

Book review

Industrial Waste Treatment Handbook

Frank Woodward, Butterworth-Heinemann, Woburn, MA, 2001, \$ 95.00, 577 pp., ISBN: 0-7506-7317-6

Woodward's goal in writing this book was "... to provide an updated primary reference for environmental managers working in industry, environmental engineering consultants, graduate students in environmental engineering, and government agency employees concerned with wastes from industries." "This book is intended to fulfill the need for an updated source of information on the characteristics of wastes from numerous types of industries, how the different types of wastes are most efficiently treated, the mechanisms involved in treatment, and the design process itself."

As an historical perspective, I retrieved my copy of C. Fred Gurnham's 1955 text, *Principles of Industrial Waste Treatment*, from my shelf for background. Gurnham's book was written primarily for students (as opposed to the broader audience Woodward wrote for) and focused totally on liquid waste (whereas Woodward discusses, albeit briefly, air pollution control and handling of solid/hazardous wastes). Both books discuss the basics of waste treatment processes, and both have chapters on wastes from specific industries.

Anyone trying to "force fit" all the information available (or needed) on pollution control into one book faces a daunting task. The author is continuously faced by decisions on what to include and how much to omit. Personally, I find there is never enough room to include all that's known on the topic.

Woodward faced a more difficult problem as he not only addressed water pollution control, but also discussed stormwater management (Chapter 5), pollution prevention (Chapter 6), treatment and disposal of solid wastes from industry (Chapter 9), and methods for treating air discharges from industry (Chapter 10).

These "applied topic" chapters are preceded by chapters on:

- Fundamentals of water pollution control (Chapter 2),
- Laws and regulations (Chapter 3),
- Wastes from 16 different industries (Chapter 4).

In addition to the standard information, one would expect to find (given the chapter topics noted above), there are also many practical examples given including cost data from the recent work of the consulting firm of Woodward & Curran as well as other environmental

engineering and science consultants. Very early in the book (p. 8), Woodward presents an economic comparison of the potential treatment processes for a microcrystalline cellulose manufacturing plant. He compares the installed plant costs for the following processes: sequencing batch reactors, rotating biological contactors, fluidized bed anaerobic reactors, and expanded bed anaerobic reactors. Then he compares annual operating costs for each process.

From the applied, Woodward moves to the basics in Chapter 2, entitled “Fundamentals”. I was surprised to see a very theoretical study of the polar properties of water including electron orbital diagrams. This discussion was fundamentally sound, but I believe “out of sync” in this very practical text book.

The reader is brought back to reality in Chapter 3, “Laws and Regulations”, which begins “The plethora of laws, rules, regulations, ordinances, and restrictions that regulate the discharge of industrial liquid, solid, and airborne wastes presents a truly formidable challenge to anyone attempting to become knowledgeable in the area of environmental regulation. These legal entities are published in hundreds of documents, and new laws are written and passed every year by dozens of local, county, state, and federal governments and agencies”.

Chapter 4 is a discussion of the waste problems (and solutions thereof) of 16 different industries such as tin electroplating, preparation of frozen foods and manufacture of lead acid batteries. Many excellent process flow diagrams are included. Waste minimization is prominently discussed.

A relatively short (p. 17) chapter is devoted to “Industrial Stormwater Management”, a topic not often found in other books but a very important one given recent developments in EPA regulations that began with the 1987 Clean Water Act Amendments.

Chapter 6 is entitled “Wastes Characterization: The Wastes Characterization Study, Wastes Audit, and the Environmental Audit”. The author defines the topic as: “Wastes characterization is the term used for the process of determining the chemical, biological, and physical characteristics, as well as the quantity, mass flow rates, strengths (in terms of concentration), and discharge, or solid waste stream.” Included in the chapter is a relatively short but good section on air sampling, both stack and ambient.

The rapidly expanding and increasingly important topic of pollution prevention is introduced in the 10-page Chapter 7. An example of a blow-down process which describes a methodology for determining the rate of blow-down required to maintain a minimum desired level of water quality for wastes undergoing recycle or reuse is included.

The longest chapter in the book (almost 200 pages) is Chapter 8, “Methods for Treating Wastewaters from Industry.”

Woodward begins at the beginning with the very important unit operation of flow equalization and how one calculates the size of an equalization basin. Next he discusses pH control. Following the preliminary treatment discussions, Woodward devotes the rest of the chapters to wastewater treatment by chemical, biological and physical processes.

The book ends with two chapters dealing with ancillary pollution topics (or least ancillary to water pollution control) They are:

- treatment and disposal of solid wastes from industry,
- methods for treating air discharges from industry.

My overall assessment of the book is very favorable. It is well written, fairly comprehensive, and contains much valuable (practical) information.

PII: S0304-3894(01)00391-0

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