

# Industrial Wastewater Treatment By Activated Sludge

## Industrial Wastewater Treatment by Activated Sludge

Water and Wastewater Treatment Technologies theme is a component of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The Theme on Water and Wastewater Treatment Technologies deals, in three volumes, and covers several topics, with several issues of great relevance to our world such as: Urban Wastewater Treatment; Characteristics of Effluent Organic Matter in Wastewater; Filtration Technologies in wastewater treatment; Air Stripping in Industrial Wastewater Treatment; Dissolved air flotation in industrial wastewater treatment; Membrane Technology for Organic Removal in Wastewater; Adsorption and Biological Filtration in Wastewater Treatment; Physico-chemical processes for Organic removal from wastewater effluent; Deep Bed Filtration: Modelling Theory And Practice ; Specific options in biological wastewater treatment for reclamation and reuse ; Biological Phosphorus Removal Processes For Wastewater Treatment ; Sequencing Batch Reactors: Principles, Design/Operation And Case Studies ; Wastewater stabilization ponds (WSP)for wastewater treatment; Treatment of industrial wastewater by membrane bioreactors; Stormwater treatment technologies; Sludge Treatment Technologies ; Wastewater Treatment Technology For Tanning Industry; Palm Oil And Palm Waste Potential In Indonesia ; Recirculating Aquaculture Systems – A Review ; Upflow anaerobic sludge blanket (UASB)reactor in wastewater treatment; Applied Technologies In Municipal Solid Waste Landfill Leachate Treatment; Water Mining: Planning and Implementation Issues for a successful project; Assessment methodologies for water reuse scheme and technology; Nanotechnology for Wastewater Treatment. These three volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, Managers, and Decision makers and NGOs W

Treating potable and polluted water for the world's population is still one of our most important challenges. The United Nations estimate that more than 1.2 billion people suffer from inadequate water supply and an even larger number, up to 4 billion people, are without hygienic disposal of waste and wastewater. Water technology and the necessary "know-how transfer", has been the key objective of the Gothenburg symposia from the very beginning. The contents of this book respond to these challenges and demonstrate the impressive development of the field of chemical water and wastewater treatment. The Chemical Water and Wastewater Treatment Series provides authoritative coverage of the key current developments in the chemical treatment of water and wastewater in theory or practice and related problems such as sludge production and properties, and the reuse of chemicals and chemically-treated waters and sludges. For the tenth in the series, the contributions document the development of the field of chemical water and wastewater technology, both in terms of new technological developments as well as public and administrative acceptance and approval of the solutions offered. Such new developments include the use of membrane technology, the application of computational tools for kinetic process modelling and optimisation as well as the use of advanced oxidation processes in actual water treatment. Chemical Water and Wastewater Treatment VII covers fundamental science, new technological developments and practical experience and is an invaluable reference source for engineers scientists and administrators, active in the treatment of drinking water, municipal and industrial wastewater and sludges.

## Activated Sludge Technologies for Treating Industrial Wastewaters

### Industrial Wastewater Treatment

### Activated Sludge Treatment of Industrial Wastewater

### Innovative Technologies for the Treatment of Industrial Wastewater

### Industrial Wastewater

This monograph provides comprehensive coverage of technologies which integrate adsorption and biological processes in water and wastewater treatment. The authors provide both an introduction to the topic as well as a detailed discussion of theoretical and practical considerations. After a review of the basics involved in the chemistry, biology and technology of integrated adsorption and biological removal, they discuss the setup of pilot- and full-scale treatment facilities, covering powdered as well as granular activated carbon. They elucidate the factors that influence the successful operation of integrated systems. Their discussion on integrated systems expands from the effects of environmental to the removal of various pollutants, to regeneration of activated carbon, and to the analysis of such systems in mathematical terms. The authors conclude with a look at future needs for research and development. A truly valuable resource for environmental engineers, environmental and water chemists, as well as professionals working in water and wastewater treatment.

Technical information for using activated sludge to treat effluents from multiple industries Covers virtually all traditional and advanced methods, as well as treatability and process modeling New methods for removing U.S. and European regulated microconstituents, trace organics, active pharmaceutical ingredients and other contaminants Explains advances in water reuse and plant retrofitting Useful for in-house training This comprehensive book presents critical information on the applications of activated sludge for treating industrial wastewaters, as well as other effluents that impact POTWs. The book offers details on how advances in activated sludge can be deployed to meet more stringent discharge limits by explaining many novel variations of activated sludge and offering technical guidance on process modeling and optimization. Special attention is given to emerging contaminants and water reuse strategies. Case studies are drawn from the pharma, food and shale gas industries. Based on short courses taught by the authors, as well as hundreds of hours of in-plant consulting, this book offers the tools to understand and modify the activated sludge process for superior and sustainable wastewater treatment. From the Authors' Preface: "After speaking with practitioners, operators and engineers, the authors felt a new text was needed...to cover the following

developments: "the continued evolution of the activated sludge process and its numerous designs, configurations and technology developments; "design of industrial water reuse systems...to achieve industry sustainability goals; "changes...from BOD, TSS and nutrient removal to removal of specific organics, toxicity...microconstituents, and more stringent effluent permit limits; "advances in process modeling tools that can be used in combination with treatability testing tools for plant design, optimization and troubleshooting; "concerns over industrial wastewater discharge impacts to POTWs, such as nitrification inhibition, the impact of frac water...and the fate of microconstituents through POTWs."

The Latest Tactics and Strategies for Treating Every Kind of Industrial Wastewater Industrial Wastewater Management offers proven methods to help you treat toxic, concentrated, and polluted water. Complete with illustrations and tables throughout, this authoritative guide contains information on the newest chemicals, significant treatment studies, efficient control processes, and the latest instrumentation. Industrial Wastewater Management equips you with the know-how for treating and removing heavy metals, arsenic, selenium, and mercury by providing detailed descriptions of pretreatment processes, design criteria, and process performance. Features include: Characteristic, sampling, and treatment studies The latest techniques and materials for heavy-metal removal Arsenic, selenium, and mercury treatment processes Applications for biological treatment Instrumentation and control procedures Design and construction procurement services SI as primary units and U.S. as secondary Pros and cons of processes in specific applications Inside: • Discharge and Disposal Regulations • Sampling and Analysis • Wastewater Survey and Characterization • Chemical and Physical Treatability Assessments • Pollution Prevention • Waste Minimization • Flow and Load Equalization • Solids Separation and Handling • Fat, Oil, and Grease Removal • pH Control • Inorganic Constituent Removal • Organic Constituent Treatment • Process Instrumentation and Control • Project Procurement Services

Industrial Wastewater and Best Available Treatment Technologies

Advances in Biological Treatment of Industrial Waste Water and their Recycling for a Sustainable Future

Comparative Study of Water Pollution Index during Pre-industrial, Industrial Period and Prospect of Wastewater Treatment for Water Resource Conservation

INDUSTRIAL WASTE WATER TREATMENT

Integration of Adsorption and Biological Treatment

*This CD-ROM presents the best available technologies needed to treat many kinds of industrial wastewaters. The publication shows how physical, chemical, and biological technologies are being modified and improved to meet or exceed removal and reduction criteria for pharmaceutical, chemical, textile, automotive, pulp, paper and other wastes.*

*Water pollution occurs when toxic pollutants of varying kinds (organic, inorganic, radioactive and so on) are directly or indirectly discharged into water bodies without adequate treatment to remove such potential pollutants. Today's sources of these potential pollutants, which cause high deterioration of freshwater quality, are city sewage and industrial waste discharge, human agricultural practices, industrial waste disposal practices, mining activities, civil and structural work activities and obviously natural contamination with climate change. When our water is polluted, it is not only devastating to the environment but also to human health. Therefore, development of water and wastewater treatment processes to alleviate water pollution has been a challenging and demanding task for engineers, scientists and researchers. Perhaps this is even more challenging for underdeveloped and developing countries, where water and wastewater treatment facilities, knowledge and infrastructure are limited. Water and wastewater treatment processes are broad and often multidisciplinary in nature, comprising a mixture of research areas including physical, chemical and biological methods to remove or transform various potential pollutants. This is in hopes to achieve acceptable water quality and satisfy governmental and environmental protection agencies laws and regulations. With these objectives, this book has been written in order to provide various research results and compilation and up-to-date development on the current states of knowledge and techniques in the broad field of water and wastewater treatment processes. Basically, this book will give a comprehensive understanding and advancement and application of various physical, chemical and biological treatment methods in the reduction of potential pollutants (inorganics/organics) from water and wastewater. There are a total 18 book chapters contributed by large number of expert authors around the world, covering the following main research areas: Physical, chemical and biological water treatment processes such as adsorption, biosorption, coagulation/flocculation, electrocoagulation, denitration, membrane filtration/separation, photocatalytic reduction, advanced oxidation, nutrients removal by struvite crystallisation and nanotechnology; Physical, chemical and biological methods for municipal wastewater and industrial wastewater treatment plants such as primary-secondary sludge treatments, anaerobic digestions, aerobic treatment, activated sludge processes, dewaterability by flocculants, pre-treatments of sludge and rheology of sludge in wastewater treatment; Various operational units/equipment and process control of wastewater treatment plant.*

*Removal of Emerging Contaminants from Wastewater through Bio-nanotechnology showcases profiles of the nonregulated contaminants termed as "emerging contaminants, which comprise industrial and household persistent toxic chemicals, pharmaceuticals and personal care products (PPCPs), pesticides, surfactants and surfactant residues, plasticizers and industrial additives, manufactured nanomaterials and nanoparticles, microplastics, etc. that are used extensively in everyday life. The occurrence of "emerging contaminants in wastewater, and their behavior during wastewater treatment and production of drinking water are key issues in the reuse and recycling of water resources. This book focuses on the exploitation of Nano-biotechnology inclusive of the state-of-the-art remediate strategies to degrade/detoxify/stabilize toxic and hazardous contaminants and restore contaminated sites, which is not as comprehensively discussed in the existing titles on similar topics available in the global market. In*

addition, it discusses the potential environmental and health hazards and ecotoxicity associated with the widespread distribution of emerging contaminants in the water bodies. It also considers the life cycle assessment (LCA) of emerging (micro)-pollutants with suitable case studies from various industrial sources. Provides natural and ecofriendly solutions to deal with the problem of pollution Details underlying mechanisms of nanotechnology-associated microbes for the removal of emerging contaminants Describes numerous successful field studies on the application of bio-nanotechnology for eco-restoration of contaminated sites Presents recent advances and challenges in bio-nanotechnology research and applications for sustainable development Provides authoritative contributions on the diverse aspects of bio-nanotechnology by world's leading experts

Industrial Wastewater Treatment Digest

Waste Water Treatment Technologies - Volume I

The Effectiveness Using Filter Based on Banana Peel Activated Carbon for Industrial Wastewater Treatment

Waste Treatment in the Food Processing Industry

Treating Industrial Waste Interferences at Publicly-owned Treatment Works

Managing wastewater is a necessary task for small businesses and production facilities, as well as for large industrial firms. Industrial Wastewater Treatment: A Guidebook presents an approach to successful selection, development, implementation, and operation of industrial wastewater treatment systems for facilities of all sizes. It explains how to determine various properties about wastewater, including how it is generated, what it contains, whether it meets regulatory requirements, and whether or not it can be recycled. It describes methodologies for developing and maintaining a treatment program, determined by the type of company under consideration. Examples of treatment systems which have been installed at various businesses over the past several years are presented in a manner that clearly illustrates successful treatment methods.

All industrial production processes generate waste waters, which can pollute water bodies into which they are discharged without adequate treatment, therefore, essential to treat such wastes and eliminate their harmful effects on the environment. This book discusses sources, characteristics, and treatment of waste waters produced in industries such as textiles, dairy, tanneries, pulp and paper, fertilizer, pesticide, organic and inorganic chemical, and fermentation. Many flow diagrams have been included to illustrate industrial processes and to indicate the sources of waste water. After describing treatment for individual factories, the author discusses the more advanced and economical common effluent plants. The book is written in a clear and straightforward language and makes the presentation attractive. This book should prove extremely useful to undergraduate students of chemical engineering and postgraduate students of environmental science and engineering. Industrial design consultants will also find it very handy. To the Greens, it may offer some of the solutions to their concerns.

This book adopts a "show and tell" approach to guiding readers in the area of industrial wastewater treatment and the facilities associated with it. It assumes the reader is familiar with wastewater treatment theory but may be unfamiliar with the reasons why certain units and equipment are included in practice, how these work, and why they fail therein. Industrial wastewaters are extremely varied and this complexity is reflected in the treatment and discussion. Numerous tables showing industrial wastewater characteristics and photographs of facilities are provided so that readers can better appreciate industrial wastewater treatment and its "culture" in Asia, and gain a degree of familiarity with the subject. Unavailable descriptions were used. The book aims to provide a link between theory and practice. It does not only cover typical textbook material but also provides much information that would usually be accessible only to persons who have handled wastewaters and treatment facilities personally. The examples provided have been drawn from the author's own field experience over two decades in Asia.

Final Wastewater Treatment of Industrial Effluent Using Activated Dolomite

Industrial Wastewater Management, Treatment, and Disposal, 3e MOP FD-3

Advanced Industrial Wastewater Treatment and Reclamation of Water

Powdered Activated Carbon-activated Sludge Treatment of Combined Industrial Wastewater

The feasibility of a regional industrial wastewater treatment facility

**High surface area, a microporous structure, and a high degree of surface reactivity make activated carbons versatile adsorbents, particularly effective in the adsorption of organic and inorganic pollutants from aqueous solutions. Activated Carbon Adsorption introduces the parameters and mechanisms involved in the activated carbon adsorption. Industrial Wastewater Treatment by Activated Sludge IWA Publishing**

**This book highlights advances in sustainable wastewater treatment technologies, particularly biological wastewater treatment, cavitation-based treatment, hybrid water treatment, membrane technologies, advance oxidation processes, and adsorption. The book focuses on a variety of advanced treatment techniques that are useful for the degradation of organic components, dyes, heavy metals effluent, etc. in wastewater. Industrial wastewater consists of variety of discharges based on the type of industry, such as the dairy/food industries, which generate more fats and high BOD value with variation in the pH value, while the electroplating industry may expel more inorganic matter and dissolved solids. The oil extraction industries will have more solvents contained in the effluent, and dyes and textiles industry create a higher organic load with high TDS. Hence, every type of manufacturing industry needs a different method for the treatment of its effluents. Looking at the use of intensified chemical processes in order to make cleaner environment, Innovative Technologies for the Treatment of Industrial Wastewater explores the new and innovative methods for pollutant removal that will prove useful for a variety of industries. Conventional wastewater treatment processes require a significant amount of energy and involve expensive equipment and maintenance. Sustainable wastewater treatment technologies, however, involve less generation of energy and employ more economically feasible treatment methods, requiring less equipment and fewer maintenance costs. Looking at the use of intensified chemical processes in order to make a cleaner environment, this volume explores new and innovative methods for pollutant removal that will prove useful for a variety of industries. This book highlights advances in sustainable wastewater treatment technologies, particularly biological wastewater treatment, cavitation-based treatment, hybrid water treatment, membrane technologies,**

*advanced oxidation processes, and adsorption.*

*Biological Treatment Systems*

*Treatment of Petroleum Refinery, Petrochemical, and Combined Industrial-municipal Wastewaters with Activated Carbon*

*Waste Water Treatment Technologies - Volume II*

*Chemical Water and Wastewater Treatment VII*

*Treatment of De-inking Effluents by Activated Sludge and Aerated Lagoon Systems: Pilot Study and Scale-up*

The main subject of the Workshop was the new developments about the cost effective treatment techniques for better removal efficiencies and discussion of policies for pollution control. Although effluent water quality requirements differ from one country to another, their application will be an efficient mean for water pollution control. Specific promotion should be provided for polluters to meet the effluent water quality requirements. Results of pilot scale studies demonstrate the applicability of and advantages of sequencing batch reactor technology for pretreatment of industrial wastewaters. Fixed film biological reactors offer the possibility to enrich slow growing specialized microorganisms by developing biofilms on support materials. Physical chemical processes are used for the treatment of unusual and difficult industrial wastewaters and membrane technologies for the concentration and recovery of raw materials and by-products, in industries where the conventional treatment technologies are inappropriate or uneconomical. Physical chemical processes give higher efficiencies when polymers are applied but the composition of these long chain chemicals is an important consideration; Most developing countries suffer from severe environmental problems and shortage of energy and resources. These countries urgently need simple, inexpensive and integrated environmental protection system, which combine wastewater treatment with recovery and reuse. Anaerobic treatment offer many advantages in this respect. Because recovery of substances from wastes serves twofold purpose of recycle and pollution control, it must be applied where possible.

Industrial Water Treatment Process Technology begins with a brief overview of the challenges in water resource management, covering issues of plenty and scarcity-spatial variation, as well as water quality standards. In this book, the author includes a clear and rigorous exposition of the various water resource management approaches such as: separation and purification (end of discharge pipe), zero discharge approach (green process development), flow management approach, and preservation and control approach. This coverage is followed by deeper discussion of individual technologies and their applications. Covers water treatment approaches including: separation and purification—end of discharge pipe; zero discharge approach; flow management approach; and preservation and control approach. Discusses water treatment process selection, trouble shooting, design, operation, and physico-chemical and treatment. Discusses industry-specific water treatment processes.

Increasing demand on industrial capacity has, as an unintended consequence, produced an accompanying increase in harmful and hazardous wastes. Derived from the second edition of the popular Handbook of Industrial and Hazardous Wastes Treatment, Waste Treatment in the Process Industries outlines the fundamentals and latest developments in waste treatment in various process industries, such as pharmaceuticals, textiles, petroleum, soap, detergent, phosphate, paper, pulp, pesticides, rubber, and power. Comprehensive in scope, it provides information that is directly applicable to daily waste management problems throughout the industry. The book contains in-depth discussions of environmental pollution sources, waste characteristics, control technologies, management strategies, facility innovations, process alternatives, costs, case histories, effluent standards, and future trends for the process industry. It includes extensive bibliographies for each type of industrial process waste treatment or practice, invaluable information to anyone who needs to trace, follow, duplicate, or improve on a specific process waste treatment practice. A quick scan of the chapters and contributors reveals the depth and breadth of the book's coverage. It provides technical and economical information on how to develop the most feasible total environmental control program that can benefit both process industry and local municipalities.

Removal of Emerging Contaminants from Wastewater through Bio-nanotechnology

INDUSTRIAL WASTEWATER TREATMENT

Surveys in Industrial Wastewater Treatment: Petroleum and organic chemicals industries

Treatment of Industrial Wastewater

Waste Treatment in the Process Industries

Industries use a large number of substances in their manufacturing processes and also generate solid residues, liquid effluents and gaseous emissions as wastes. These may be organic, inorganic, inert or toxic compounds but are hazardous in nature and thus need to be treated and disposed off suitably in order to maintain ecological balance of the environment. Also, wherever feasible, recovery of useful by-products, recycling of water and reuse of wastewater (with or without treatment) save resources and reduce production cost. In view of the above, the book has been written, and now updated in the second edition to discuss sources, characteristics and treatment of wastewater produced in industries such as textiles, dairy, tanneries, pulp and paper, fertilizer, pesticide, organic and inorganic chemicals, engineering and fermentation. Many flow diagrams have been included to illustrate industrial processes and to indicate the sources of wastewater. After describing treatment for individual factories, the author discusses the more advanced and economical common effluent plants. The text uses simple and straightforward language and makes the presentation attractive. This book should prove extremely useful to undergraduate students of civil and chemical engineering and postgraduate students of environmental science and engineering. Industrial design consultants will also find the book very handy. To the Greens, it may offer some of the solutions to their concerns. NEW TO THE SECOND EDITION • Includes the concept of Zero Liquid Discharge (ZLD) in Chapter 1 and provides further information in Appendix A. • Incorporates brief information about plasma gasification technique in Appendix B and advanced oxidation technique in Chapter 3. • Includes ecological aspects of pollution control and a reference on benthal load in Chapter 4. • Provides information on jute retting in Chapter 6. • Incorporates topics such as photocatalytic degradation of phenols from coke oven wastes, HCl recovery from pickling operations and e-waste handling and disposal in Chapter 13.

Many standard industrial waste treatment texts sufficiently address a few major technologies for conventional in-plant environmental control strategies in the food industry. But none explore the complete range of technologies with a focus on new developments in innovative and alternative technology, design criteria, effluent standards, managerial decision methodology, and regional and global environmental conservation specific to the food industry. Until now. *Waste Treatment in the Food Processing Industry* provides in-depth coverage of environmental pollution sources, waste characteristics, control technologies, management strategies, facility innovations, process alternatives, costs, case histories, effluent standards, and future trends. It delineates methodologies, technologies, and the regional and global effects of important pollution control practices. The book highlights major food processing plants or installations that have significant effects on the environment. Since the areas of food industry waste treatment are broad, no one can claim to be an expert in all of them. Reflecting this, the editors recruited collective contributions from specialists in their respective topics, rather than relying on a single author's expertise. The topics covered include dairies, seafood processing plants, olive oil manufacturing factories, potato processing plants, soft drink production plants, bakeries, and various other food processing facilities. Professors, students, and researchers in the environmental, civil, chemical, sanitary, mechanical, and public health engineering and science fields will find valuable educational materials in this book. The extensive bibliographies for each type of food waste treatment or practice will be invaluable to environmental managers, or researchers who need to trace, follow, duplicate, or improve on a specific food waste treatment practice. Comprehensive in scope, the book provides solutions that are directly applicable to the daily waste management problems specific to the food processing industry.

With rampant industrialization, the management of waste generated by various industries is becoming a mammoth problem. Wastewater discharges from industrial and commercial sources may contain pollutants at levels that could affect the quality of receiving waters or interfere with potable water supplies. Thousands of small and large-scale industrial units dump their waste, which is often toxic and hazardous, in open spaces and nearby water sources. Over the last three decades, many cases of serious and permanent damage to the environment and human health on the part of these industries have come to the fore. This book mainly focuses on the biological treatment of wastewater from various industries, and provides detailed information on the sources and characteristics of this wastewater, followed by descriptions of the biological methods used to treat them. Individual chapters address the treatment of wastewater from pulp and paper mills; tanneries; distilleries, sugar mills; the dairy industry; wine industry; textile industry; pharmaceutical industry; food processing industry; oil refinery/petroleum industry; fertilizer industry and beverage/ soft drink bottling industry; and include the characteristics of wastewater, evaluation of biological treatment methods, and recycling of wastewater. Easy to follow, with simple explanations and a good framework for understanding the complex nature of biological wastewater treatment processes, the book will be instrumental to quickly understanding various aspects of the biological treatment of industrial wastewater. It will serve as a valuable reference book for scientists, researchers, educators, and engineers alike.

#### Literature Review

#### Industrial Wastewater Treatment Using Biological Activated Carbon

#### New Developments in Industrial Wastewater Treatment

#### Activated Sludge

#### The Future of Effluent Treatment Plants

*Water and Wastewater Treatment Technologies* theme is a component of *Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS)*, which is an integrated compendium of twenty one Encyclopedias. The Theme on *Water and Wastewater Treatment Technologies* deals, in three volumes, and covers several topics, with several issues of great relevance to our world such as: *Urban Wastewater Treatment; Characteristics of Effluent Organic Matter in Wastewater; Filtration Technologies in wastewater treatment; Air Stripping in Industrial Wastewater Treatment; Dissolved air flotation in industrial wastewater treatment; Membrane Technology for Organic Removal in Wastewater; Adsorption and Biological Filtration in Wastewater Treatment; Physico-chemical processes for Organic removal from wastewater effluent; Deep Bed Filtration: Modelling Theory And Practice ; Specific options in biological wastewater treatment for reclamation and reuse ; Biological Phosphorus Removal Processes For Wastewater Treatment ; Sequencing Batch Reactors: Principles, Design/Operation And Case Studies ; Wastewater stabilization ponds (WSP)for wastewater treatment; Treatment of industrial wastewater by membrane bioreactors; Stormwater treatment technologies; Sludge Treatment Technologies ; Wastewater Treatment Technology For Tanning Industry; Palm Oil And Palm Waste Potential In Indonesia ; Recirculating Aquaculture Systems – A Review ; Upflow anaerobic sludge blanket (UASB)reactor in wastewater treatment; Applied Technologies In Municipal Solid Waste Landfill Leachate Treatment; Water Mining: Planning and Implementation Issues for a successful project; Assessment methodologies for water reuse scheme and technology; Nanotechnology for Wastewater Treatment. These three volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, Managers, and Decision makers and NGOs.*

*In the past, industrial wastewater treatment primarily focused on the removal of BOD and suspended solids. In recent years, however, the focus has changed to aquatic toxicity, priority pollutants, and volatile organics. This required changes in how we design and operate biological treatment plants. Many existing plants must be retrofitted. New approaches to meet new requirements are discussed in detail. The authors, with a combined experience of sixty years, have presented case studies for a wide variety of industrial wastewaters including pulp and paper, food processing, chemical and pharmaceuticals, and textile wastewaters. Data interpretation and process design are developed through the use of seventeen examples. Procedures for the laboratory and pilot plant generation of process design data are presented. Emphasis is placed on meeting the many new regulations governing industrial wastewater discharges.*

*The Future of Effluent Treatment Plants: Biological Treatment Systems* is an advanced and updated version of existing biological technologies that includes their limitations, challenges, and potential application to remove chemical oxygen demand (COD), refractory chemical oxygen demand, biochemical oxygen demand (BOD), color removal and environmental pollutants through advancements in microbial bioremediation. The book introduces new trends and advances in environmental bioremediation with thorough discussions of recent developments. In addition, it illustrates that the application of these new emerging innovative technologies can lead to energy savings and resource recovery. The importance of respiration, nitrogen mineralization, nitrification, denitrification and biological phosphorus removal processes in the development of a fruitful and applicable solution for the removal of toxic pollutants from wastewater treatment plants is highlighted. Equally important is the knowledge and theoretical modeling of water movement through

*wastewater ecosystems. Finally, emphasis is given to the function of constructed wetlands and activated sludge processes. Considers different types of industrial wastewater Focuses on biological wastewater treatments Introduces new trends in bioremediation Addresses the future of WWTPs*

*Industrial Wastewater Treatment by Activated Sludge*

*Industrial Waste Treatment Handbook*

*Activated Carbon for Water and Wastewater Treatment*

*Water, 1974*

*Activated Carbon Adsorption*

All industries produce waste products that unless treated or mitigated in some way will be harmful to the human or natural environment. These waste products will generally need to be identified according to the industrial process in question, neutralized or rendered less harmful and finally disposed of into the surrounding land, air or watercourses. It is therefore of vital importance to every environmental, pollution or plant manager or engineer that these processes be fully understood and implemented or the cost to either the company or the environment can be catastrophic. With increasing government regulation of pollution, as well as willingness to levy punitive fines for transgressions, and the ever-present financial imperative to carry out these activities in the most efficient and cost-effective manner it is the responsibility of the professionals in question to ensure that they have the most up-to-date information available at their disposal.

This book provides not only that, but the only available methodology for identifying which waste types are produced from which industrial processes, and how they can be treated. This unique feature makes this book one that every environmental, industrial and plant manager, engineer and consultant will want to have on their bookshelf. Essential aspect of, and requirement for, all manufacturing industry The only up-to-date book on this subject area available Takes a practical applications standpoint, not a theoretical approach

I. Industrial Wastewater Treatment

Performance, Reliability, and Economics

Biological activated carbon as tertiary treatment for municipal-industrial wastewater

A Sustainable Approach

Physical Chemical and Biological Treatment Processes for Water and Wastewater