coal accounts for approximately one quarter of world energy consumption and of the coal produced worldwide approximately 65% is shipped to electricity producers and 33% to industrial consumers, with most of the remainder going to consumers in the residential and commercial sectors. The total share of total world energy consumption by coal is expected to increase to almost 30% in 2035. This book describes the challenges and steps by which electricity is produced form coal and deals with the challenges for removing the environmental objections to the use of coal in future power plants. New technologies are described that could virtually eliminate the sulfur, nitrogen, and mercury pollutants that are released when coal is burned for electricity

generation. In addition, technologies for the capture greenhouse gases emitted from coal-fired power plants are described and the means of preventing such emissions from contributing to global warming concerns. Written by one of the world's leading energy experts, this volume is a must-have for any engineer, scientist, or student working in this field, providing a valuable reference and guide in a quickly changing field.

Fundamentals of Air Pollution, Second Edition discusses the basic chemistry, physics, and engineering of air pollution. This edition explores the processes and equipment that produce less pollution in the atmosphere. This book is comprised of six parts encompassing 28 chapters. This text starts with an overview of the predominant air pollution problems during the Industrial Revolution, including smoke and ash produced by burning oil or coal in the boiler furnaces of power plants, marine vessels, and locomotives. This edition then explores the mathematical models of atmospheric transport and diffusion and discusses the air pollution control in communities. Other chapters deal with atmospheric chemistry, control technology, and visibility through the atmosphere. This book further examines the regulatory concepts that have become more significant, such as the bubble concept, air quality, emission standards, and the trading and banking of emission rights. Air pollution scientists, atmospheric scientists, ecologists, engineers, educators, researchers, and students will find this book extremely useful.

The Multiphase Flow Handbook, Second Edition is a thoroughly updated and reorganized revision of the late Clayton Crowe's work, and provides a detailed look at the basic concepts and the wide range of applications in this important area of thermal/fluids engineering. Revised by the new editors, Efstathios E. (Stathis) Michaelides and John D. Schwarzkopf, the new Second Edition begins with two chapters covering fundamental concepts and methods that pertain to all the types and applications of multiphase flow. The remaining chapters cover the applications and engineering systems that are relevant to all the types of multiphase flow and heat transfer. The twenty-one chapters and several sections of the book include the basic science as well as the contemporary engineering and technological applications of multiphase flow in a comprehensive way that is easy to follow and be understood. The editors created a common set of nomenclature that is used throughout the book, allowing readers to easily compare fundamental theory with currently developing concepts and applications. With contributed chapters from sixty-two leading experts around the world, the Multiphase Flow Handbook, Second Edition is an essential reference for all researchers, academics and engineers working with complex thermal and fluid systems.

This unique textbook examines the basic health and environmental issues associated with air pollution including the relevant toxicology and epidemiology. It provides a foundation for the sampling and analysis of air pollutants as well as an understanding of international air quality regulations. Written for upper-level undergraduate and introductory graduate courses in air pollution, the book is also a valuable desk reference for practicing professionals who need to have a broad understanding of the topic. Important Notice: the digital edition of this book is missing some of the images or content found in the physical edition.

During the past 20 years, the field of mechanical engineering has undergone enormous changes. These changes have been driven by many factors, including: the development of computer technology worldwide competition in industry improvements in the flow of information satellite communication real time monitoring increased energy efficiency robotics automatic control increased sensitivity to environmental impacts of human activities advances in design and manufacturing methods These developments have put more stress on mechanical engineering education, making it increasingly difficult to cover all the topics that a professional engineer will need in his or her career. As a result of these developments, there has been a growing need for a handbook that can serve the professional community by providing relevant background and current information in the field of mechanical engineering. The CRC Handbook of Mechanical Engineering serves the needs of the professional engineer as a resource of information into the next century.

A detailed reference for the practicing engineer, Air Pollution Control Technology Handbook, Second Edition focuses on air pollution control systems and outlines the basic process engineering and cost estimation required for its design. Written by seasoned experts in the field, this book offers a fundamental understanding of the factors resulting in air pollution and covers the techniques and equations used for air pollution control. Anyone with an engineering or science background can effectively select techniques for control, review alternative design methods and equipment proposals from vendors, and initiate cost studies of control equipment using this book. This second edition of a bestseller includes new methods for designing control equipment, enhanced material on air pollution science, updates on major advances in the field, and explains the importance of a strategy for identifying the most cost-effective design. The book also covers: New legislation and updates on air regulation New advances in process integration design techniques The atmospheric and health effects of air pollution Air Pollution Control Technology Handbook, Second Edition helps combat the solution problem with extensive coverage of air pollution control processes. Fully updated with new legislation, air regulations, and extensive reviews of the design of control equipment, this book serves as an ideal reference for industry professionals or anyone with an engineering or science background needing a basic introduction to air pollution control equipment design.

The Science of Environmental Pollution focuses on pollution of the atmosphere, of surface and groundwater, and of soil (the three environmental mediums) and solving pollution problems by using real world methods. This introductory textbook in environmental science focuses on pollution of the atmosphere, of surface and groundwater, and of soil, all critical to our very survival.

"Analyzes health and hazard risk assessment in commercial, industrial, and refining industries. Emphasizes legal requirements, emergency planning and response, safety equipment, process implementation, and occupational and environmental protection exposure guidelines. Presents applicatoins and calculations for risk analysis of real systems, as well as numerous end-of-chapter examples and references."

Waste Management Practices: Municipal, Hazardous, and Industrial, Second Edition addresses the three main categories of wastes (hazardous, municipal, and "special" wastes) covered under federal regulation outlined in the Resource Conservation and Recovery Act (RCRA), an established framework for managing the generation, transportation, treatment, storage, and disposal of several forms of waste. Focusing on integrating the technical and regulatory complexities of waste management, this book covers the historical and regulatory development of waste

management and the management of municipal solid wastes. It also addresses hazardous wastes and their management, from the perspectives of identification, transportation, and requirements for generators as well as the treatment, storage, and disposal facilities. Features: Covers the three main categories of wastes under regulation in the United States Incorporates an extensive set of problems, presented at the end of several chapters as appendices Includes numerous review/homework questions at the end of each chapter Highlights special categories of waste that may not fit precisely into either RCRA Subtitle D (Solid Wastes) or Subtitle C (Hazardous Wastes) In addition to the end-of-chapter problems provided in all chapters of this book, the text also contains practical exercises using data from field situations. Waste Management Practices: Municipal, Hazardous, and Industrial, Second Edition is an ideal textbook or reference guide for students and professionals involved in the management of all three categories of wastes. Ozone-destroying chemicals, greenhouse gases, and dangerous airborne substances that were once thought to be benign are the most urgent issues facing air pollution control experts. Students need a thorough, updated reference that explores these current trends while also covering the fundamental concepts of this emerging discipline. A new revision of a bestseller, Air Quality, Fourth Edition provides a comprehensive overview air quality issues, including a better understanding of atmospheric chemistry, the effects of pollution on public health and the environment, and the technology and regulatory practices used to achieve air quality goals. New sections cover toxicological principles and risk assessment. The book also contains revised discussions on public policy concerns, with a focus on air quality standards for ozone depletion and global warming, and the health effects of particulate air pollutants. This edition continues to serve as a very readable text for advanced level undergraduate and early graduate study in environmental science, environmental management, and in programs related to the study of public health, industrial hygiene, and pollution control.