



Book review

**HANDBOOK OF INDUSTRIAL AND HAZARDOUS
WASTES TREATMENT
Second Edition, Revised and Expanded**

Lawrence K. Wang, Yung-Tse Hung, Howard H. Lo,
Constantine Yapijakis, Kathleen Hung Li (Eds.)
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X+1345 pags.

The second edition of *Handbook of Industrial and Hazardous Wastes Treatment* focuses on developments in innovative and alternative environmental technology, design criteria, effluent standards, managerial decision methodology, and regional and global environmental conservation. Many books cover major industries for conventional in-plant pollution control strategies, but this handbook highlights in detail pollution sources, wastes properties, effluents standards, control technologies, management strategies, process alternatives, and potential trends for many industrial practices.

The purpose of the book is to provide information not only on traditional water pollution control, but also air pollution control, noise control, soil conservation, site remediation, radiation protection, solid waste disposal and combined industrial-municipal waste treatment and management. Another goal is to offer technical and economical information on the development of the most feasible total environmental control program that can be benefit both industry and local municipalities. New subjects are presented in detail for the first time in any industrial waste treatment book. The handbook consists of 32 chapters sharing the experience of the authors in the implementation of industrial ecology for hazardous waste management, treatment of pharmaceutical wastes, treatment of photographic processing wastes, treatment of soap and detergent industry wastes, application of biotechnology for industrial wastes treatment, site remediation and groundwater decontamination, explosive waste treatment, treatment of landfill leachate, environmental regulations. The team of contributors is of high scientific level and demonstrates that special efforts were made to invite experts to contribute chapters in their own areas of expertise.

Implementation of industrial ecology for industrial hazardous waste management is the theme of the first chapter, written by Lawrence K. Wang and Donald B. Aulenbach. Topics covered include industrial ecology definitions, goals, objectives, tasks, approach, applications, implementation framework and levels, way and means for analysis and design. Also, case studies are presented

in order to illustrate cleaner production, zero discharge, waste minimization, material and process substitution.

Bioassay of industrial waste pollutants is the topic of the second chapter, whose authors: Svetlana Yu. Selivanovskaya, Venera Z. Latypova, Nadezda Yu. Stepanova and Yung-Tse Hung emphasize the importance and advantages, as well the disadvantages of bioassay control strategies for chemical pollution over chemical monitoring.

Chapter 3, *Treatment of pharmaceutical wastes* offers, by means of its authors: Sudir Kumar Gupta, Sunil Kumar Gupta and Yung-Tse Hung the possibility to distinguish the main categories of effluents as consequence of pharmaceutical industry diversity, including chemical synthesis, fermentation, extraction etc. It is important that design examples are presented.

Treatment of oilfield and refinery wastes is approached by Joseph M. Wong and Yung-Tse Hung and draw attention to the treatment of liquid wastes from the production and refining branches. Pollution prevention/hazardous waste minimization practices are also considered.

Chapter 5, *Treatment of metal finishing wastes*, written by Olcay Tünay, Isic Kabdasli and Yung-Tse Hung gives emphasis to process and operation of the industry, origin, sources, characteristics and treatment of wastewaters. Pollution prevention measures and applications are evaluated.

Treatment of photographic processing wastes, approached by Thomas W. Bober, Dominick Vacco, Thomas J. Dragon, and Harvey E. Fowler is considered as a constantly shifting target, both because of evolving regulations as well as advances in photography and waste treatment technology. In the same framework is sited the Chapter 7, *Treatment of soap and detergent industry wastes*, by Constantine Yapijakis and Lawrence K. Wang.

Treatment of textile wastes, by Thomas Bechtold, Eduard Burtscher and Yung-Tse Hung refers to identification and classification of textiles wastes and treatment processes applied to wastewaters from different sectors of textile industry. Chapter 9 discusses about *Treatment of phosphate industry wastes* (authors, Constantine Yapijakis and Lawrence K. Wang). Sources of raw materials, industrial operations and wastewaters, as well as impacts of phosphate industry pollution in the framework of regulations, wastewater control and treatment are analyzed.

Treatment of pulp and paper mill wastes is a topic of great importance approached by Suresh Sumathi and Yung-Tse Hung, because pulp and paper mills are major sources of industrial pollution worldwide. The authors highlight that the development of pollution treatment strategies, technologies and their implementation in this special industry requires an integrated approach and a detailed understanding of the physical, chemical and biological properties of the specific pollutants.

Chapter 11, *In-plant management and disposal of industrial hazardous substances*, author Lawrence K. Wang, provides hazardous waste terminologies and characteristics, while special emphasis is placed on the manifest system, hazardous substances storage requirements, transportation, handling and

disposal. *Application of biotechnology for industrial waste treatment*, includes considerations of the authors (Joo-Hwa Tay, Stephen Tiong-Lee Tay, Volodymyr Ivanov, Yung-Tse Hung) on biotreatability of hazardous industrial wastes, conventional and advanced biotechnological waste treatment, together with key factors that are critical for the successful application of biotechnology for the treatment of hazardous wastes.

Treatment of dairy processing wastewater by Trevor J. Britz, Corne van Schalkwijk and Yung-Tse Hung is the chapter that open a large analysis of wastes generation and treatment in food industries, done also in Chapter 14 (*Seafood processing wastewater treatment* by Joo-Hwa Tay, Kuan-Yeow Show, Yung-Tse Hung), Chapter 15 (*Treatment of meat wastes* by Charles J. Banks and Zhengjian Wang), Chapter 16 (*Treatment of palm oil wastewaters*, by Mohd Ali Hassan, Shahrakbah Yacov, Yoshihito Shirai and Yung-Tse Hung) Chapter 17 (*Olive oil waste treatment*, by Adel Awad, Hana Salman and Yung-Tse Hung), Chapter 18 (*Potato wastewater treatment*, by Yung-Tse Hung, Howard H. Lo, Adel Awad and Hana Salman). The discussion about sources of pollution, pollutants and treatment approaches are fulfilled with case studies.

Stormwater management and treatment is a Chapter (19) that includes considerations regarding pollution aspects, regulations, management made by the authors: Constantine Yapijakis, Robert Leo Trotta, Chein-Chi Chang and Lawrence K. Wang. They also analyze recent advances in stormwater management and treatment. Chapter 20, written by Lawrence K. Wang, deals with *Site remediation and groundwater decontamination* and presents hazardous waste pollution, terminologies, various onsite, offsite, *in situ* and *ex situ* environmental remediation technologies, as well as case studies.

Pollution prevention as a distinct topic approached by J. Paul Chen, Thomas T. Shen, Yung-Tse Hung, Lawrence K. Wang is viewed as a group of concepts and applications focusing on the expanding environmental problems from municipal and industrial wastes to toxic chemicals, hazardous products and services, as well as pollution management challenges and search for new cost-effective technologies.

Treatment of pesticide industry wastes is a chapter written by Joseph M. Wong that deals with the characterization, environmental regulations, treatment and disposal of liquid wastes generated from the pesticides industry.

In Chapter 23, *Livestock waste treatment* the authors: J. Paul Chen, Yung-Tse Hung and Lawrence K. Wang analyze the problem of pollution and waste treatment and management in the past half century within livestock and poultry agriculture that has experienced a rapid transition to large-scale intensive production due to global industrialization.

Soft drink waste treatment is approached by J. Paul Chen, Swee-Song Seng and Yung-Tse Hung is because of the great quantity of water used by this industry. This chapter reviews the technologies that are typically used to treat soft drink wastewaters. The bakery industry as one of the world's major food industry with wide variations of production scale and process is analyzed from the waste sources and treatment point of view by J. Paul Chen, Lei Yang, Renbi

Bai and Yung-Tse Hung in Chapter 25: *Bakery waste treatment*. Cleaner production case study in the bakery industry is also presented.

Explosive waste treatment is the topic addressed by J. Paul Chen, Shuaiwen Zou, Simo Olavi Pehkonen, Yung-Tse Hung, Lawrence K. Wang. They emphasize the development of explosive industry and the contamination of soil, sediments, water with toxic explosive residues at a large number of installations.

Food waste treatment, considered as a whole, occupies an important part of the book, as a consequence of the economical position and large volumes of mostly biodegradable wastes. The authors, Masao Ukita, Tsuyoshi Imai and Yung-Tse Hung introduced also several topics regarding recent technologies related to food wastes.

Municipal waste landfills are one of the most popular methods for waste disposal, major threats being related to leachate discharge into the environment. Chapter 28, entitled *Treatment of landfill leachate*, by Michal Bodzek, Joanna Surmacz-Gorska and Yung-Tse Hung deals with these aspects, also discussing the appropriate methods necessary to be applied to guarantee proper environmental protection, in the light of the growing concern about water quality and environmental standards in worldwide leachate treatment.

Chapter 29 refers to *On-site monitoring and analysis of industrial pollutants* and the authors, Jerry R. Taricska, Yung-Tse Hung and Kathleen Hung Li include considerations regarding monitoring and analysis of industrial pollutants, field analytical screening, on-site monitoring and analytical technologies, immunoassays, sensors, sampling.

Treatment of rubber industry wastes (authors: Jerry R. Taricska, Lawrence K. Wang, Yung-Tse Hung, Joo-Hwa Tay and Kathleen Hung Li) as well as *Treatment of timber industry wastes* (author Lawrence K. Wang) analyze the sectors of these activities, the main hazardous wastes and treatment. The last chapter, *Treatment of power industry wastes* (author Lawrence K. Wang), analyses the stream electric power generation industry, where combustion of fossil fuels – coal, oil, gas, supplies heat to produce steam, used then to generate mechanical energy in turbines, subsequently converted to electricity. Wastes include wastewaters from cooling water systems, ash handling systems, wet-scrubber air pollution control systems, boiler blowdown. Wastewaters are characterized and waste treatment by physical and chemical systems to remove pollutants is presented. Plant-specific examples are provided.

The book is to be used as a reference book for professors, students, and researchers in environmental, chemical, sanitary, mechanical, and public health engineering and science that may find valuable materials. The extensive bibliographies for each chapter topics should be invaluable to managers and researchers who need to improve on a specific industrial waste treatment practice.

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