

*Tel.: +1 419 531 1322; fax: +1 419 530 8086.

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Environmental Impacts of Treated Wood, T.G. Townsend, H. Solo-Gabriele (Eds.). CRC Press/Taylor & Francis, Boca Raton, FL (2006). 519 pp., US\$ 139.95, ISBN: 0-8493-6495-7

One of the chapters in this book discusses the Management of Risk of treated wood. It concludes with these words:

“Treated wood is a very useful product. It allows the use of wood in situations that would quickly destroy untreated wood, saves time and money associated with construction and maintenance, saves trees and has all the ease of use associated with regular wood. . . . However, as with any product, treated wood will continue to change with time. Newer and better wood preservatives will replace the current ones. The risk associated with the new preservatives will likely be less. This reduction in risk should not lead to complacency. The basic principle that treated wood is a wood product with a pesticide in it will still apply. So will the basic principle that a wood preservative must be toxic in order to fulfill its function.”

The above comment is in one of the 26 papers contained in this most excellent book. The editors are to be congratulated for assembling this material on a very current topic. The book is an outgrowth of a conference held in Orlando, Florida in 2004 and contains papers categorized under four major headings which are as follows: (1) Introduction and Background (4 papers); (2) Environmental Impact (7 papers); (3) Assessing and Managing Human Health Risk (7 papers); (4) End-of-Life Management Impacts (9 papers).

The first paper in the book discusses chromated copper arsenate (CCA), which is used as a wood preservative. In this paper, the author notes that issues related to disposal of material treated with the above noted compound as well as public concern for the presence of arsenic in the system has led chemical suppliers to voluntarily cease the use of this material for residential applications. This decision has resulted in the substitution of amine copper quaternary and amine copper azole, which eliminate the risks associated with chromated arsenate. However, there still exist large quantities of CCA-treated materials still in service and the debate about the ultimate fate of these materials is thoroughly discussed. Other papers review organic biocides such as creosote and pentachlorophenol.

Environmental impacts are thoroughly covered in Section 2. In the preamble to this section, the editors write:

“As described in Section 1, wood-preservative chemicals are designed to extend the service life of treated wood products by inhibiting the biological organisms that would otherwise result in deterioration of the wood. Leaching or migration of preserved chemicals during the product’s intended use is one possible consequence of preservation. By their nature,

preservative chemicals are toxic to some organisms at sufficient exposure, so their release into the environment may result in adverse impact to nontarget organisms, including humans. Section 2 contains seven chapters which describe the topic of release of preservative elements to the environment and the possible impact on ecosystems.”

One of the papers in this section discusses the “Leaching of chromated copper arsenate, alkaline copper quaternary and copper azole components from wood exposed to natural weathering above ground and reaction of leachates from soil.” The author notes that coatings are very effective for reducing the leaching of all preservatives, as long as the coating is intact.

Section 3 discusses the health risks resulting from preservatives leaching from treated wood products. Release of arsenic from treated lumber is discussed in detail. Arsenic related cancer is one of the topics explored.

In Section 4, the papers discuss the management of disposed treated wood. Discussed are the minimization of those risks as well as issues pertaining to the disposal of treated wood. Different management strategies for handling this waste stream are reviewed. Topics in the final book section include the reuse of treated wood and the recycling of treated wood products. Remediation approaches include bioremediation of treated wood with bacteria, bioremediation of treated wood with fungi, electrolytic remediation of wood treated with chromated copper arsenate, thermal treatment technologies and disposal in landfills.

Gary F. Bennett*

The University of Toledo, Department of Chemical and Environmental Engineering, Mail Stop 305, Toledo, OH 43606-3390, United States

*Tel.: +1 419 531 1322; fax: +1 419 530 8086.
E-mail address: gbenett@eng.utoledo.edu

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Industrial Waste Treatment Handbook, 2nd ed., Woodward & Curran, Inc., Butterworth-Heinemann, Burlington, MA (2006). 532 pp., US\$ 99.95, ISBN: 0-7506-7963-8

The second edition of this book was produced by members of the Woodward & Curran organization, an environmentally oriented consulting firm. The focus of the contributors was on industrial waste which they note requires distinctly different treatment approaches than utilized for municipal wastes.

The authors write:

“Industrial waste treatment thus encompasses a wide array of environmental, technical, and regulatory considerations. Regardless of the industry, the evaluation and selection of waste treatment technologies typically follows a logical

series of steps that help to meet the goal of minimizing waste toxicity and volume.”

The steps in this process, the authors note, are as follows:

1. analysis of manufacturing processes;
2. wastes minimization and wastes characterization study;
3. determine treatment objectives;
4. select candidate technologies;
5. bench-scale investigations;
6. pilot-scale investigations;
7. prepare preliminary designs;
8. conduct economic comparisons;
9. final design;
10. solicitation of competitive bids for construction.

To illustrate their approach to cost estimation as a part of the above step-wise process, the authors provide a detailed cost estimate for five alternative processes for treating wastewater from an industrial plant producing microcrystalline cellulose from wood pulp. Details of both capital and O&M costs are provided in this excellent section.

I was surprised by the topic of material in Chapter 2 which is entitled “Fundamentals.” In this chapter, the authors present “. . . a summarized version of the basic chemistry and physics on which treatment technologies are based, with the objective of showing that a command of these principles can enable quick, efficient identification of very effective treatment schemes for almost any given type of wastewater.” The above statement I certainly agree with, but the inclusion of this topic in a design text seems out of place to me.

Chapter 3, entitled “Laws and Regulations,” is a concise review of water and air laws. Solid and hazardous waste laws are discussed later in Chapter 5 which is entitled “Waste Characterization.” Between these two chapters is the current “hot topic” of pollution prevention. Included in this chapter are short, practical examples of problems and solutions; this material which is provided in highlighted boxes added much to the chapter.

“Industrial Stormwater Management” was the title of Chapter 6. Discussion of that topic is not found in most texts. I found it useful and interesting.

Treatment processes are first discussed in Chapter 7 which deals with wastewater. Discusses in sequence were flow equalization, pH control, chlorination, coagulation, chemical oxidation, biological wastewater treatment (activated sludge, PACT, lagoons, attached growth systems, and anaerobic treatment), physical methods (screens, plate and frame filters, etc.), settling, sedimentation, sludge thickening, dissolved air flotation, ion exchange, and stripping.

Clearly, the authors have “touched all the bases” and although discussion is not in great detail, it is certainly sufficient to understand basic treatment technologies. The chapter is well endowed with pictures of equipment, plots of data analysis, and appropriate mathematical equations as needed. Almost 200 pages long, this chapter is the heart of the book.

The next two chapters are entitled “Treatment of Air Discharges from Industry” and “Solid Waste Treatment and Disposal.” The material in these chapters is mainly descriptive with

the inclusion of numerous diagrams and photographs of equipment to describe air pollution control and solid waste disposal systems.

The book ends with an industrial case studies chapter. Waste treatment processes for 13 representative industries are reviewed. “Discussion of the 13 representative industries is preceded by a discussion of three processes that are common to many different industries: vapor degreasing, chemical descaling (pickling), and rinsing.”

My only criticism of the book is the lack of truly current references and the use of too many 20-year old reference articles. Admittedly, the material in these old citations is relevant but I would have preferred updated citations.

Gary F. Bennett*

The University of Toledo, Department of Chemical and Environmental Engineering, Mail Stop 305, Toledo, OH 43606-3390, United States

* Tel.: +1 419 531 1322; fax: +1 419 530 8086.
E-mail address: gbennett@eng.utoledo.edu

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Nanomaterials—Toxicity, Health and Environmental Issues, C. Kumar (Ed.). Wiley-VCH, Verlag GmbH & Co. KGaA, Weinheim, Germany (2006). 351 pp., Price: US\$ 190.00, ISBN: 3-527-31385-0

Nanotechnology is a “new frontier” in science. It is having a widespread impact on engineering and, as this book notes, medicine also. “Nanotechnological advances . . .” the flyer accompanying the book notes, “. . . have resulted in new and improved diagnostic and monitoring microdevices, microsurgery tools and instruments, tissue engineering technology, drug delivery methods, and artificial organs.”

This book is the fifth in a planned 10-volume series entitled “Nanotechnology for the Life Sciences.”

The editor notes that “Some of the critical risk assessment issues that are currently being investigated by the health & environmental nano researchers are toxicology, exposure assessment, environmental and biological fate, transport, persistence, transformation, recyclables and overall sustainability of manufactured nanomaterials.”

New information is coming out daily and will extend our knowledge of the topic. To this end, Kumar has solicited 12 chapters collaboratively written by 37 authors from 6 countries. The material is divided into three major sections. The first section of the book deals with toxicity aspects of nanomaterials which are “. . . the most commercially significant materials as they are used in cosmetics, sunscreens, dental materials, water filter processes, catalysis, glare-reducing coating for glasses, etc.” The two chapters in this section are entitled: